# INDIVIDUAL WATER QUALITY ASSESSMENT REPORT

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| **Site Name/Facility:** | **South Chollas Creek Channel** |
| **Master Program Map No.:** | **Map 101** |
| **Date:** | March 31, 2017; **Revised June 8, 2017** |
| **Civil Engineer** (name, company, phone number): | **Jayne Janda-Timba**<br>**Rick Engineering Company**<br>**5620 Friars Road**<br>**San Diego, California 92110**<br>**(619) 688-1448** |
| **Register Civil Engineer Number & Expiration Date** (place stamp here): | **RCE # 70649**<br>**Exp. 06/2017** |

REGISTERED PROFESSIONAL ENGINEER
JAYNE MARIE JANDA-TIMBA
NO. 70649
EXP. 6/30/17
CIVIL
STATE OF CALIFORNIA

**Instructions**: This form must be completed for each facility prior to the completion of the Individual Maintenance Plan and prior to any work being conducted in the facility. Attach additional sheets if needed.

## EXISTING CONDITIONS

**Introduction:**

The City of San Diego developed the Master Storm Water System Maintenance Program (MMP) to optimize its business processes and environmental protection practices related to channel operation and maintenance activities. The MMP is intended to integrate operation and maintenance planning, implementation and assessment activities with its water quality protection programs. This document provides a summary of the Individual Water Quality Assessment (IWQA) Report activities conducted within South Chollas Creek Channel (MMP Map 101) (herein referred to as South Chollas Creek Channel); southwest of the City of San Diego and the City of Lemon Grove boundary (reference point 32°43'46.18"N; 117° 3'51.01"W, Latitude and Longitude) and northeast of Federal Boulevard. For the location of South Chollas Creek Channel, see Attachment 1: Figure 1 – Regional Location Map, and Figure 2 – Project Vicinity Map attached.

IWQA procedures under the MMP provide a methodology for a water quality management model to evaluate potential water quality benefits and impacts associated with channel maintenance activities. The site-specific field measurements and conditions provide the analytical data to determine the pollutant load removed, the water quality benefits, and estimate the loss of temporary pollutant sorption/retention capacity as a result of sediment and vegetation removal during channel maintenance. The sediment pollutant load removal, combined with an estimate of pollutant removal during vegetation regrowth between maintenance events, is compared to the estimated loss of total channel pollutant removal capacity due to vegetation removal as a means of assessing potential water quality benefits and impact of channel maintenance. Channel maintenance eliminates the potential for accumulated sediment to release pollutants into the water, via natural vegetation decomposition and channel scour. In addition, periodic maintenance facilitates optimal sorption of pollutants in vegetation.

The IWQA procedures are documented in the report titled, "Standard Operating Procedures to Conduct Water Quality Assessment and Quantification Model for Flood Control Channel (Storm Water Facility) Maintenance," written by Weston Solutions in March 2011 (herein referred to as SOP), located in Appendix A of the Water Quality Assessment and Quantification Model for Flood Channel Maintenance White Paper found in Appendix F of the report titled, "Master Storm Water System Maintenance Program Final Recirculated Program Environmental Impact Report SCH. No. 2004101032, Project No. 42891," prepared for the City of San Diego in October 2011. The SOP identifies two criteria that must be met for IWQA component implementation: 1) the storm water facility must have fairly consistent dry weather flows, and 2) it must have vegetation capable of assimilation of pollutants. Site visits were performed by Rick Engineering Company on November 9, 2016 and December 5, 2016 and the two criteria described above were met.

**Project Description:**

South Chollas Creek Channel is a drainage channel, located southwest of the City of San Diego and the City of Lemon Grove boundary and south of interstate 94. A City of Lemon Grove flood control channel discharges into the upstream end of South Chollas Creek Channel, a City of San Diego flood control channel, west of the intersection between Winnett Street and Federal Boulevard. From there the channel flows in a southwesterly direction crossing underneath a single span bridge, 20-feet wide by 11-feet high, at Federal Boulevard. The single span bridge at Federal Boulevard is the downstream limit of the hydraulic analysis. South Chollas Creek Channel continues downstream and confluences with the Encanto Channel which then confluences with the Chollas Creek Channel which ultimately discharges into the San Diego Bay.

The channel within the overall area of study has been divided into two reaches: Reach 2 and Reach 3. The two reaches of South Chollas Creek Channel have been identified as:

- Reach 2 - HEC-RAS Cross-sections 292.825 to 976.670
- Reach 3 – HEC-RAS Cross-sections 976.670 to 2306.424

General descriptions of each reach are provided below:

**Reach 2**

The downstream limit of Reach 2 is the upstream end of the bridge at Federal Boulevard. Reach 2 extends approximately 600 feet to the downstream limit of Reach 3. Reach 2 is an earthen channel with a retaining wall on the left overbank (facing downstream) for approximately 550-feet upstream of the bridge at Federal Boulevard. The upstream limit of Reach 2 is where the channel bottom transitions from 2-ton rip-rap to concrete lined. Reach 2 is bounded by Interstate 94 to the north and industrial buildings to the south. The limits of channel maintenance to occur within Reach 2 are described in the section below.

**Reach 3**

The downstream limit of Reach 3 is the upstream limit of Reach 2, the transition in channel bottom from rip-rap lined to concrete lined. Reach 3 extends approximately 1,140 feet upstream as a concrete lined trapezoidal channel. Reach 3 then transitions to a rectangular concrete channel for approximately 175 feet upstream before reaching the City of Lemon Grove flood control channel, north of Federal Boulevard and south of Interstate 94. Reach 3 is bounded by Interstate 94 to the north and industrial buildings to the south. The limits of channel maintenance to occur within Reach 3 are described in the section below.

**Description of Creek/Channel Geometry (length, width, and depth):**

Pursuant to the MMP, the Individual Hydrologic and Hydraulic Assessment (IHHA) recommends the limits and amount of maintenance for each channel. The IHHA Report for South Chollas Creek Channel consists of three reaches (Reach 1, 2, and 3). Pursuant to the IHHA, only a portion of Reach 2, HEC-RAS Cross-sections 926.753 to 976.670, and a portion of Reach 3, HEC-RAS Cross-sections 976.670 to 2098.664 are proposed for maintenance. All channel reaches within the area of study are briefly described in the Project Description above; however, the portions of Reach 2 and Reach 3 that are proposed for maintenance are the focal point of this assessment, as they are the only portions of the channel proposed for maintenance.

The limits of channel maintenance within Reach 2 and Reach 3 are indicated below and illustrated in Attachment 1: Figure 4 – Limits of Channel Maintenance and Figure 5 – Hydraulic Workmap attached.

- Reach 2: HEC-RAS Cross-sections 926.753 to 976.670 – sediment and vegetation removal is proposed
- Reach 3: HEC-RAS Cross-sections 976.670 to 2098.664 – vegetation maintenance is proposed.

The area of study for the IWQA (upstream portion of Reach 2 and downstream portion of Reach 3) has been identified by specific cross-sections described below:

Limits of Channel Maintenance within Reach 2 and Reach 3: (HEC-RAS Cross-sections 926.753 to 2098.664) MMP Map 101

The area of study, illustrated in Attachment 1: Figure 4 - Limits of Channel Maintenance, is the upstream portion of Reach 2 and the downstream portion of Reach 3, and extends from the 2-ton rip-rap lined section of channel directly downstream of the concrete lined section, which is approximately 50-feet long (pursuant to as-built plan 20039-5-D prepared by Charles R. Crull on November 22, 1985). It is important to note that the area of study is not the entirety of Reach 2 and Reach 3, but rather the upstream portion of Reach 2 and the downstream portion of Reach 3 proposed for maintenance.

The proposed maintenance method will include sediment removal at the upstream end of Reach 2 (HEC-RAS Cross-sections 926.753 to 976.670), and vegetation removal will occur throughout the upstream portion of Reach 2 and downstream portion of Reach 3 (HEC-RAS Cross-sections 926.753 to 2098.664).

**Existing Conditions**

Reach 2 and Reach 3 of South Chollas Creek Channel are located in the Chollas Hydrologic Subarea (908.22), located within the San Diego Mesa Hydrologic Area (908.2), and the Pueblo San Diego Hydrologic Unit (908). Surface waters in the Chollas Hydrologic Subarea and elsewhere are subject to comply with the Water Quality Control Plan for the San Diego Basin (Basin Plan, San Diego RWQCB 1994 with amendments effective on or before May 17, 2016) which designates beneficial uses and establishes water quality objectives.

South Chollas Creek Channel is a tributary to Chollas Creek. In accordance with California's List of Impaired Waters [California's 2010 Integrated Report (Clean Water Act Section 303(d) List and 305(b) Report)], approved by the USEPA on October 11, 2011, Chollas Creek is listed as an impaired water body, in which standards are not met and a Total Maximum Daily Load (TMDL) is required, but not yet completed, for at least one of the pollutants listed. The pollutants listed for Chollas Creek on the 303(d) list are indicated in Table 1.

**TABLE 1. 303(d) Listed Pollutants for Chollas Creek**

| Pollutant | Adopted TMDL (Yes or No) | Current or Anticipated TMDL Date |
|---|---|---|
| Copper | Yes | 2007 |
| Diazinon | Yes | 2002 |
| Indicator Bacteria | Yes | 2010 |
| Lead | Yes | 2007 |
| Phosphorus | No | 2019 |
| Total Nitrogen as N | No | 2019 |
| Trash | No | 2021 |
| Zinc | Yes | 2007 |

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) regulates discharges from Phase I municipal separate storm sewer systems (MS4s) in the San Diego Region under the Regional MS4 Permit (Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100). The region-wide NPDES Permit (commonly referred to as the Regional MS4 Permit) is intended to set the framework for municipalities, such as the City of San Diego, to implement a collaborative watershed-based approach to restore and maintain the health of surface waters. The Regional MS4 Permit requires development of Water Quality Improvement Plans (WQIPs) that will allow the City of San Diego (and other watershed stakeholders) to prioritize and address pollutants through an appropriate suite of best management practices (BMPs) for each watershed. Water quality BMPs related to channel maintenance activities are outlined later in this report and provide a framework that may be used by the City of San Diego to address priority pollutants. It is recommended that the relative effectiveness of any implemented water quality and conservation strategies be evaluated and the programs adaptively managed to maximize pollutant and/or storm water flow reduction benefits over the course

of the program lifecycle. This adaptive management approach, coupled with other storm water management techniques implemented by the City of San Diego as part of the Regional MS4 Permit, may lead to long-term reductions in the need for channel maintenance activities.

**Description of Sediment Sampling Activities (location(s), depth, shipment/deliverer to laboratory(s)):**

Allied Geotechnical Engineers, Inc. personnel collected two sediment samples from South Chollas Creek Channel Map 101 on March 9, 2017. The two samples were collected at a location immediately downstream from the water samples at the Upstream Sampling Location. As stated in the SOP, sediment samples shall be collected for every 1,000 cubic yards of sediment removal, or a representative sample number. The Maintenance Methodology Table provided in the Individual Maintenance Plan for South Chollas Creek Channel MMP Map 101 indicates the approximate volume of sediment removal associated with the maintenance activity for permitting application. As listed in the Maintenance Methodology Table, the total anticipated sediment removal for the maintenance area is 1,410 cubic yards (530 cubic yards for Reach 2 and 880 cubic yards for Reach 3). Therefore, consistent with SOP requirements, two sediment samples were collected; one sample was collected along the North Bank and one was collected along the South Bank. The approximate soil sampling locations are shown in Attachment 1: Figure 3 – Channel Reach Exhibit. While consistent dry weather (low) flows exist within the limits of channel maintenance, the depth of flowing water within those limits was too shallow with respect to depth (<0.2") for the flow rate meter to be submerged and measure flow. The nearest location to collect samples and measure flow at an adequate depth for the flow rate meter to be submerged was immediately downstream of the two-ton rip-rap. Sediment samples were collected downstream of the water samples so as not to impact the water sample collection process, as well as it was the nearest location where an adequate, representative bulk sample could be collected. The sampling activities were performed in general accordance with the SOP.

A bulk sediment sample was collected using a clean shovel from ground surface to approximately 24 inches below the top of the existing sediment. The sediment sample was then placed in clean dedicated 5-gallon bucket. The bucket was tagged with the sample ID, collection date, project number and sampling personnel name. Grain-size analysis was performed on the sample in accordance with procedures of ASTM D6913. The test results are presented in Attachment 3.

A stainless steel hand auger was used to collect the sediment samples for analytical testing. The top of the existing sediment at the time of sampling activities was located above the water level in the channel. The sediment sample was placed in a sealed plastic bag. Preliminary screening for the potential presence of organic vapors was performed using a MiniRAE 3000 Volatile Organic Compound Gas Monitor. The sample was then labeled with the sample ID, collection date, project number and sampling personnel name. The sample was then placed on ice in a cooler box and transported to the laboratory under chain-of-custody (COC). COC documents are included with the analytical test results.

Non-dedicated sampling equipment used on this project was decontaminated prior to sampling and between sampling by washing in non-phosphate detergent (Alconox). Sediment analytical testing was performed by Clarkson Laboratory and Supply, Inc. of Chula Vista, CA and Midwest Laboratories of Omaha, NE. Table A-3 of the SOP provides guidance with respect to test methods and corresponding reporting limits for sediment sampling, however, it should be noted that Midwest Laboratories and Clarkson Laboratory and Supply, Inc. used different testing methodologies for particular analyses. The test results are presented in Attachment 3.

**Description of Flow Measurement Activities (location(s) and equipment):**

On March 9, 2017, field personnel from Rick Engineering Company measured instantaneous flow during dry weather flow conditions along two cross-sections along South Chollas Creek Channel. The upstream and downstream flow measurement locations surrounding the proposed maintenance area were chosen following SOP Guidelines. While consistent dry weather (low) flows exist within the limits of channel maintenance, the depth of flowing water within those limits was too shallow with respect to depth (<0.2") for the flow rate meter to be submerged and measure flow. The nearest location to collect samples and measure flow at an adequate depth for the flow rate meter to be submerged was immediately downstream of the two-ton rip-rap. The

locations are referred to as "Upstream Sampling Location", and "Downstream Sampling Location", respectively. Permission to access the locations was obtained from the City of San Diego prior to conducting flow measurement activities. City of San Diego maintenance workers assisted personnel in access to both locations and remained on-site during the sampling activities.

A site north of the intersection of Federal Boulevard and 60th Street, bounded by Neff Rental Company to the south was selected as the Upstream Sampling Location. To access the site, personnel from Neff Rental Company unlocked a locked gate to access the channel. Since the access point for the Upstream Sampling Location is located along the rectangular portion of the channel, City of San Diego maintenance workers provided a ladder and supported all personnel climbing down into the channel. The Upstream Sampling Location is located directly downstream of the rip-rap pad at the transition of the concrete lined section of the channel.

A site just north of Federal Boulevard, located directly upstream of the single span bridge at Federal Boulevard was selected as the Downstream Sampling Location. To access the site, personnel entered the channel south of Federal Boulevard and walked in the channel under the bridge to the Downstream Sampling Location.

Pursuant to the SOP, required measurements to be made include an initial point where the water meets the right bank (facing downstream). From the first point where water depth is at least 0.2 feet, flow velocity, depth, and distance from the initial point was be recorded at approximately 1-foot intervals. Water depth was determined by a wading rod.

Upon accessing each of the two sampling locations, field personnel extended a measuring tape across the full width of the channel, perpendicular to the flow, and measured the width of the cross-section of the channel in feet. The width was measured from the waterline of the right bank (facing downstream) to the water line of the left bank (facing downstream). Flow velocity was measured using the Marsh-McBirney Flow-Mate 2000 Flow Meter at regular horizontal intervals. The flow meter was set at 60% of the water depth (from the surface) as described in the SOP for channels with a depth less than 1.5 feet. To minimize interference with flow meter readings, personnel stood downstream and slightly to the right side of the flow meter while facing upstream. Distance from the left bank (facing downstream) and associated water depth was recorded with each velocity reading. Field forms that were used to record flow measurements can be found in Attachment 4.

At the Upstream Sampling Location, the total width of the channel measured 9.5 feet across. A total of nine flow measurements, at a distance of one foot horizontal spacing, were recorded along the width of the upstream channel.

At the Downstream Sampling Location, the total width of the channel measured 11 feet across. A total of six flow measurements, at a distance of one foot horizontal spacing, were recorded along the width of the downstream channel. Although the width of the downstream channel allowed for eleven flow measurements, field personnel could only retrieve six recordable measurements due to the water level being too shallow (less than 0.1 inches) for a measurable reading by the flow meter.

To calculate total flow (discharge) across the channel, the velocity measurements were integrated over the cross-sectional area of the channel at each sampling location using an Excel model. The calculated discharge at each sampling locations is as follows: Upstream Sampling Location had a discharge of 0.15 cubic feet per second (cfs), and Downstream Sampling Location had a discharge of 0.17 cfs. An example of the Excel spreadsheets used to calculate the total discharge rates across the channel at these locations can be found in Attachment 4.

**Description of Volume Measurement Activities (interval, total number, equipment):**

As described in the SOP, the process to estimate the annual treatment volume of water uses one instantaneous flow measurement and a representative data sample. The annual treatment volume, the volume of water in one year that discharges into the maintenance area of South Chollas Creek Channel Map 101 due to low flow conditions, was estimated following the SOP. To determine the annual treatment volume, the average number of "dry days" per year was calculated. "Dry days" are days in which the channel experiences "dry weather" low flow conditions. The number of "dry days" was estimated using rainfall data from the National Oceanic and Atmospheric Administration (NOAA) website. Rainfall data, between 1998 and 2017, from the National City

SDNAC rain gauge was analyzed to calculate the number of "wet days" in each year. Pursuant to the SOP, "wet days" are defined as the days in which rainfall greater than or equal to 0.2 inches occurs, also including the 3 days (72 hours) following. The number of "dry days" for each year was calculated by subtracting the total number of "wet days" in a year from the total number of days in the wet season, October 1 to June 30. Since South Chollas Creek Channel is expected to have dry weather flows continuous through the summer months, July 1 through September 30, the days of the summer months are added to the number of "dry days". The SOP's method for estimating the number of "dry days" takes a conservative approach and assumes that low flow is continuous year round on all days not considered "wet days". Thus the number of "wet days" and "dry days" sum up to the total number of days in a year, 365. From the calculations averaging the number of dry days each year from 1998-2017, it is estimated that the South Chollas Creek Channel experiences 334 dry days annually. The total annual treatment volumes were calculated by multiplying the estimated number of dry days per year by the measured instantaneous upstream flows at both the Upstream Sampling Location and the Downstream Sampling Location. For the Upstream Sampling Location, 12,960 cubic feet per day (0.15 cfs) was multiplied by 334 dry days per year, resulting in approximately 4,328,640 cubic feet ($ft^3$) or 32 million gallons per year (See Table 10U in Attachment 6 for annual treatment volume at the Upstream Sampling Location). For the Downstream Sampling Location, 14,688 cubic feet per day (0.17 cfs) was multiplied by 334 dry days per year, resulting in approximately 4,905,792 cubic feet ($ft^3$) or 37 million gallons per year (See Table 10D in Attachment 6 for annual treatment volume at the Downstream Sampling Location).

Hydraulic residence time (HRT) for South Chollas Creek Channel Map 101 was determined by dividing the length of the maintenance area, 1,225 feet, by the average of the upstream and downstream velocity in the study area, which averages to 0.071 feet per second (ft/s). It should be noted that this method deviates from page 11 of the SOP. It is the method employed by Caltrans when determining the HRT of water quality or biofiltration swale following the Caltrans Storm Water Quality Handbook (Caltrans, 2011). Using the average velocities of each area, a HRT of 0.19962 days was determined for the study area.

**Description of Water Quality Sampling Activities (location(s), shipment/delivery to laboratory(s) ):**

On March 9, 2017, field personnel from Rick Engineering Company collected surface water grab samples during dry weather conditions following SOP guidelines. Samples were collected at the Upstream Sampling Location, as well as the Downstream Sampling Location for South Chollas Creek Channel Map 101. The approximate water sampling locations are shown in Attachment 1: Figure 3 – Channel Reach Exhibit.

Grab samples were collected at the Upstream Sampling Location before sampling at the Downstream Sampling Location.

For each sample collected, the sampler wore powder-free nitrile gloves and stood in the horizontal center of the channel. Prior to sample collection, the field personnel allowed sediment that was suspended in the water column to settle out prior to collection. Clean, laboratory supplied bottles labeled with the sample ID, date, time, analytes, preservative (if applicable), project, and name of sampling personnel were identified with each bottle, capped and immediately placed on ice within an insulated cooler, and transported to the laboratory by the water quality samplers following Chain of Custody procedures.

The samples were analyzed for constituents, which were determined based on the SOP. Water sample chemical analyses were conducted by Enviromatrix Analytical, Inc., a state-accredited laboratory. Table A-4 of the SOP provides guidance with respect to test methods and corresponding reporting limits for water column sampling, however, it should be noted that Enviromatrix Analytical, Inc. used different testing methodologies for particular analyses. The laboratory analytical results can be found in Attachment 3 and tabulated analysis in Tables 10U and 10D of Attachment 6.

For both the Upstream and Downstream Sampling Locations, all constituents analyzed were below their respective water quality benchmarks.

**Description of Wetland Assessment (Existing) Activities (personnel, general conditions):**

An assessment of existing wetland conditions of the South Chollas Creek Channel (specifically within Map 101) was performed by HELIX biologists to evaluate the ability of the channel to recover to its current condition following maintenance. A scoring system was used which evaluated the following three key macrofeatures: vegetation, hydrosoil, and hydroperiod. The scoring system estimates the influence of maintenance on sorption, deposition, and other transfers and transformations of waterborne pollutants. The methodology follows the Water Quality Assessment and Quantification Model for Flood Channel Maintenance White Paper (Weston Solutions, 2011) prepared for the Master Stormwater Maintenance PEIR. Field observations made during the Individual Biological Assessment (IBA) site survey on December 7, 2016 were considered when conducting the Existing Wetland Assessment. Worksheets used for the scoring are included in Attachment 10.

**Vegetation**

The vegetation recovery score of a storm water facility is defined by the time required for the vegetation to return to its current condition with an assumed removal of greater than 75-percent of the sediment and standing vegetative crop. A score of 0 corresponds to an assumption that the current vegetation will not recover to its current density after removal of the current standing crop. A score of 1 assumes that the current vegetation is comprised of trees and woody species, and recovery would take more than 5 years. A score of 2 indicates that the current standing crop is a mature mix of woody and leafy vegetation (both terrestrial and wetland species), and recovery to the current condition is expected to require 1 to 5 years. A score of 3 corresponds to vegetation comprised of primarily emergent and submerged wetland species which would take approximately 1 year to re-establish to the current condition.

The South Chollas Creek IBA presents the acreage of each vegetation community or land cover type surveyed within Map 101 that will be impacted by maintenance activities in the channel. A total of seven vegetation communities are identified in the IBA for Map 101 of the South Chollas Creek including freshwater marsh (disturbed), southern willow scrub (disturbed), southern riparian forest (disturbed), disturbed wetland (arundo-dominated), Diegan coastal sage scrub (disturbed), non-native vegetation/ornamental, and disturbed land, and one land cover type: developed/concrete channel. In accordance with the scoring system described above, a score of 0 – 3 was assigned to each of the vegetation communities and land cover types. These scores are listed in Table 2 below.

**Table 2**
**Existing Vegetation Community/Land Use Type Scoring**

| Vegetation Community or Land Cover Type (Holland) | Map 101 Acres | Vegetation Score | Scoring Rationale |
|---|---|---|---|
| Freshwater Marsh (Disturbed) | 0.04 | 3 | Dominance (> 75%) of emergent wetland species (i.e., *Juncus acutus* |
| Southern Willow Scrub (Disturbed) | 0.16 | 2 | Mature wetland population |
| Southern Riparian Forest (Disturbed) | 0.25 | 1 | Mature willows |
| Disturbed Wetland (Arundo-Dominated) | 0.03 | 3 | Monotypic stands of invasive species (i.e. giant reed [*Arundo donax*]) |
| Diegan Coastal Sage Scrub (Disturbed) | 2.85 | 1 | Adjacent upland species |
| Non-Native Vegetation/Ornamental | 0.03 | 1 | Adjacent upland species; primarily fan palm (*Washingtonia robusta*) |
| Disturbed Land | 0.32 | 0 | Largely un-vegetated |
| Developed/Concrete Channel | 0.37 | 0 | No visible vegetation |
| **TOTAL** | **4.05** | | |
| **Overall Existing Vegetation Score** | | **1** | |

Using the acreage identified in the IBA for Map 101, an area-weighted average vegetation score was determined to be 1 for the South Chollas Creek Channel, which would mean that the current vegetation condition is expected to take more than 5 years to return to the current vegetation condition.

**Hydrosoil**

The importance of the existing hydrosoil condition to a storm water facility is evaluated by estimating how removal of greater than 75 percent of the sediments will affect the organic carbon concentration, particle size distribution, nutrient availability, and overall load removal of contaminants. The evaluation is based on the effects of the potential hydrosoil removal related to water depth, flow, hydraulic retention time (HRT), and deposition/settling rates. The evaluation also considers how the removal of sediments will affect the re-growth of vegetation to current densities and distributions.

The hydrosoil parameter is scored between 0 and 3. A score of 0 represents a high flow or no flow area with little to no deposition likely. A score of 1 corresponds to short-term sand deposition where the likelihood of the accumulation of fines and/or organic carbon is considered low within the next five-year period. A score of 2 anticipates that a heterogeneous mix of sand, organics, and fines is expected to accumulate in the next 1 to 5 years. A score of 3 indicates that a heterogeneous mix of sand, organics, and fines is expected to accumulate within 1 year.

Based on the scoring criteria described above, a hydrosoil score of 0 – 3 was assigned to Map 101 of South Chollas Creek Channel based on the type of substrate and deposition, pH, and Redox value. An existing hydrosoil score of 1 was assigned to the channel based on the rationale that the channel is primarily concrete-lined with cobbles and silty sand deposits, and having a neutral pH (7.73-8.13) (Table 3). A hydrosoil score of 1 corresponds to short-term sand deposition where the likelihood of the accumulation of fines and/or organic carbon is considered low within the next five-year period.

**Table 3**
**Existing Hydrosoil Scoring**

| South Chollas Map | Hydrosoil Score | Scoring Rationale |
|---|---|---|
| Map 101 | 1 | Majority of the channel is concrete. Substrate is primarily cobbles with some deposition of fine and organic carbon, neutral pH |
| **Overall Score** | **1** | |

**Hydroperiod**

The hydroperiod recovery score of a storm water facility is defined by the time it takes for the storm water facility to recover to an average, optimal depth of 1 to 1.5 feet of overlying water. A score of 0 indicates the expectation that the velocity of storm water flow will prevent sediment deposition. A score of 1 indicates the expectation that some slowdown of flow will occur resulting in some deposition of sand and other coarse grain materials. A score of 2 typically represents a broader channel bottom with an overlying water depth of 0.5 feet resulting in some deposition of fines. A score of 3 corresponds to a channel with an overlying water depth greater than 1 foot with proportionately greater deposition of fines and organics.

An existing hydroperiod score of 3 was assigned to the South Chollas Creek Channel (Table 4). The extent of Map 101 has shallow to moderate water depth (0.5 to 1 ft. increasing to 1.5 to 3 ft.), which is likely dependent on volume inputs, slow flow (velocity of 0.07 ft/sec), and an HRT greater than 1 hour (4.79). Based on this score, moderate sediment deposition is expected to occur.

| Table 4<br>Existing Hydroperiod Scoring | | | |
|---|---|---|---|
| **South Chollas Map** | **Average Water Depth (ft.)** | **Hydrosoil Score** | **Scoring Rationale** |
| Map 101 | 0.5-1.0 | 3 | Primarily shallow water (0.5 – 1 ft.), but could increase to 1.5 to 3.0 ft. Variable flow depending on volume inputs |
| **Overall Score** | | 3 | |

**Total Existing Score**

The total existing wetland macrofeature assessment score for a storm water facility is derived by adding the ratings from all three categories (vegetation, hydrosoil, and hydroperiod). An overall score of 0 to 2 is considered a poor rating, 3 to 4 is considered fair, 5 to 7 is comparable to good wetland quality and health, and 8 to 9 represents the best recovery for sorption and deposition of suspended solids and associated contaminants.

Adding the three scores for the South Chollas Creek channel results in an overall existing score of 5 for the existing wetlands which indicates good wetland quality and health (Table 5).

| Table 5<br>Existing Wetland Macrofeature<br>Assessment Scoring | |
|---|---|
| **Wetland Macrofeature** | **Overall Score** |
| Vegetation | 1 |
| Hydrosoil | 1 |
| Hydroperiod | 3 |
| **Overall Existing Wetland Score** | **5** |

**Description of Wetland Assessment (Recovery) Activities (personnel, general conditions):**

**Vegetation**

In a similar manner to the existing vegetation score, a recovery vegetation score of 0 – 3 was assigned to each vegetation community (excluding land cover types) identified in the IBA for each reach. Using the acreage identified in the IBA, an area-weighted average recovery vegetation score was determined to be 2 for the South Chollas Creek Channel which would mean that the vegetation condition is expected to return within 1-5 years. The recovery vegetation scores are listed in Table 6 below.

| Table 6<br>Recovery Vegetation Community Scoring | | | |
|---|---|---|---|
| **Vegetation Community or Land Cover Type (Holland)** | **Map 101 Acres** | **Vegetation Score** | **Scoring Rationale** |
| Freshwater Marsh (Disturbed) | 0.04 | 3 | Emergent wetland species (i.e., *Junucus acutus*) will exhibit regrowth within 1 year |
| Southern Willow Scrub (Disturbed) | 0.16 | 2 | Recovery of mixed vegetation (i.e., *Salix* spp., *Baccharis*, and *Juncus*) will take 1-5 years |
| Southern Riparian Forest (Disturbed) | 0.25 | 1 | Recovery of trees and woody species will take more than 5 years. |
| Disturbed Wetland (Arundo- | 0.03 | 3 | Existing vegetation (i.e., *Arundo*) will exhibit |

| | | | |
|---|---|---|---|
| Dominated) | | | regrowth within 1 year. |
| Diegan Coastal Sage Scrub (Disturbed) | 2.85 | 2 | Recovery of encroachment from adjacent upland species will take 1-5 years |
| Non-Native Vegetation/Ornamental | 0.03 | 2 | Recovery of encroachment from adjacent upland species will take 1-5 years |
| Disturbed Land | 0.32 | 0 | Largely un-vegetated |
| Developed/Concrete Channel | 0.37 | 0 | No visible vegetation |
| **TOTAL** | **4.05** | | |
| **Overall Recovery Vegetation Score** | **2** | | |

**Hydrosoil**

A recovery hydrosoil score of 3 was calculated for the South Chollas Creek Channel Map 101. This assignment was based on the expectation that sediment deposited in the channel will be a heterogeneous mix of sand, organic carbons, and fines within five years of maintenance activities due to anticipated low input from the surrounding urban environment.

**Hydroperiod**

A recovery hydroperiod score of 2 was calculated for the South Chollas Creek Channel Map 101. The channel shows evidence of some deposition of fines and revegetation as well as an overlaying water depth of less than 1 foot.

**Total Estimated Recovery Score**

The total estimated recovery wetland macrofeature assessment score for a storm water facility is calculated similarly to the existing score and is derived by adding the ratings from all three categories (vegetation, hydrosoil, and hydroperiod). An overall score of 0 to 2 is considered a poor rating, 3 to 4 is considered fair, 5 to 7 is comparable to good wetland quality and health, and 8 to 9 represents the best recovery for sorption and deposition of suspended solids and associated contaminants. Adding the three recovery scores results in an overall predicted recovery score of 7, and indicates good water quality and health (Table 7). In summary, the overall likely sediment redeposition and recovery of wetland species is expected to occur within one to five years.

**Table 7**
**Recovery Wetland Macrofeature Assessment Scoring**

| Wetland Macrofeature | Overall Score |
|---|---|
| Vegetation | 2 |
| Hydrosoil | 3 |
| Hydroperiod | 2 |
| **Overall Recovery Wetland Score** | **7** |

**Sediment Pollutant Loading Estimates:**

Pollutant loading estimates were performed following the guidelines outlined in the SOP. Sediment volumes were split into two areas, North Bank of the channel and South Bank of the channel. A total sediment volume of approximately 1,410 cubic yards is scheduled to be removed from the channel. The total removal volume was split in half and applied to each sediment sample taken for each area (referred to as SO6331-1 and SO6330-1, respectively). SO6331-1 was taken from the South Bank of the channel at 32.727930°, -117.068434°, and SO6330-1 was taken from the North Bank of the channel at 32.727991°, -117.068392°. Load removal estimates are corrected for the presence of cobble larger than 1.5 inches in accordance with the SOP. No correction factor was applied to either sample, as no cobbles were observed at the sediment sampling location or in the sieve test

results. See Attachment 3 for full sieve test results. The resultant pollutant loading estimates and Excel model calculations can be found in Table 8N and 8S of Attachment 6.

**MAINTENANCE IMPACTS**

**Evaluation of Benefits / Impacts:**

**Are there constituents that have potential impacts greater than benefits?**
Yes ☒ No ☐
**If so, identify constituents here and compare measured concentrations to thresholds.**

An evaluation of the water quality benefits versus impacts of the proposed channel maintenance area, the upstream portion of Reach 2 and downstream portion of Reach 3, of the South Chollas Creek Channel was carried out in accordance with the SOP. The maintained pollutant removal estimates were compared to the corresponding existing pollutant removal estimates for each constituent over a three year maintenance period. The results of this comparison can be found in Table 12 in Attachment 6. The results of this comparison show for each constituent, with the exception of Selenium and Nitrate as N, that the estimated maintained pollutant removal exceeds the estimated existing pollutant removal, indicating an overall pollutant removal benefit.

These results of the water quality impact analysis outlined by the SOP suggest that overall the proposed sediment and vegetation removal during maintenance of the South Chollas Creek Channel will remove a larger pollutant load than that which is theoretically removed under existing conditions during dry weather flow by NTS processes over three years. The proposed maintenance will therefore provide a slight overall water quality benefit. Sediment excavation will prevent the re-suspension and downstream transport of sediment-bound pollutants during wet weather, and regrowth of fresh water marsh species within one year will further enhance pollutant removal from the channel.

**MITIGATION**

**If impacts are identified, list potential mitigation efforts (e.g., BMPs type(s) and number(s)) that may be implemented in the watershed:**

The results of this IWQA process suggest that there is a pollutant reduction benefit due to sediment and vegetation removal as a result of the proposed maintenance activities, and therefore no additional mitigation measures are necessary. For the constituents analyzed, all show an increase in estimated maintained pollutant removal.

Pursuant to page 20 of the SOP, no mitigation is necessary because although the impacts are greater than the benefits of sediment and vegetation removal for Selenium and Nitrate as N (reference Tables 10U and 12), the maintained channel water column concentrations of Selenium and Nitrate as N are more than 25% below the water quality objectives established by the San Diego Basin Plan. Despite the fact that no additional mitigation is necessary, mitigation measures may be implemented in order to further decrease pollutant concentrations and improve overall water quality. The applicable mitigation measures, as identified in the PEIR, include: street sweeping, retrofitting residential landscaping to reduce runoff, installing artificial turf, installing inlet devices on storm drains, replacing impermeable surfaces with permeable surfaces, installing modular storm water filtration systems, installing storm water retention basins, installing catch basin media filters, creating vegetated swales, restoring wetlands, and installing check dams. All of the listed mitigation measures would decrease the overall bacteria, metals, pesticides, total dissolved solids, and trash in the water. A summary and table of Applicable PEIR mitigation measures and benefits can be found in their entirety in Attachment 7. In order to comply with the settlement agreement, the City shall increase frequency of catch basin inspection and as-needed cleaning for one year after maintenance. For every segment that is cleared, the City shall conduct an inspection and cleaning if necessary of every catch basin within 100 feet of the maintained segment, and conduct additional inspections and cleaning if necessary every three months. While these mitigation measures are only optional, pursuant to the SOP, the City of San Diego may have additional mitigation requirements pursuant to other governing policies (i.e. the Settlement Agreement).

## REFERENCES


California's List of Polluted Waters [California's 2010 Section 303(d) List], a component of the California 2010 Integrated Report [Clean Water Act Section 303(d) List and 305(b) Report], approved by the USEPA on October 11, 2011

Caltrans, 2011. Biofiltration Swale Design Guidance. Sacramento, California. June 2011

CDFG (California Department of Fish and Game), 2000. *Office of Spill Prevention and Response, Water Quality Criteria for Diazinon and Chlorpyrifos.*

CDFG (California Department of Fish and Game), 1998. *Office of Spill Prevention and Response, Hazard Assessment of the Insecticide Malathion to Aquatic Life in the Sacramento-San Joaquin River System.*

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NOAA, 2017. National Oceanic and Atmospheric Administration, http://www.wrh.noaa.gov/sgx/obs/rtp/national.html *Climatic Data - Western Region Headquarters*. NOAA, n.d. Web. 24 Mar. 2017.

San Diego RWQCB, 1994. Water Quality Control Plan for the San Diego Basin (9), September 8, 1994 with amendments effective on or before May 17, 2016.

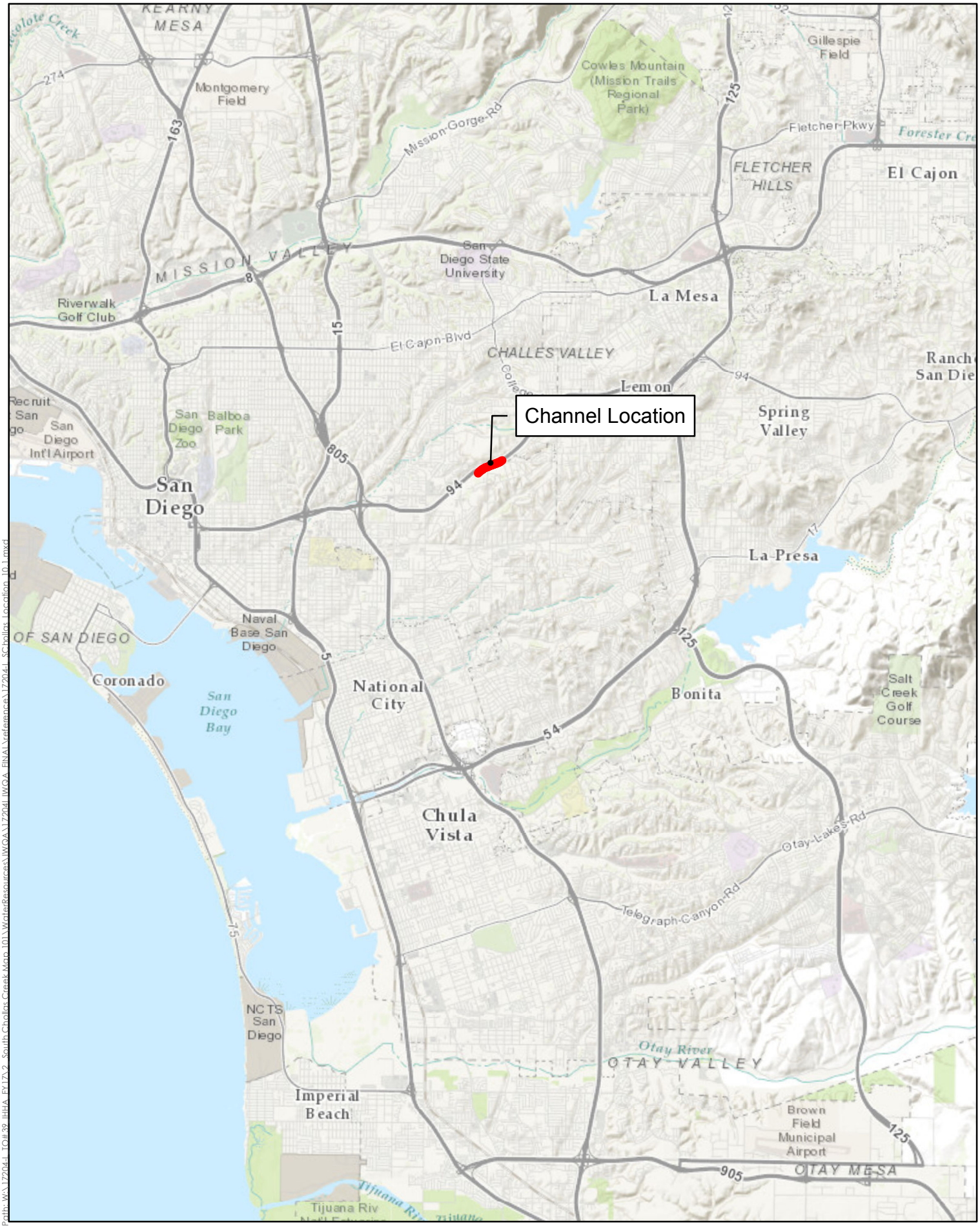
San Diego RWQCB, 2015. Order No. R9-2013-0001, as amended by Order Nos. R9-2015-001 and R9-2015-0100, NPDES No. CAS0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds Within the San Diego Region. November 2015.

Weston Solutions, 2011. Standard Operating Procedures (SOP) to Conduct Water Quality Assessment and Quantification Model For Flood Control Chanel (Storm Water Facility) Maintenance, found in Appendix F of the Programmatic Environmental Impact Report (PEIR).

USEPA 1994. Sediment Sampling. SOP #: 2016 November 17, 1994

## Attachment 1: Channel Exhibits

**Figure 1 – Regional Location Map**




Path: W:\17204-L TO#39 IIHA FY17\2_South Chollas Creek Map 101\WaterResources\IWQA\17204l IWQA FINAL\reference\17204-L SChollas Location 10.1.mxd

Date of Exhibit: May 26, 2017
Source: ESRI World Topographic Baselayer

RICK ENGINEERING COMPANY

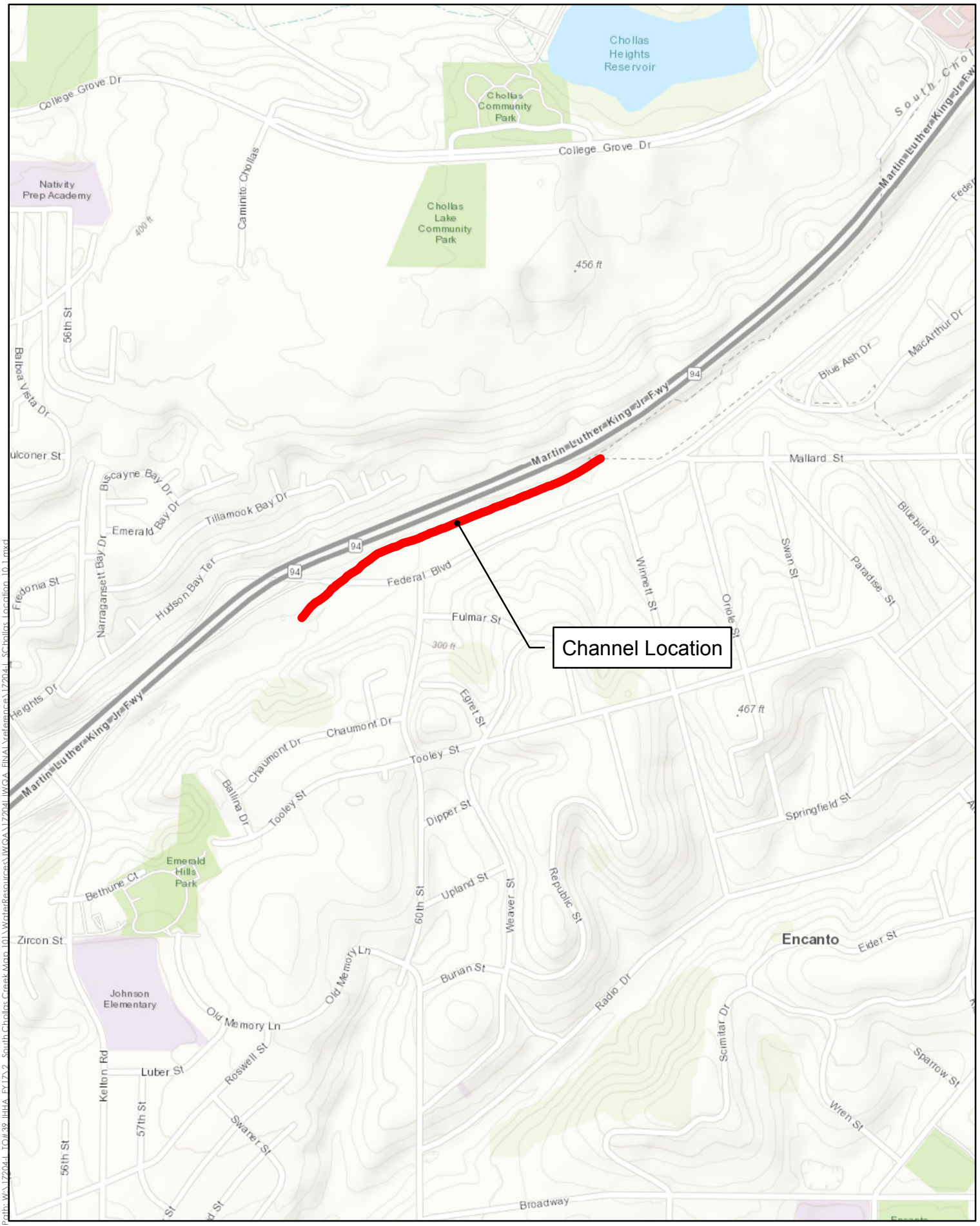
Miles
0 1 2
North

# IWQA Report - Figure 1 - Regional Location Map

## South Chollas Creek Channel MMP Map 101

**Job Number: 17204-L**

**Figure 2 – Project Vicinity Map**




Path: W:\17204-L TO#39 IIHA FY17\2 South Chollas Creek Map 101\WaterResources\IWQA\17204 IWQA FINAL\reference\17204-L SChollas Location 10.1.mxd

Date of Exhibit: May 26, 2017
Source: ESRI World Topographic Baselayer

RICK ENGINEERING COMPANY

Miles
0 0.09 0.18
North

# IWQA Report - Figure 2 - Project Vicinity Map

## South Chollas Creek Channel MMP Map 101

**Job Number: 17204-L**

**Figure 3 – Channel Reach Exhibit**


Path: W:\17204-L TO#39 IHHA FY17\2 South Chollas Creek Map 101\WaterResources\WQA\17204 IWQA FINAL\reference\17204-L SChollas ChannelReachExhibit.mxd

Date of Exhibit: May 26, 2017
Source: ESRI World Topographic Baselayer

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Miles
0 0.035 0.07
North

# Figure 3 - Channel Reach Exhibit

**South Chollas Creek Channel MMP Map 101**

**Job Number: 17204-L**

**Figure 4 – Limits of Channel Maintenance**


Path: W:\17204-L TO# 39 IHHA FY17\2 South Chollas Creek Map 101\WaterResources\IWQA\17204 IWQA FINAL\reference\17204-L SChollas LimitsChMtnc 10-1.mxd

Date of Exhibit: May 26, 2017
Source: ESRI World Topographic Baselayer

RICK ENGINEERING COMPANY

Miles
0 0.02 0.04
North

# Figure 4 - Limits of Channel Maintenance

**South Chollas Creek Channel MMP Map 101**

**Job Number: 17204-L**

**Figure 5 – Hydraulic Workmap**


W:\17204-L_TO#39_IHHA_FY17\2_South Chollas Creek Map 101\WaterResources\WQA\17204L_IWQA_FINAL\reference\17204-L_SChollasMap101_HydraulicWorkmap.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 150 300
North

Date of Exhibit: May 26, 2017
DigitalGlobe Aerial Image: 04.2013

# South Chollas Creek Channel - Figure 5 - Hydraulic Workmap

**MMP Map 101**

**Job Number: 17204-L**

## Attachment 2: Site Photos

**Figure 6 – Photo Locations Map**

TILLAMOOK BAY
HUDSON BAY TR
SR-94 WB
SR-94 EB
WINNETT ST
SR-94 WB ON RA
FEDERAL BL
SR-94 EB OFF RA
60TH ST
FULMAR ST
WEAVER ST

**Legend**
- Reach_3
- Reach_2
- Reach_1
- Limits of Channel Maintenance
- Photo Location

W:\17204-L_TO#39_IHHA_FY17\2_South Chollas Creek Map 101\WaterResources\IWQA\17204L_IWQA_FINAL\reference\17204-L_SChollasMap101_PhotoLocation_10.1.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 150 300

North

Date of Photos: March 9, 2017
Date of Exhibit: May 26, 2017
DigitalGlobe Aerial Image: 04.2013

# South Chollas Creek Channel - Figure 6 - Photo Locations Map

## MMP Map 101

**Job Number: 17204-L**

## Site Photographic Log

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

1.


Upstream portion of South Chollas Creek Channel Map 101 Reach 3 facing east at access point for the Upstream Sampling Location.

2.


Middle portion of South Chollas Creek Channel Map 101 Reach 3 facing west (looking downstream).

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

3.


Middle portion of South Chollas Creek Channel Map 101 Reach 3 facing west (looking downstream).

4.

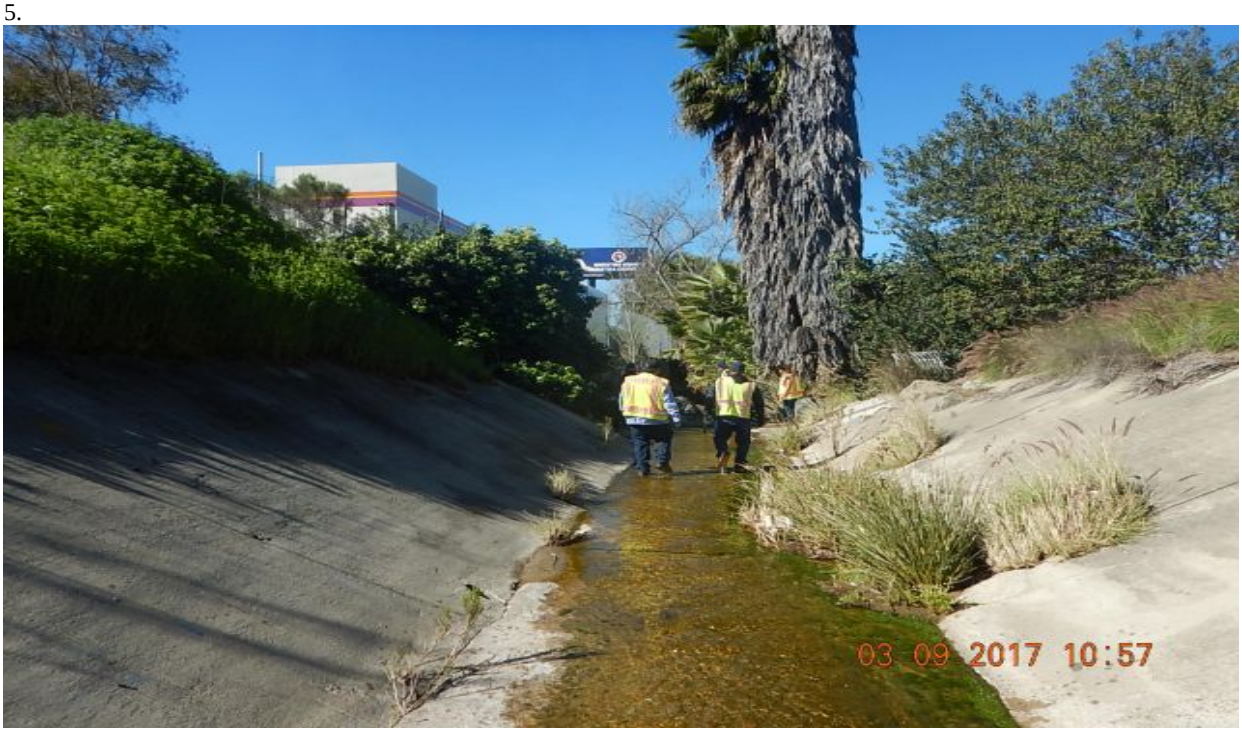

Lower portion of South Chollas Creek Channel Map 101 Reach 3 facing east (looking upstream).

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

5.




Lower portion of South Chollas Creek Channel Map 101 Reach 3 facing west (looking downstream).

6.


Upstream portion of South Chollas Creek Channel Map 101 Reach 2 facing south. This is the rip rap section of the channel, which marks the transitions from a concrete lined bottom to an earthen bottom.

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

7.


Water samples collected at the Upstream Sampling Location of South Chollas Creek Channel Map 101.

8.

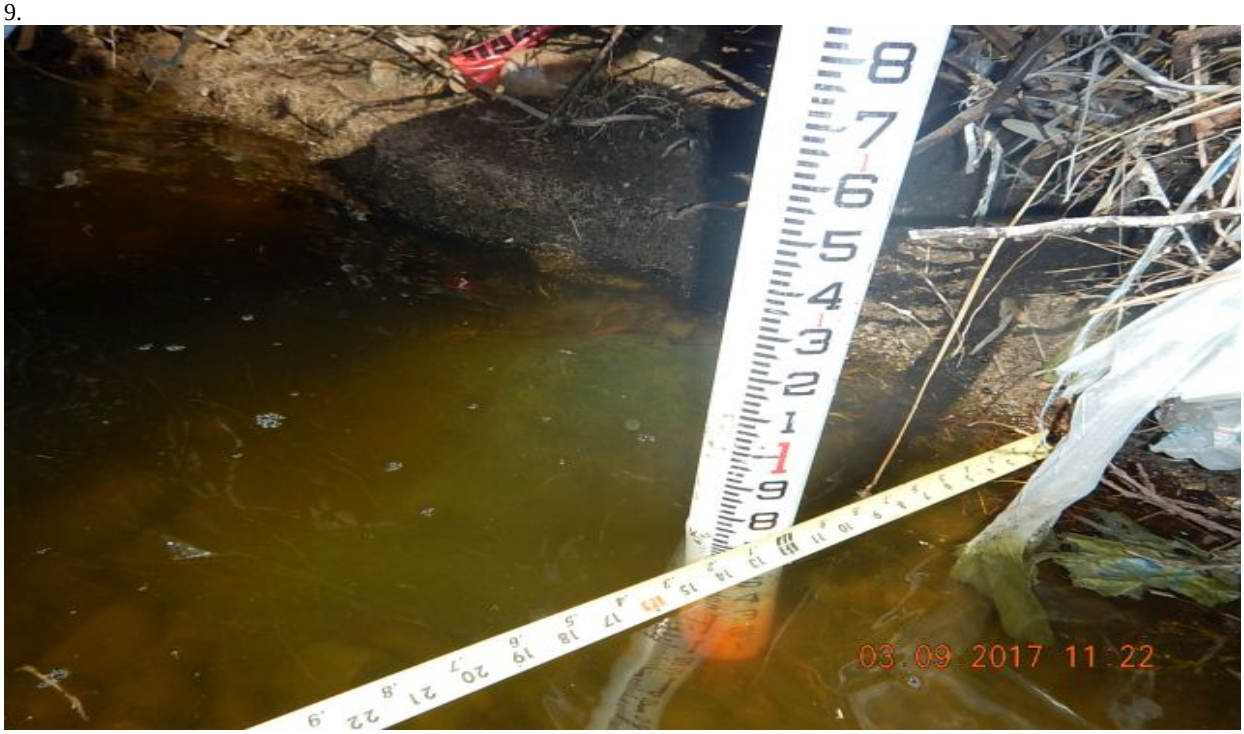

Water samples collected at the Upstream Sampling Location of South Chollas Creek Channel Map 101.

## Site Photographic Log

Date of Site Visit: 3/9/17

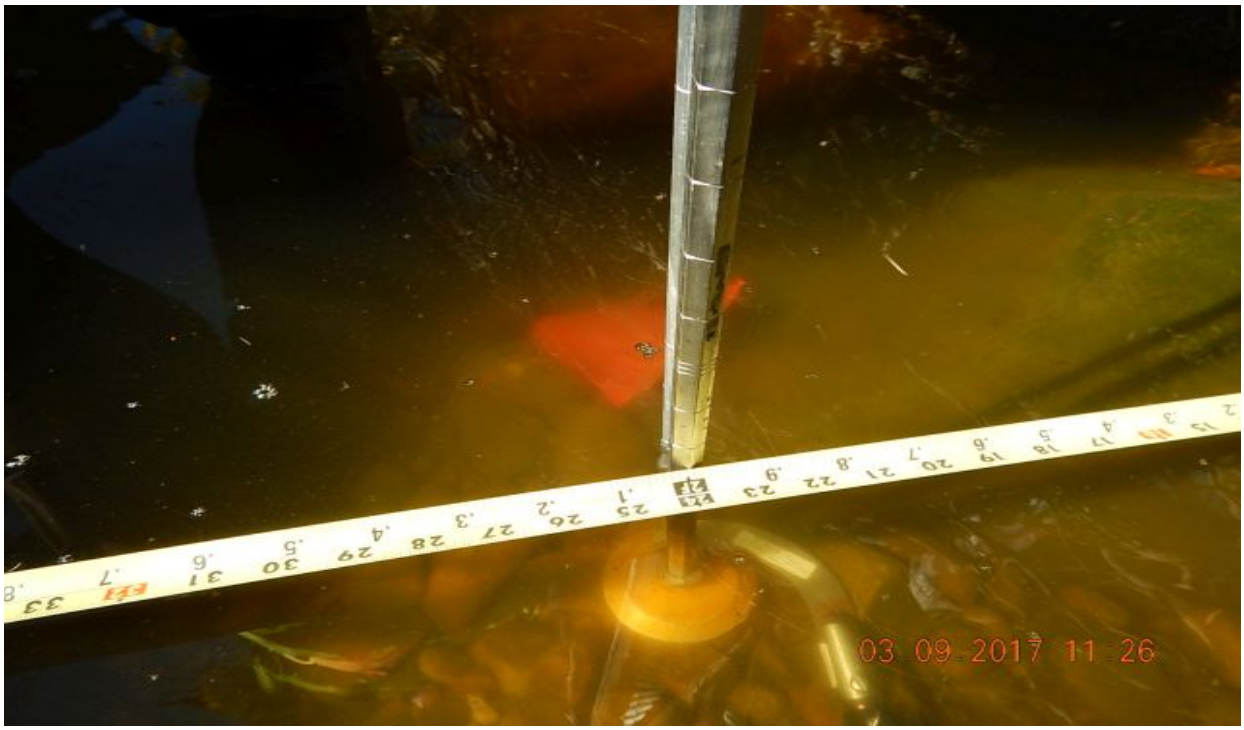
See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

9.




Depth measurement rod at 1 foot interval from the right bank (facing downstream). Depth and velocity measurements were taken here at the Upstream Sampling Location.

10.




Flow rate meter measurement at the Upstream Sampling Location for South Chollas Creek Channel Map 101.

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

11.


Upstream portion of South Chollas Creek Channel Map 101 Reach 2 facing west (looking downstream).

12.


Downstream portion of South Chollas Creek Channel Map 101 Reach 2 looking east (facing upstream). This is the Downstream Sampling Location.

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

13.


Bridge at Federal Boulevard located downstream of the Downstream Sampling Location for South Chollas Creek Channel Map 101. Facing southwest (looking downstream).

14.


Downstream Sampling Location located at the downstream portion of South Chollas Creek Channel Map 101 Reach 2. Facing southwest (looking downstream).

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

15.


Right bank (looking downstream) of the Downstream Sampling Location of South Chollas Creek Channel Map 101.

16.


Left bank (looking downstream) of the Downstream Sampling Location of South Chollas Creek Channel Map 101.

## Site Photographic Log

Date of Site Visit: 3/9/17

See notes below and Figure 6 – Photo Locations Map for picture location and orientation.

17.


Depth measurement rod at 1 foot interval from the right bank (facing downstream). Depth and velocity measurements were taken here at the Downstream Sampling Location.

## Attachment 3: Analytical Sampling Results

## Analytical Results of Sediment Sample(s)

Midwest Laboratories
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23 March 2017

Work Order: 1524960

CLARKSON LABORATORY & SUPPLY - 11564
350 TROUSDALE DR
CHULA VISTA, CA 91910-

RE: Chollas Creek Soils

Enclosed are the results of analyses for samples received by the laboratory on 2017-03-17 17:00. If you have any questions concerning this report, please feel free to contact me.

Report reissued to report only 3 compounds on EPA 8141 for both samples

Sincerely,

Sue Ann Seitz
Project Manager
sac6@midwestlabs.com
402-829-9892

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350 TROUSDALE DR
CHULA VISTA, CA 91910-

Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| S06330 | 1524960-01 | Solid | 2017-03-09 10:00 | 2017-03-17 17:00 |
| S06331 | 1524960-02 | Solid | 2017-03-09 10:30 | 2017-03-17 17:00 |

**Containers used for the following Analyses:**

| | |
|---|---|
| 1524960-01 A: | EPA 8141 |
| 1524960-01 B: | EPA 353.2, PAI-DK 01, SM 4500-NO2 B-2000 |
| 1524960-01 C: | Total Metals per EPA 6010B |
| 1524960-01 E: | SM 2540 G |
| 1524960-02 A: | EPA 8141 |
| 1524960-02 B: | EPA 353.2, PAI-DK 01, SM 4500-NO2 B-2000 |
| 1524960-02 C: | Total Metals per EPA 6010B |
| 1524960-02 E: | SM 2540 G |

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350 TROUSDALE DR
CHULA VISTA, CA 91910-

Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

**Sample ID: S06330**
**Laboratory ID: 1524960-01**
**Sampled Date/Time: 2017-03-09 10:00**

| Analyte | Dry Weight Result | Reporting Limit | Units | As Received Result | Method | Prepared | Analyzed | Reviewer | (Container) / Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Total Metals** | | | | | | | | | |
| Antimony | < | 6.5 | mg/kg dry | < mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Arsenic | < | 6.5 | mg/kg dry | < mg/kg | EPA 6010B | 2017-03-21 | 2017-03-23 | bab2 | (C) |
| Cadmium | < | 0.1 | mg/kg dry | < mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Chromium | 5.2 | 0.7 | mg/kg dry | 4.0 mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Copper | 7.1 | 0.7 | mg/kg dry | 5.3 mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Lead | 8.7 | 3.3 | mg/kg dry | 6.6 mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Manganese | 95.1 | 0.7 | mg/kg dry | 72.0 mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Nickel | 2.3 | 0.7 | mg/kg dry | 1.7 mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Phosphorus | 117.5 | 6.5 | mg/kg dry | 89.0 mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Selenium | < | 6.5 | mg/kg dry | < mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Zinc | 37.4 | 0.7 | mg/kg dry | 28.3 mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| **Environmental Chemistry** | | | | | | | | | |
| Total Kjeldahl Nitrogen | < | 264 | mg/kg dry | < mg/kg | PAI-DK 01 | 2017-03-22 | 2017-03-22 | mjs5 | (B) |
| Nitrate/Nitrite Nitrogen | < | 1.0 | mg/kg dry | < mg/kg | EPA 353.2 | 2017-03-21 | 2017-03-21 | mjs5 | (B) |
| Nitrite Nitrogen | < | 0.3 | mg/kg dry | < mg/kg | SM 4500-NO2 B-2000 | 2017-03-21/14:21 | 2017-03-21/14:21 | cmw2 | (B) |
| Percent Solids | | 0.01 | % | 75.73 % | SM 2540 G | 2017-03-21 | 2017-03-22 | cmw2 | (E) |
| **Pesticide Screen** | | | | | | | | | |
| Diazinon | < | 0.80 | ug/g | < ug/g | EPA 8141 | 2017-03-20 | 2017-03-30 | hlr3 | (A) |
| Malathion | < | 0.80 | ug/g | < ug/g | EPA 8141 | 2017-03-20 | 2017-03-30 | hlr3 | (A) |
| Chlorpyrifos | < | 0.80 | ug/g | < ug/g | EPA 8141 | 2017-03-20 | 2017-03-30 | hlr3 | (A) |

Work Order: 1524960

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Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

**Sample ID: S06331**
**Laboratory ID: 1524960-02**
**Sampled Date/Time: 2017-03-09 10:30**

| Analyte | Dry Weight Result | Reporting Limit | Units | As Received Result | | Method | Prepared | Analyzed | Reviewer | (Container) / Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Metals** | | | | | | | | | | |
| Antimony | < | 5.8 | mg/kg dry | < | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Arsenic | < | 5.8 | mg/kg dry | < | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-23 | bab2 | (C) |
| Cadmium | < | 0.1 | mg/kg dry | < | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Chromium | 7.3 | 0.6 | mg/kg dry | 6.3 | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Copper | 18.1 | 0.6 | mg/kg dry | 15.5 | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Lead | 20.5 | 2.9 | mg/kg dry | 17.6 | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Manganese | 107.4 | 0.6 | mg/kg dry | 92.1 | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Nickel | 3.2 | 0.6 | mg/kg dry | 2.7 | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Phosphorus | 145.3 | 5.8 | mg/kg dry | 124.6 | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Selenium | < | 5.8 | mg/kg dry | < | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| Zinc | 55.9 | 0.6 | mg/kg dry | 47.9 | mg/kg | EPA 6010B | 2017-03-21 | 2017-03-21 | bab2 | (C) |
| **Environmental Chemistry** | | | | | | | | | | |
| Total Kjeldahl Nitrogen | < | 233 | mg/kg dry | < | mg/kg | PAI-DK 01 | 2017-03-22 | 2017-03-22 | mjs5 | (B) |
| Nitrate/Nitrite Nitrogen | < | 1.0 | mg/kg dry | < | mg/kg | EPA 353.2 | 2017-03-21 | 2017-03-21 | mjs5 | (B) |
| Nitrite Nitrogen | < | 0.2 | mg/kg dry | < | mg/kg | SM 4500-NO2 B-2000 | 2017-03-21/14:21 | 2017-03-21/14:21 | cmw2 | (B) |
| Percent Solids | | 0.01 | % | 85.76 | % | SM 2540 G | 2017-03-21 | 2017-03-22 | cmw2 | (E) |
| **Pesticide Screen** | | | | | | | | | | |
| Diazinon | < | 0.80 | ug/g | < | ug/g | EPA 8141 | 2017-03-20 | 2017-03-30 | hlr3 | (A) |
| Malathion | < | 0.80 | ug/g | < | ug/g | EPA 8141 | 2017-03-20 | 2017-03-30 | hlr3 | (A) |
| Chlorpyrifos | < | 0.80 | ug/g | < | ug/g | EPA 8141 | 2017-03-20 | 2017-03-30 | hlr3 | (A) |

Work Order: 1524960

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Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## Total Metals - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B701870** | | | | | | | | | | |
| **Blank (B701870-BLK1)** | | | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Antimony | < | 0.2 | mg/kg wet | | | | | | | |
| Arsenic | < | 0.2 | mg/kg wet | | | | | | | |
| Cadmium | < | 0.004 | mg/kg wet | | | | | | | |
| Chromium | < | 0.02 | mg/kg wet | | | | | | | |
| Copper | < | 0.02 | mg/kg wet | | | | | | | |
| Lead | < | 0.1 | mg/kg wet | | | | | | | |
| Manganese | < | 0.02 | mg/kg wet | | | | | | | |
| Nickel | < | 0.02 | mg/kg wet | | | | | | | |
| Phosphorus | < | 0.2 | mg/kg wet | | | | | | | |
| Selenium | < | 0.2 | mg/kg wet | | | | | | | |
| Zinc | < | 0.02 | mg/kg wet | | | | | | | |
| **LCS (B701870-BS1)** | | | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Antimony | 0.99 | 0.2 | mg/kg wet | 1.00 | | 99.5 | 80-120 | | | |
| Arsenic | 0.96 | 0.2 | mg/kg wet | 1.00 | | 95.6 | 80-120 | | | |
| Cadmium | 0.97 | 0.004 | mg/kg wet | 1.00 | | 96.9 | 80-120 | | | |
| Chromium | 0.96 | 0.02 | mg/kg wet | 1.00 | | 96.4 | 80-120 | | | |
| Copper | 2.02 | 0.02 | mg/kg wet | 2.00 | | 101 | 80-120 | | | |
| Lead | 0.97 | 0.1 | mg/kg wet | 1.00 | | 96.8 | 80-120 | | | |
| Manganese | 1.98 | 0.02 | mg/kg wet | 2.00 | | 99.2 | 80-120 | | | |
| Nickel | 0.98 | 0.02 | mg/kg wet | 1.00 | | 97.6 | 80-120 | | | |
| Phosphorus | 20.76 | 0.2 | mg/kg wet | 20.0 | | 104 | 80-120 | | | |
| Selenium | 1.18 | 0.2 | mg/kg wet | 1.00 | | 118 | 80-120 | | | |
| Zinc | 1.99 | 0.02 | mg/kg wet | 2.00 | | 99.3 | 80-120 | | | |
| **Matrix Spike (B701870-MS1)** | | **Source: 1524960-01** | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Antimony | 20.06 | 6.3 | mg/kg dry | 31.4 | < | 63.9 | 75-125 | | | MI |
| Arsenic | 34.37 | 6.3 | mg/kg dry | 31.4 | 3.83 | 97.3 | 75-125 | | | |
| Cadmium | 30.13 | 0.1 | mg/kg dry | 31.4 | < | 96.0 | 75-125 | | | |
| Chromium | 36.00 | 0.6 | mg/kg dry | 31.4 | 5.25 | 97.9 | 75-125 | | | |
| Copper | 71.73 | 0.6 | mg/kg dry | 62.8 | 7.05 | 103 | 75-125 | | | |
| Lead | 56.70 | 3.1 | mg/kg dry | 31.4 | 8.67 | 153 | 75-125 | | | MI |
| Manganese | 159.0 | 0.6 | mg/kg dry | 62.8 | 95.10 | 102 | 75-125 | | | |
| Nickel | 33.57 | 0.6 | mg/kg dry | 31.4 | 2.26 | 99.7 | 75-125 | | | |
| Selenium | 31.47 | 6.3 | mg/kg dry | 31.4 | < | 100 | 75-125 | | | |
| Zinc | 104.8 | 0.6 | mg/kg dry | 62.8 | 37.38 | 107 | 75-125 | | | |

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CLARKSON LABORATORY & SUPPLY - 11564
350 TROUSDALE DR
CHULA VISTA, CA 91910-

Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## Total Metals - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B701870** | | | | | | | | | | |
| **Matrix Spike Dup (B701870-MSD1)** | **Source: 1524960-01** | | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Antimony | 19.21 | 6.3 | mg/kg dry | 31.3 | < | 61.3 | 75-125 | 4.30 | 20 | MI |
| Arsenic | 35.16 | 6.3 | mg/kg dry | 31.3 | 3.83 | 100 | 75-125 | 2.28 | 20 | |
| Cadmium | 29.55 | 0.1 | mg/kg dry | 31.3 | < | 94.3 | 75-125 | 1.95 | 20 | |
| Chromium | 36.71 | 0.6 | mg/kg dry | 31.3 | 5.25 | 100 | 75-125 | 1.96 | 20 | |
| Copper | 72.78 | 0.6 | mg/kg dry | 62.7 | 7.05 | 105 | 75-125 | 1.46 | 20 | |
| Lead | 39.79 | 3.1 | mg/kg dry | 31.3 | 8.67 | 99.3 | 75-125 | 35.1 | 20 | MI |
| Manganese | 173.4 | 0.6 | mg/kg dry | 62.7 | 95.10 | 125 | 75-125 | 8.66 | 20 | |
| Nickel | 33.71 | 0.6 | mg/kg dry | 31.3 | 2.26 | 100 | 75-125 | 0.432 | 20 | |
| Selenium | 30.25 | 6.3 | mg/kg dry | 31.3 | < | 96.5 | 75-125 | 3.94 | 20 | |
| Zinc | 108.8 | 0.6 | mg/kg dry | 62.7 | 37.38 | 114 | 75-125 | 3.71 | 20 | |

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CHULA VISTA, CA 91910-

Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## Environmental Chemistry - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B701875** | | | | | | | | | | |
| **Blank (B701875-BLK1)** | | | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Nitrate/Nitrite Nitrogen | < | 0.2 | mg/kg wet | | | | | | | |
| **LCS (B701875-BS1)** | | | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Nitrate/Nitrite Nitrogen | 20.52 | 1.0 | mg/kg wet | 20.0 | | 103 | 85-115 | | | |
| **Matrix Spike (B701875-MS1)** | | **Source: 1524960-01** | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Nitrate/Nitrite Nitrogen | 19.67 | 1.0 | mg/kg dry | 20.0 | < | 98.3 | 80-120 | | | |
| **Matrix Spike Dup (B701875-MSD1)** | | **Source: 1524960-01** | | Prepared & Analyzed: 2017-03-21 | | | | | | |
| Nitrate/Nitrite Nitrogen | 19.78 | 1.0 | mg/kg dry | 20.0 | < | 98.9 | 80-120 | 0.576 | 20 | |
| **Batch B701883** | | | | | | | | | | |
| **Blank (B701883-BLK1)** | | | | Prepared: 2017-03-21 Analyzed: 2017-03-22 | | | | | | |
| Percent Solids | 99.99 | 0.01 | % | | | | | | | |
| **LCS (B701883-BS1)** | | | | Prepared: 2017-03-21 Analyzed: 2017-03-22 | | | | | | |
| Percent Solids | 97.41 | 0.01 | % | 97.6 | | 99.8 | 80-120 | | | |
| **Duplicate (B701883-DUP1)** | | **Source: 1524838-01** | | Prepared: 2017-03-21 Analyzed: 2017-03-22 | | | | | | |
| Percent Solids | 1.540 | 0.01 | % | | 1.520 | | | 1.31 | 20 | |
| **Batch B701906** | | | | | | | | | | |
| **Blank (B701906-BLK1)** | | | | Prepared & Analyzed: 2017-03-22 | | | | | | |
| Total Kjeldahl Nitrogen | < | 100 | mg/kg wet | | | | | | | |

Work Order: 1524960

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Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## Environmental Chemistry - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B701906** | | | | | | | | | | |
| **LCS (B701906-BS1)** | | | | Prepared & Analyzed: 2017-03-22 | | | | | | |
| Total Kjeldahl Nitrogen | 4355 | 250 | mg/kg wet | 4400 | | 99.0 | 85-115 | | | |
| **Matrix Spike (B701906-MS1)** | | **Source: 1524960-01** | | Prepared & Analyzed: 2017-03-22 | | | | | | |
| Total Kjeldahl Nitrogen | 2679 | 264 | mg/kg dry | 2570 | 231.1 | 95.3 | 80-120 | | | |
| **Matrix Spike Dup (B701906-MSD1)** | | **Source: 1524960-01** | | Prepared & Analyzed: 2017-03-22 | | | | | | |
| Total Kjeldahl Nitrogen | 2790 | 264 | mg/kg dry | 2630 | 231.1 | 97.4 | 80-120 | 4.06 | 20 | |

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Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## Pesticide Screen - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B701853** | | | | | | | | | | |
| **Blank (B701853-BLK1)** | | | | Prepared: 2017-03-20 Analyzed: 2017-03-30 | | | | | | |
| Diazinon | < | 0.08 | ug/g | | | | | | | |
| Malathion | < | 0.08 | ug/g | | | | | | | |
| Chlorpyrifos | < | 0.08 | ug/g | | | | | | | |
| **LCS (B701853-BS1)** | | | | Prepared: 2017-03-20 Analyzed: 2017-03-30 | | | | | | |
| Diazinon | < | 0.08 | ug/g | 0.0996 | | | 0-120 | | | |
| Malathion | 0.07 | 0.08 | ug/g | 0.0996 | | 74 | 57.7-120 | | | |
| Chlorpyrifos | 0.07 | 0.08 | ug/g | 0.0996 | | 68 | 59.3-120 | | | |
| **LCS Dup (B701853-BSD1)** | | | | Prepared: 2017-03-20 Analyzed: 2017-03-30 | | | | | | |
| Diazinon | 0.02 | 0.08 | ug/g | 0.0995 | | 22 | 0-120 | 200 | 200 | |
| Malathion | 0.08 | 0.08 | ug/g | 0.0995 | | 80 | 57.7-120 | 8 | 200 | |
| Chlorpyrifos | 0.07 | 0.08 | ug/g | 0.0995 | | 72 | 59.3-120 | 6 | 200 | |
| **Matrix Spike (B701853-MS1)** | | **Source: 1524967-06** | | Prepared: 2017-03-20 Analyzed: 2017-03-30 | | | | | | |
| Diazinon | 0.02 | 0.08 | ug/g | 0.0997 | < | 17 | 0-120 | | | |
| Malathion | 0.08 | 0.08 | ug/g | 0.0997 | < | 80 | 57.7-120 | | | |
| Chlorpyrifos | 0.07 | 0.08 | ug/g | 0.0997 | < | 69 | 59.3-120 | | | |
| **Matrix Spike Dup (B701853-MSD1)** | | **Source: 1524967-06** | | Prepared: 2017-03-20 Analyzed: 2017-03-30 | | | | | | |
| Diazinon | 0.05 | 0.08 | ug/g | 0.0995 | < | 54 | 0-120 | 104 | 200 | |
| Malathion | 0.07 | 0.08 | ug/g | 0.0995 | < | 74 | 57.7-120 | 8 | 200 | |
| Chlorpyrifos | 0.06 | 0.08 | ug/g | 0.0995 | < | 64 | 59.3-120 | 8 | 200 | |

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Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## Certified Analyses included in this Report

| Method | Analyte | Certifications |
|---|---|---|
| ***EPA 353.2 in Solid*** | Nitrate/Nitrite Nitrogen | IA,FL |
| ***EPA 6010B in Solid*** | Antimony | TX,KS,FL,UT,OK,IA,WA |
| | Arsenic | TX,KS,FL,UT,OK,IA,WA |
| | Cadmium | TX,KS,FL,UT,OK,IA,WA |
| | Chromium | TX,KS,FL,UT,OK,IA,WA |
| | Copper | TX,KS,FL,UT,OK,IA,WA |
| | Lead | FL,KS,TX,UT,OK,IA,WA |
| | Manganese | FL,KS,TX,UT,OK,IA,WA |
| | Nickel | FL,KS,TX,UT,OK,IA,WA |
| | Phosphorus | FL,KS,TX,UT,OK,IA,WA |
| | Selenium | FL,KS,TX,UT,OK,IA,WA |
| | Zinc | FL,KS,TX,UT,IA,WA |
| ***PAI-DK 01 in Solid*** | Total Kjeldahl Nitrogen | IA,FL |
| ***SM 2540 G in Solid*** | Percent Solids | FL,IA,WA |

## Non-Certified Analyses included in this Report

| Method | Analyte |
|---|---|
| ***EPA 8141 in Solid*** | Diazinon |
| | Malathion |
| | Chlorpyrifos |
| ***SM 4500-NO2 B-2000 in Solid*** | Nitrite Nitrogen |

| Code | Description | Number | Expires |
|---|---|---|---|
| FL | Florida Department of Health | E87918 | 06/30/2017 |
| FL-B | Florida Department of Health | E871122 | 06/30/2017 |
| IA | Iowa Department of Natural Resources | 064 | 05/01/2017 |
| KS | Kansas Department of Health and Environment | E-10402 | 04/30/2017 |
| OK | Oklahoma Department of Environmental Quality | 2016-085 | 08/31/2017 |
| TX | Texas Commission on Environmental Quality | T104704416-13-5 | 07/31/2017 |
| UT | State of Utah Department of Health | NE000012013-3 Pending | 07/31/2016 |
| WA | State of Washington Department of Ecology | C912 | 06/07/2017 |

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Project: Chollas Creek Soils

Project Manager: CLARKSON LABORATORY & SUPPLY - 11564

**Reported:**
2017-03-23 16:35

## Notes and Definitions

| | |
|---|---|
| MI | Matrix interference suspected in matrix spiked sample. |
| < | Less than reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |

EPA 624, EPA 8260, OA-1, and GRO analyses are conducted in the facility located at 13606 B Street, Omaha, NE 68144. All other analyses are conducted in the main facility located at 13611 B Street, Omaha, NE 68144.

REPORT NUMBER
**17-080-4128 v2**

REPORT DATE
**Mar 21, 2017**

SEND TO
**11564**

RECEIVED DATE
**Mar 17, 2017**

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ISSUE DATE
**Mar 21, 2017**

**CLARKSON LABORATORY & SUPPLY**
**350 TROUSDALE DR**
**CHULA VISTA CA 91910-**

# REPORT OF ANALYSIS

For: (11564) CLARKSON LABORATORY & SUPPLY
SOIL SAMPLE ANALYSIS
54716

| Analysis | | Level Found As Received | Units | Reporting Limit | Method | Analyst-Date | Verified-Date |
|---|---|---|---|---|---|---|---|
| Sample ID: **S06330** | Lab Number: **2645830** | Date Sampled: **2017-03-09 1000** | | | | | |
| Enterobacteriaceae | | 9300 | cfu/g | 10 | AOAC 2003.01 | arj0-2017/03/19 | kej7-2017/03/19 |
| Fecal coliforms | | 14 | MPN/g | 2 | SM 9221 E- (2006) | mtp4-2017/03/21 | arj0-2017/03/21 |
| Total coliforms | | 750 | MPN/g | 3.6 | FDA BAM Chapter 4 | snl7-2017/03/20 | kej7-2017/03/21 |
| Sample ID: **S06331** | Lab Number: **2645831** | Date Sampled: **2017-03-09 1030** | | | | | |
| Enterobacteriaceae | | 32000 | cfu/g | 10 | AOAC 2003.01 | arj0-2017/03/19 | kej7-2017/03/19 |
| Fecal coliforms | | 8 | MPN/g | 2 | SM 9221 E- (2006) | mtp4-2017/03/21 | arj0-2017/03/21 |
| Total coliforms | | 2400 | MPN/g | 3.6 | FDA BAM Chapter 4 | snl7-2017/03/20 | kej7-2017/03/21 |

This report was reissued on 2017-03-21 15:06:49 by sjc9 for the following reason:
CORRECTED SAMPLE ID .
All results are reported on an AS RECEIVED basis., cfu = colony forming unit , MPN = most probable number

For questions please contact:

Sue Ann Seitz
Account Manager
sueann.seitz@midwestlabs.com (402)829-9892

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# REPORT OF ANALYSIS

For: (11564) CLARKSON LABORATORY & SUPPLY
SOIL SAMPLE ANALYSIS
54716

## Detailed Method Description(s)

**Enterobacteriaceae - AOAC 2003.01**

Sample analysis follows MWL MI 290 which is based on AOAC 2003.01. A representative 5g, 25g, or 125g sample is obtained and placed in a stomacher bag along with a 9:1 ratio of phosphate buffer. The stomacher bag is blended to homogenize the sample. Aliquots of the sample are withdrawn and placed on the Petrifilm plates. After the plates are prepared, they are incubated for 24 +/- 2 hours to allow for growth of the organisms at 35 +/- 1C. After plates are incubated, the colonies found on the plates are counted and the levels reported as colony forming units (cfu) per gram.

**Fecal Coliforms-MPN by SM 9221 E**

Sample analysis follows MWL MI 131 which is based on Standard Methods (SM) 9221 E. A minimum of four (4) sample dilutions are required, while five (5) or more are preferred. Each sample dilution is inoculated into five (5) test tubes containing A-1 medium and inverted vials. Sample tubes are incubated in an incubator at 35°C ± 0.5°C for 3 hours and then transferred to a water bath at 44.5°C ± 0.2°C. After 21 hours, tubes are examined for growth and gas production. Results are reported as MPN

**Total Coliforms MPN**

Sample analysis follows MWL MI 312 which is based on FDA/BAM Chapter 4 using the most probable number (MPN) procedure. A representative 25+/-0.5 g sample is obtained and placed in a stomacher bag along with 225 mL of phosphate buffer. The stomacher bag is blended to homogenize the material. Aliquots of the sample are withdrawn and placed into LTB for total coliform.

# L A B O R A T O R Y  R E P O R T

Telephone (619) 425-1993  Fax 425-7917  Established 1928

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350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
A N A L Y T I C A L  A N D  C O N S U L T I N G  C H E M I S T S

Date: March 22, 2017
Purchase Order Number: NONE
Sales Order Number: 34989
Account Number: ALLG

To:
*------------------------------------------------*
Allied Geotechnical Engineers
1810 Gillespie Way Ste 104
El Cajon, CA 92020
Attention: Sani Sutanto

Laboratory Number: SO6330-1  Customers Phone: 449-5900
Fax: 449-5902
Sample Designation:
*------------------------------------------------*
One soil sample received on 03/09/17 at 12:00pm,
taken on 03/09/17 at 10:00am from South Chollas Creek Channel
marked as End of Conc. Channel/N Side.

| Analyte | Results | Units | MDL | Method | Analyzed |
|---|---|---|---|---|---|
| Enterobacteriaceae | 9300 | cfu/g | 10 | AOAC 2003.01* | 03/19/17 |
| Fecal Coliforms | 14 | MPN/g | 2 | SM9221E(2006)* | 03/21/17 |
| Total Coliforms | 750 | MPN/g | 3.6 | FDABAM Chapter4* | 03/20/17 |

Note: Sample sent to a subcontract Laboratory. See attached.
* = See page two on attached report

Rosa M. Bernal

# L A B O R A T O R Y  R E P O R T

Telephone (619) 425-1993  Fax 425-7917  Established 1928

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A N A L Y T I C A L  A N D  C O N S U L T I N G  C H E M I S T S

Date: March 22, 2017
Purchase Order Number: NONE
Sales Order Number: 34989
Account Number: ALLG

To:
*----------*
Allied Geotechnical Engineers
1810 Gillespie Way Ste 104
El Cajon, CA 92020
Attention: Sani Sutanto

Laboratory Number: SO6331-1  Customers Phone: 449-5900
Fax: 449-5902

Sample Designation:
*----------*
One soil sample received on 03/09/17 at 12:00pm,
taken on 03/09/17 at 10:30am from South Chollas Creek Channel
marked as West End of Conc. Channel/So Side.

| Analyte | Results | Units | MDL | Method | Analyzed |
|---|---|---|---|---|---|
| Enterobacteriaceae | 32000 | cfu/g | 10 | AOAC 2003.01* | 03/19/17 |
| Fecal Coliforms | 8 | MPN/g | 2 | SM9221E(2006)* | 03/21/17 |
| Total Coliforms | 2400 | MPN/g | 3.6 | FDABAM Chapter4* | 03/20/17 |

Note: Sample sent to a subcontract Laboratory. See attached.
* = See page two on attached report

Rosa M. Bernal

## Sieve Analysis Laboratory Results of Sediment Samples

**Allied Geotechnical Engineers, Inc.**
*9500 Cuyamaca Street., Suite 102*
*Santee, CA 92071-2685*
*Tel: (619) 449-5900*
*Fax: (619) 449-5902*

**MEMORANDUM**
**VIA ELECTRONIC MAIL**

**DATE:** **March 15, 2017**

**TO:** **Ms. Kelly Doyle**
**Rick Engineering Company**

**FROM:** **Sani Sutanto**

**SUBJECT:** **South Chollas Creek Channel (Map 101)**
**AGE Project No. 154 GS-13-H**

**NUMBER OF PAGES:** **1**

As per your request, here are the particle size distribution (sieve wash) test results.

| | Percent Passing (%) | |
|---|---|---|
| **Sieve Size** | **Sample #1** | **Sample #2** |
| #4 | 100 | 100 |
| #8 | 99.3 | 99.7 |
| #16 | 98.8 | 98.4 |
| #30 | 94.7 | 92.8 |
| #50 | 48.9 | 58.6 |
| #100 | 14.4 | 20.2 |
| #200 | 3.7 | 6.2 |

## Chain of Custody Sheet(s) for Water Column Sampling

1710308

# CHAIN-OF-CUSTODY RECORD

EnviroMatrix Analytical, Inc.
4340 Viewridge Ave., Ste. A - San Diego, CA 92123 - Phone (858) 560-7717 - Fax (858) 560-7763



**EMA LOG #:**

Client: City of San Diego via Rick Engineering Company
Attn: Kelly Doyle
Samplers(s): Kelly Doyle and John Shokohi
Address: 5620 Friars Road
San Diego, CA 92110
Phone: (619) 908-3588 Fax: (619) 291-4165
Email: kdoyle@rickengineering.com
Billing Address: 5620 Friars Road
San Diego, CA 92110
Project ID: South Chollas Creek Map 101
Project #: SouthCollasMap101WQA PO #:

**Requested Analysis**

| ID # | Client Sample ID | Sample Date | Sample Time | Sample Matrix | Container # / Type | Oil & Grease ☐ 413.1 ☐ 413.2 ☐ 1664 | 8015 (TPH) ☐ Gas ☐ Diesel ☐ Ext | 624/8260 (VOC) Full BTXE MTBE Oxy Nap | 625 / 8270 (SVOC) ☐ PAH only | 608 / 8081 (Organochlorine Pesticides) | 608 / 8082 (Polychlorinated Biphenyls) | 8141 (Organophosphorus Pesticides) | TBT (Organotin Compounds) | ☐ pH ☐ EC ☒ TSS ☐ TDS | ☒ Nitrate ☒ Nitrite ☒ TKN ☐ NH3 | CAC Title 22/CAM17 Metals ☐ TTLC ☐ STLC | TCLP (RCRA) ☐ Metals ☐ Organics | Cd Cr Cu Pb Ni Ag Zn ☐ Dissolved | Coliform, ☒ Total (MTF) ☒ Fecal (MTF) | Colilert, T+E.Coli ☐ P/A ☐ Enumeration | Enterococcus, ☒ MTF ☐ Enterolert | Heterotrophic Plate Count (HPC) | ☐ BOD ☐ COD ☐ Cyanide | Total Nitrogen as N, Total Hardness | Sb, As, Cd, Cr, Cu, Pb, Mn | Ni, Se, Zn | Total Phosphate as P | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | South Chollas Creek Map 101 Downstream | 3/9/17 | 11:10am | SW | 6 | | | | | | | X | | X | X | | | | X | | X | | | X | X | X | X | |
| 2 | South Chollas Creek Map 101 Upstream | 3/9/17 | 9:40am | SW | 6 | | | | | | | X | | X | X | | | | X | | X | | | X | X | X | X | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Matrix Codes:** A = Air, DW = Drinking Water, GW = Groundwater, SW = Storm Water
WW = Wastewater, S = Soil, SED = Sediment, SD = Solid, T = Tissue, O = Oil, L = Liquid

**Shipped By:** ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☒ Client Drop Off ☐ Other

[1]**Turn-Around-Time:** ☐ Same Day ☐ 1 day ☐ 2 day ☐ 3 day ☐ 4 day ☐ 5 day ☒ STD (7 day)

[1]**Reporting Requirements:** ☐ Fax ☒ PDF ☐ Excel ☐ Geotracker/EDF ☐ Hard Copy ☐ EDT

[1]**Sample Disposal:** ☒ By Laboratory ☐ [2]Return to Client: P/U or Delivery ☐ Archive

**Sample Integrity**

Correct Containers: Yes No N/A
Containers Properly Preseved: Yes No N/A
Custody Seals Intact: Yes No N/A
Temp @ Receipt: 10° Conice
COC/Labels Agree: Yes No N/A
Sampled By: Client EMA Autosampler

| RELINQUISHED BY | DATE/TIME | RECEIVED BY |
|---|---|---|
| Signature: Kelly Doyle | 3/9/17 | Signature: |
| Print: Kelly Doyle | 12:10 | Print: Mika Mayer |
| Company: Rick Engineering Company | | Company: EMA |
| Signature | | Signature |
| Print | | Print |
| Company: | | Company: |
| Signature | | Signature |
| Print | | Print |
| Company: | | Company: |

**Project/Sample Comments:**

[1]Additional costs may apply. Please note there is a $35 minimum charge for all clients.

[2]EMA reserves the right to return any samples that do not match our waste profile.

NOTE: By relinquishing samples to EMA, Inc., client agrees to pay for the services requested on this COC form and any additional analyses performed on this project. Payment for services is due within 30 days from date of invoice. Samples will be disposed of 7 days after report has been finalized unless otherwise noted. All work is subject to EMA's terms and conditions.

## Analytical Results of Water Column Sample(s)

**EnviroMatrix Analytical, Inc.**

22 March 2017

Rick Engineering Company
Attn: Kelly Doyle
5620 Friars Road
San Diego, California 92110-2596

**EMA Log #: 17C0300**

**Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling**
**Project Desc./#:March 9, 2017**

Enclosed are the results of analyses for samples received by the laboratory on 03/09/17 12:10. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

**Dan Verdon**
**Laboratory Director**

CA ELAP Certification #: 2564

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| South Chollas Creek Map 101 Downstream | 17C0300-01 | Stormwater | 03/09/17 11:10 | 03/09/17 12:10 |
| South Chollas Creek Map 101 Upstream | 17C0300-02 | Stormwater | 03/09/17 09:40 | 03/09/17 12:10 |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Total Metals by EPA 200 Series Methods

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **South Chollas Creek Map 101 Downstream (17C0300-01) Stormwater Sampled: 03/09/17 11:10 Received: 03/09/17 12:10** | | | | | | | | | |
| Arsenic | ND | 0.010 | mg/l | 1 | 7031705 | 03/17/17 | 03/20/17 | EPA 200.7 | |
| Cadmium | ND | 0.010 | " | " | " | " | " | " | |
| Chromium | ND | 0.050 | " | " | " | " | 03/20/17 | " | |
| Copper | ND | 0.050 | " | " | " | " | 03/20/17 | " | |
| **Manganese** | **0.043** | 0.030 | " | " | " | " | 03/20/17 | " | |
| Nickel | ND | 0.050 | " | " | " | " | 03/20/17 | " | |
| Lead | ND | 0.050 | " | " | " | " | " | " | |
| Antimony | ND | 0.100 | " | " | " | " | " | " | |
| **Selenium** | **0.017** | 0.010 | " | " | " | " | " | " | |
| Zinc | ND | 0.050 | " | " | " | " | " | " | |
| **South Chollas Creek Map 101 Upstream (17C0300-02) Stormwater Sampled: 03/09/17 09:40 Received: 03/09/17 12:10** | | | | | | | | | |
| **Arsenic** | **0.011** | 0.010 | mg/l | 1 | 7031705 | 03/17/17 | 03/20/17 | EPA 200.7 | |
| Cadmium | ND | 0.010 | " | " | " | " | " | " | |
| Chromium | ND | 0.050 | " | " | " | " | 03/20/17 | " | |
| Copper | ND | 0.050 | " | " | " | " | 03/20/17 | " | |
| Manganese | ND | 0.030 | " | " | " | " | 03/20/17 | " | |
| Nickel | ND | 0.050 | " | " | " | " | 03/20/17 | " | |
| Lead | ND | 0.050 | " | " | " | " | " | " | |
| Antimony | ND | 0.100 | " | " | " | " | " | " | |
| **Selenium** | **0.017** | 0.010 | " | " | " | " | " | " | |
| Zinc | ND | 0.050 | " | " | " | " | " | " | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Organophosphorus Pesticides by EPA Method 8141A

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **South Chollas Creek Map 101 Downstream (17C0300-01) Stormwater Sampled: 03/09/17 11:10 Received: 03/09/17 12:10** | | | | | | | | | |
| Chlorpyrifos | ND | 0.05 | ug/l | 1 | 7031629 | 03/16/17 | 03/22/17 | EPA 8141A | |
| Diazinon | ND | 0.05 | " | " | " | " | " | " | |
| Malathion | ND | 0.05 | " | " | " | " | " | " | |
| *Surrogate: Triphenyl phosphate* | | *112 %* | *60-130* | | " | " | " | " | |
| *Surrogate: Tribuytlphosphate* | | *108 %* | *60-130* | | " | " | " | " | |
| **South Chollas Creek Map 101 Upstream (17C0300-02) Stormwater Sampled: 03/09/17 09:40 Received: 03/09/17 12:10** | | | | | | | | | |
| Chlorpyrifos | ND | 0.05 | ug/l | 1 | 7031629 | 03/16/17 | 03/22/17 | EPA 8141A | |
| Diazinon | ND | 0.05 | " | " | " | " | " | " | |
| Malathion | ND | 0.05 | " | " | " | " | " | " | |
| *Surrogate: Triphenyl phosphate* | | *88 %* | *60-130* | | " | " | " | " | |
| *Surrogate: Tribuytlphosphate* | | *112 %* | *60-130* | | " | " | " | " | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Conventional Chemistry Parameters by Standard/EPA Methods

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **South Chollas Creek Map 101 Downstream (17C0300-01) Stormwater Sampled: 03/09/17 11:10 Received: 03/09/17 12:10** | | | | | | | | | |
| **Hardness (Total)** | **919** | 50 | mg CaCO3/L | 5 | 7031705 | 03/17/17 | 03/20/17 | EPA 200.7 | |
| **Nitrate as N** | **0.87** | 0.05 | mg/l | 1 | 7031632 | 03/16/17 | 03/16/17 | SM4500 NO3 E | W-02 |
| **Nitrate/Nitrite as N** | **0.89** | 0.05 | " | " | " | " | " | " | |
| Nitrite as N | ND | 0.05 | " | " | 7031103 | 03/11/17 | 03/11/17 | SM4500 NO2 B | |
| **Total Kjeldahl Nitrogen** | **0.5** | 0.5 | " | " | 7031627 | 03/16/17 | 03/16/17 | SM4500 N C | |
| **Total Nitrogen** | **1.4** | 0.5 | " | " | 7032137 | 03/21/17 | 03/21/17 | Calculation | |
| **Phosphorus, Total** | **0.09** | 0.05 | " | " | 7031633 | 03/16/17 | 03/16/17 | SM4500 P B, E | |
| **Total Suspended Solids** | **23.0** | 20.0 | " | " | 7031446 | 03/14/17 | 03/15/17 | SM2540 D | |
| **South Chollas Creek Map 101 Upstream (17C0300-02) Stormwater Sampled: 03/09/17 09:40 Received: 03/09/17 12:10** | | | | | | | | | |
| **Hardness (Total)** | **858** | 50 | mg CaCO3/L | 5 | 7031705 | 03/17/17 | 03/20/17 | EPA 200.7 | |
| **Nitrate as N** | **0.21** | 0.05 | mg/l | 1 | 7031632 | 03/16/17 | 03/16/17 | SM4500 NO3 E | W-02 |
| **Nitrate/Nitrite as N** | **0.22** | 0.05 | " | " | " | " | " | " | |
| Nitrite as N | ND | 0.05 | " | " | 7031103 | 03/11/17 | 03/11/17 | SM4500 NO2 B | |
| Total Kjeldahl Nitrogen | ND | 0.5 | " | " | 7031627 | 03/16/17 | 03/16/17 | SM4500 N C | |
| Total Nitrogen | ND | 0.5 | " | " | 7032137 | 03/21/17 | 03/21/17 | Calculation | |
| **Phosphorus, Total** | **0.06** | 0.05 | " | " | 7031633 | 03/16/17 | 03/16/17 | SM4500 P B, E | |
| Total Suspended Solids | ND | 20.0 | " | " | 7031446 | 03/14/17 | 03/15/17 | SM2540 D | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Microbiological Parameters by Standard Methods

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **South Chollas Creek Map 101 Downstream (17C0300-01) Stormwater Sampled: 03/09/17 11:10 Received: 03/09/17 12:10** | | | | | | | | | |
| **Total Coliforms** | **8000** | 200 | MPN/100 ml | 100 | 7030949 | 03/09/17 | 03/13/17 | SM 9221 B, E | |
| **Fecal Coliforms** | **330** | 20 | " | 10 | " | " | 03/12/17 | " | |
| **Enterococcus** | **240** | 2 | " | 1 | 7030951 | " | 03/13/17 | SM 9230 A, B | |
| **South Chollas Creek Map 101 Upstream (17C0300-02) Stormwater Sampled: 03/09/17 09:40 Received: 03/09/17 12:10** | | | | | | | | | |
| **Total Coliforms** | **5000** | 200 | MPN/100 ml | 100 | 7030949 | 03/09/17 | 03/13/17 | SM 9221 B, E | |
| **Fecal Coliforms** | **170** | 20 | " | 10 | " | " | 03/12/17 | " | |
| **Enterococcus** | **700** | 20 | " | " | 7030951 | " | 03/13/17 | SM 9230 A, B | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

# Total Metals by EPA 200 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031705** | | | | | | | | | | |
| **Blank (7031705-BLK1)** | | | | Prepared: 03/17/17 Analyzed: 03/20/17 | | | | | | |
| Manganese | ND | 0.030 | mg/l | | | | | | | |
| Zinc | ND | 0.050 | " | | | | | | | |
| Nickel | ND | 0.050 | " | | | | | | | |
| Chromium | ND | 0.050 | " | | | | | | | |
| Lead | ND | 0.050 | " | | | | | | | |
| Cadmium | ND | 0.010 | " | | | | | | | |
| Antimony | ND | 0.100 | " | | | | | | | |
| Copper | ND | 0.050 | " | | | | | | | |
| Arsenic | ND | 0.010 | " | | | | | | | |
| Selenium | ND | 0.010 | " | | | | | | | |
| **LCS (7031705-BS1)** | | | | Prepared: 03/17/17 Analyzed: 03/20/17 | | | | | | |
| Zinc | 1.05 | 0.050 | mg/l | 1.00 | | 105 | 75-125 | | | |
| Manganese | 1.03 | 0.030 | " | 1.00 | | 103 | 75-125 | | | |
| Chromium | 1.06 | 0.050 | " | 1.00 | | 106 | 75-125 | | | |
| Lead | 1.04 | 0.050 | " | 1.00 | | 104 | 75-125 | | | |
| Antimony | 1.04 | 0.100 | " | 1.00 | | 104 | 75-125 | | | |
| Nickel | 0.980 | 0.050 | " | 1.00 | | 98 | 75-125 | | | |
| Cadmium | 1.08 | 0.010 | " | 1.00 | | 108 | 75-125 | | | |
| Copper | 1.06 | 0.050 | " | 1.00 | | 106 | 75-125 | | | |
| Arsenic | 1.01 | 0.010 | " | 1.00 | | 101 | 75-125 | | | |
| Selenium | 1.05 | 0.010 | " | 1.00 | | 105 | 75-125 | | | |
| **LCS Dup (7031705-BSD1)** | | | | Prepared: 03/17/17 Analyzed: 03/20/17 | | | | | | |
| Manganese | 1.03 | 0.030 | mg/l | 1.00 | | 103 | 75-125 | 0.5 | 20 | |
| Zinc | 1.03 | 0.050 | " | 1.00 | | 103 | 75-125 | 2 | 20 | |
| Nickel | 0.952 | 0.050 | " | 1.00 | | 95 | 75-125 | 3 | 20 | |
| Chromium | 1.03 | 0.050 | " | 1.00 | | 103 | 75-125 | 2 | 20 | |
| Lead | 1.04 | 0.050 | " | 1.00 | | 104 | 75-125 | 0.3 | 20 | |
| Antimony | 1.04 | 0.100 | " | 1.00 | | 104 | 75-125 | 0.1 | 20 | |
| Copper | 1.02 | 0.050 | " | 1.00 | | 102 | 75-125 | 3 | 20 | |
| Cadmium | 1.05 | 0.010 | " | 1.00 | | 105 | 75-125 | 2 | 20 | |
| Selenium | 1.04 | 0.010 | " | 1.00 | | 104 | 75-125 | 0.4 | 20 | |
| Arsenic | 1.01 | 0.010 | " | 1.00 | | 101 | 75-125 | 0.2 | 20 | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

# Total Metals by EPA 200 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031705** | | | | | | | | | | |
| **Duplicate (7031705-DUP1)** | | **Source: 17C0426-05** | | Prepared: 03/17/17 | Analyzed: 03/20/17 | | | | | |
| Manganese | ND | 0.030 | mg/l | | ND | | | | 20 | |
| Zinc | 0.007 | 0.050 | " | | 0.010 | | | 33 | 20 | QR-04 |
| Nickel | ND | 0.050 | " | | ND | | | | 20 | |
| Lead | ND | 0.050 | " | | ND | | | | 20 | |
| Antimony | ND | 0.100 | " | | ND | | | | 20 | |
| Chromium | ND | 0.050 | " | | ND | | | | 20 | |
| Cadmium | ND | 0.010 | " | | ND | | | | 20 | |
| Copper | ND | 0.050 | " | | ND | | | | 20 | |
| Arsenic | ND | 0.010 | " | | ND | | | | 20 | |
| Selenium | 0.007 | 0.010 | " | | 0.008 | | | 24 | 20 | QR-04 |
| **Matrix Spike (7031705-MS1)** | | **Source: 17C0426-05** | | Prepared: 03/17/17 | Analyzed: 03/20/17 | | | | | |
| Zinc | 1.01 | 0.050 | mg/l | 1.00 | 0.010 | 100 | 75-125 | | | |
| Manganese | 0.994 | 0.030 | " | 1.00 | ND | 99 | 75-125 | | | |
| Chromium | 0.998 | 0.050 | " | 1.00 | ND | 100 | 75-125 | | | |
| Copper | 1.02 | 0.050 | " | 1.00 | ND | 102 | 75-125 | | | |
| Cadmium | 1.05 | 0.010 | " | 1.00 | ND | 105 | 75-125 | | | |
| Nickel | 0.957 | 0.050 | " | 1.00 | ND | 96 | 75-125 | | | |
| Antimony | 1.03 | 0.100 | " | 1.00 | ND | 103 | 75-125 | | | |
| Lead | 1.04 | 0.050 | " | 1.00 | ND | 104 | 75-125 | | | |
| Arsenic | 0.999 | 0.010 | " | 1.00 | ND | 100 | 75-125 | | | |
| Selenium | 1.03 | 0.010 | " | 1.00 | 0.008 | 102 | 75-125 | | | |
| **Matrix Spike (7031705-MS2)** | | **Source: 17C0559-01** | | Prepared: 03/17/17 | Analyzed: 03/20/17 | | | | | |
| Zinc | 0.986 | 0.050 | mg/l | 1.00 | 0.032 | 95 | 75-125 | | | |
| Manganese | 0.986 | 0.030 | " | 1.00 | ND | 99 | 75-125 | | | |
| Antimony | 1.02 | 0.100 | " | 1.00 | ND | 102 | 75-125 | | | |
| Cadmium | 1.04 | 0.010 | " | 1.00 | ND | 104 | 75-125 | | | |
| Lead | 1.01 | 0.050 | " | 1.00 | ND | 101 | 75-125 | | | |
| Nickel | 0.932 | 0.050 | " | 1.00 | 0.006 | 93 | 75-125 | | | |
| Copper | 1.04 | 0.050 | " | 1.00 | 0.010 | 103 | 75-125 | | | |
| Chromium | 0.974 | 0.050 | " | 1.00 | 0.003 | 97 | 75-125 | | | |
| Selenium | 1.03 | 0.010 | " | 1.00 | 0.013 | 102 | 75-125 | | | |
| Arsenic | 1.02 | 0.010 | " | 1.00 | ND | 102 | 75-125 | | | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Total Metals by EPA 200 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031705** | | | | | | | | | | |
| **Matrix Spike Dup (7031705-MSD1)** | | **Source: 17C0426-05** | | Prepared: 03/17/17 Analyzed: 03/20/17 | | | | | | |
| Zinc | 1.04 | 0.050 | mg/l | 1.00 | 0.010 | 103 | 75-125 | 4 | 20 | |
| Manganese | 1.05 | 0.030 | " | 1.00 | ND | 105 | 75-125 | 5 | 20 | |
| Antimony | 1.07 | 0.100 | " | 1.00 | ND | 107 | 75-125 | 4 | 20 | |
| Lead | 1.08 | 0.050 | " | 1.00 | ND | 108 | 75-125 | 3 | 20 | |
| Cadmium | 1.10 | 0.010 | " | 1.00 | ND | 110 | 75-125 | 4 | 20 | |
| Chromium | 1.03 | 0.050 | " | 1.00 | ND | 103 | 75-125 | 3 | 20 | |
| Nickel | 0.991 | 0.050 | " | 1.00 | ND | 99 | 75-125 | 3 | 20 | |
| Copper | 1.06 | 0.050 | " | 1.00 | ND | 106 | 75-125 | 4 | 20 | |
| Arsenic | 1.04 | 0.010 | " | 1.00 | ND | 104 | 75-125 | 4 | 20 | |
| Selenium | 1.06 | 0.010 | " | 1.00 | 0.008 | 105 | 75-125 | 3 | 20 | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

# Organophosphorus Pesticides by EPA Method 8141A - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031629** | | | | | | | | | | |
| **Blank (7031629-BLK1)** | | | | Prepared: 03/16/17 Analyzed: 03/22/17 | | | | | | |
| Chlorpyrifos | ND | 0.05 | ug/l | | | | | | | |
| Diazinon | ND | 0.05 | " | | | | | | | |
| Malathion | ND | 0.05 | " | | | | | | | |
| *Surrogate: Triphenyl phosphate* | *0.250* | | *"* | *0.250* | | *100* | *60-130* | | | |
| *Surrogate: Tribuytlphosphate* | *0.280* | | *"* | *0.250* | | *112* | *60-130* | | | |
| **LCS (7031629-BS1)** | | | | Prepared: 03/16/17 Analyzed: 03/22/17 | | | | | | |
| Bolstar | 0.47 | 0.10 | ug/l | 0.500 | | 94 | 60-130 | | | |
| Diazinon | 0.53 | 0.05 | " | 0.500 | | 106 | 60-130 | | | |
| Ethoprop | 0.58 | 0.05 | " | 0.500 | | 116 | 60-130 | | | |
| Mevinphos | 0.51 | 0.25 | " | 0.500 | | 102 | 60-130 | | | |
| Methyl parathion | 0.41 | 0.10 | " | 0.500 | | 82 | 60-130 | | | |
| Phorate | 0.52 | 0.05 | " | 0.500 | | 104 | 60-130 | | | |
| Ronnel | 0.45 | 0.25 | " | 0.500 | | 90 | 60-130 | | | |
| Trichlorinate | 0.55 | 0.05 | " | 0.500 | | 110 | 60-130 | | | |
| *Surrogate: Triphenyl phosphate* | *0.290* | | *"* | *0.250* | | *116* | *60-130* | | | |
| *Surrogate: Tribuytlphosphate* | *0.280* | | *"* | *0.250* | | *112* | *60-130* | | | |
| **LCS Dup (7031629-BSD1)** | | | | Prepared: 03/16/17 Analyzed: 03/22/17 | | | | | | |
| Bolstar | 0.49 | 0.10 | ug/l | 0.500 | | 98 | 60-130 | 4 | 30 | |
| Diazinon | 0.54 | 0.05 | " | 0.500 | | 108 | 60-130 | 2 | 30 | |
| Ethoprop | 0.47 | 0.05 | " | 0.500 | | 94 | 60-130 | 21 | 30 | |
| Mevinphos | 0.52 | 0.25 | " | 0.500 | | 104 | 60-130 | 2 | 30 | |
| Methyl parathion | 0.49 | 0.10 | " | 0.500 | | 98 | 60-130 | 18 | 30 | |
| Phorate | 0.41 | 0.05 | " | 0.500 | | 82 | 60-130 | 24 | 30 | |
| Ronnel | 0.51 | 0.25 | " | 0.500 | | 102 | 60-130 | 12 | 30 | |
| Trichlorinate | 0.51 | 0.05 | " | 0.500 | | 102 | 60-130 | 8 | 30 | |
| *Surrogate: Triphenyl phosphate* | *0.270* | | *"* | *0.250* | | *108* | *60-130* | | | |
| *Surrogate: Tribuytlphosphate* | *0.220* | | *"* | *0.250* | | *88* | *60-130* | | | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031103** | | | | | | | | | | |
| **Blank (7031103-BLK1)** | | | | Prepared & Analyzed: 03/11/17 | | | | | | |
| Nitrite as N | ND | 0.05 | mg/l | | | | | | | |
| **LCS (7031103-BS1)** | | | | Prepared & Analyzed: 03/11/17 | | | | | | |
| Nitrite as N | 0.10 | 0.05 | mg/l | 0.100 | | 105 | 80-120 | | | |
| **LCS Dup (7031103-BSD1)** | | | | Prepared & Analyzed: 03/11/17 | | | | | | |
| Nitrite as N | 0.11 | 0.05 | mg/l | 0.100 | | 114 | 80-120 | 8 | 20 | |
| **Duplicate (7031103-DUP1)** | | **Source: 17C0304-07** | | Prepared & Analyzed: 03/11/17 | | | | | | |
| Nitrite as N | ND | 0.05 | mg/l | | ND | | | | 20 | |
| **Matrix Spike (7031103-MS1)** | | **Source: 17C0304-07** | | Prepared & Analyzed: 03/11/17 | | | | | | |
| Nitrite as N | 0.10 | 0.05 | mg/l | 0.100 | ND | 99 | 80-120 | | | |
| **Matrix Spike Dup (7031103-MSD1)** | | **Source: 17C0304-07** | | Prepared & Analyzed: 03/11/17 | | | | | | |
| Nitrite as N | 0.10 | 0.05 | mg/l | 0.100 | ND | 100 | 80-120 | 1 | 20 | |
| **Batch 7031446** | | | | | | | | | | |
| **Blank (7031446-BLK1)** | | | | Prepared: 03/14/17 Analyzed: 03/15/17 | | | | | | |
| Total Suspended Solids | ND | 20.0 | mg/l | | | | | | | |
| **Duplicate (7031446-DUP1)** | | **Source: 17C0362-01** | | Prepared: 03/14/17 Analyzed: 03/15/17 | | | | | | |
| Total Suspended Solids | 270 | 20.0 | mg/l | | 276 | | | 2 | 20 | |
| **Reference (7031446-SRM1)** | | | | Prepared: 03/14/17 Analyzed: 03/15/17 | | | | | | |
| Total Suspended Solids | 96.0 | 20.0 | mg/l | 100 | | 96 | 77.1-110 | | | |

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031627** | | | | | | | | | | |
| **Blank (7031627-BLK1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Total Kjeldahl Nitrogen | ND | 0.5 | mg/l | | | | | | | |
| **LCS (7031627-BS1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Total Kjeldahl Nitrogen | 4.7 | 0.5 | mg/l | 5.00 | | 95 | 80-120 | | | |
| **LCS Dup (7031627-BSD1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Total Kjeldahl Nitrogen | 4.9 | 0.5 | mg/l | 5.00 | | 99 | 80-120 | 4 | 20 | |
| **Duplicate (7031627-DUP1)** | | **Source: 17C0117-01** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Total Kjeldahl Nitrogen | ND | 0.5 | mg/l | | ND | | | | 20 | |
| **Matrix Spike (7031627-MS1)** | | **Source: 17C0117-01** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Total Kjeldahl Nitrogen | 4.5 | 0.5 | mg/l | 5.00 | ND | 90 | 80-120 | | | |
| **Matrix Spike Dup (7031627-MSD1)** | | **Source: 17C0117-01** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Total Kjeldahl Nitrogen | 4.4 | 0.5 | mg/l | 5.00 | ND | 88 | 80-120 | 3 | 20 | |
| **Batch 7031632** | | | | | | | | | | |
| **Blank (7031632-BLK1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Nitrate/Nitrite as N | ND | 0.05 | mg/l | | | | | | | |
| Nitrate as N | ND | 0.05 | " | | | | | | | |
| **LCS (7031632-BS1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Nitrate/Nitrite as N | 0.51 | 0.05 | mg/l | 0.500 | | 102 | 80-120 | | | |
| Nitrate as N | 0.51 | 0.05 | " | 0.500 | | 102 | 80-120 | | | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031632** | | | | | | | | | | |
| **LCS Dup (7031632-BSD1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Nitrate/Nitrite as N | 0.49 | 0.05 | mg/l | 0.500 | | 98 | 80-120 | 4 | 20 | |
| Nitrate as N | 0.49 | 0.05 | " | 0.500 | | 98 | 80-120 | 4 | 20 | |
| **Duplicate (7031632-DUP1)** | | **Source: 17C0288-02** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Nitrate/Nitrite as N | 0.06 | 0.05 | mg/l | | 0.08 | | | 17 | 20 | |
| Nitrate as N | 0.06 | 0.05 | " | | 0.08 | | | 17 | 20 | |
| **Matrix Spike (7031632-MS1)** | | **Source: 17C0288-02** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Nitrate/Nitrite as N | 0.59 | 0.05 | mg/l | 0.500 | 0.08 | 103 | 80-120 | | | |
| Nitrate as N | 0.59 | 0.05 | " | 0.500 | 0.08 | 103 | 80-120 | | | |
| **Matrix Spike Dup (7031632-MSD1)** | | **Source: 17C0288-02** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Nitrate/Nitrite as N | 0.59 | 0.05 | mg/l | 0.500 | 0.08 | 102 | 80-120 | 0.3 | 20 | |
| Nitrate as N | 0.59 | 0.05 | " | 0.500 | 0.08 | 102 | 80-120 | 0.3 | 20 | |
| **Batch 7031633** | | | | | | | | | | |
| **Blank (7031633-BLK1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Phosphorus, Total | ND | 0.05 | mg/l | | | | | | | |
| **LCS (7031633-BS1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Phosphorus, Total | 0.51 | 0.05 | mg/l | 0.500 | | 102 | 80-120 | | | |
| **LCS Dup (7031633-BSD1)** | | | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Phosphorus, Total | 0.50 | 0.05 | mg/l | 0.500 | | 100 | 80-120 | 2 | 20 | |
| **Duplicate (7031633-DUP1)** | | **Source: 17C0280-01** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Phosphorus, Total | 0.02 | 0.05 | mg/l | | 0.02 | | | | 20 | |

Client Name: Rick Engineering Company **EMA Log #: 17C0300**
Project Name: South Chollas Creek Channel (Map 101)-WQ Sampling

## Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 7031633** | | | | | | | | | | |
| **Matrix Spike (7031633-MS1)** | | **Source: 17C0280-01** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Phosphorus, Total | 0.51 | 0.05 | mg/l | 0.500 | 0.02 | 97 | 80-120 | | | |
| **Matrix Spike Dup (7031633-MSD1)** | | **Source: 17C0280-01** | | Prepared & Analyzed: 03/16/17 | | | | | | |
| Phosphorus, Total | 0.52 | 0.05 | mg/l | 0.500 | 0.02 | 101 | 80-120 | 3 | 20 | |
| **Batch 7031705** | | | | | | | | | | |
| **Blank (7031705-BLK1)** | | | | Prepared: 03/17/17 Analyzed: 03/20/17 | | | | | | |
| Hardness (Total) | ND | 10 | mg CaCO3/L | | | | | | | |
| **Duplicate (7031705-DUP1)** | | **Source: 17C0426-05** | | Prepared: 03/17/17 Analyzed: 03/20/17 | | | | | | |
| Hardness (Total) | ND | 10 | mg CaCO3/L | | ND | | | | 20 | |

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

## Notes and Definitions

| | |
|---|---|
| W-02 | The sample for nitrate analysis was preserved with H2SO4 after the nitrite portion of the analysis was completed to extend the holding time for the sample. Nitrate results are corrected for the nitrite contribution per the method. |
| QR-04 | The RPD between the sample and sample duplicate is not valid since both results are below the reporting limit for this analyte. |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |

1C0300

# CHAIN-OF-CUSTODY RECORD

EnviroMatrix Analytical, Inc.
4340 Viewridge Ave., Ste. A - San Diego, CA 92123 - Phone (858) 560-7717 - Fax (858) 560-7763

**EMA LOG #:**

Client: City of San Diego via Rick Engineering Company
Attn: Kelly Doyle
Samplers(s): Kelly Doyle and John Shokohi
Address: 5620 Friars Road
San Diego, CA 92110
Phone: (619) 908-3588 Fax: (619) 291-4165
Email: kdoyle@rickengineering.com
Billing Address: 5620 Friars Road
San Diego, CA 92110
Project ID: South Chollas Creek Map 101
Project #: SouthCollasMap101WQA PO #:

**Requested Analysis**

| ID # | Client Sample ID | Sample Date | Sample Time | Sample Matrix | Container # / Type | Oil & Grease □ 413.1 □ 413.2 □ 1664 | 8015 (TPH) □ Gas □ Diesel □ Ext | 624/8260 (VOC) Full BTXE MTBE Oxy Nap | 625 / 8270 (SVOC) □ PAH only | 608 / 8081 (Organochlorine Pesticides) | 608 / 8082 (Polychlorinated Biphenyls) | 8141 (Organophosphorus Pesticides) | TBT (Organotin Compounds) | □ pH □ EC X TSS □ TDS | X Nitrate X Nitrite X TKN □ NH3 | CAC Title 22/CAM17 Metals □ TTLC □ STLC | TCLP (RCRA) □ Metals □ Organics | Cd Cr Cu Pb Ni Ag Zn □ Dissolved | X Coliform, X Total (MTF) X Fecal (MTF) | Colilert, T+E.Coli □ P/A □ Enumeration | Enterococcus, X MTF □ Enterolert | Heterotrophic Plate Count (HPC) | □ BOD □ COD □ Cyanide | Total Nitrogen as N, Total Hardness | Sb, As, Cd, Cr, Cu, Pb, Mn | Ni, Se, Zn | Total Phosphate as P | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | South Chollas Creek Map 101 Downstream | 3/9/17 | 11:10am | SW | 6 | | | | | | | | | X | X | | | | X | | X | | | X | X | X | X | |
| 2 | South Chollas Creek Map 101 Upstream | 3/9/17 | 9:40am | SW | 6 | | | | | | | X | | X | X | | | | X | | X | | | X | X | X | X | |
| 3 | | | | | | | | | | | | X | | X | X | | | | X | | X | | | X | X | X | X | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Matrix Codes:** A = Air, DW = Drinking Water, GW = Groundwater, SW = Storm Water
WW = Wastewater, S = Soil, SED = Sediment, SD = Solid, T = Tissue, O = Oil, L = Liquid

**Shipped By:** □ Courier □ UPS □ FedEx □ USPS X Client Drop Off □ Other

[1]**Turn-Around-Time:** □ Same Day □ 1 day □ 2 day □ 3 day □ 4 day □ 5 day X STD (7 day)

[1]**Reporting Requirements:** □ Fax X PDF □ Excel □ Geotracker/EDF □ Hard Copy □ EDT

[1]**Sample Disposal:** X By Laboratory □ [2]Return to Client: P/U or Delivery □ Archive

**Sample Integrity**

| | |
|---|---|
| Correct Containers: Yes No N/A | Containers Properly Preseved: Yes No N/A |
| Custody Seals Intact: Yes No N/A | Temp @ Receipt: 10°C on ice |
| COC/Labels Agree: Yes No N/A | Sampled By: Client EMA Autosampler |

| RELINQUISHED BY | DATE/TIME | RECEIVED BY |
|---|---|---|
| Signature: Kelly Doyle | 3/9/17 | Signature: |
| Print: Kelly Doyle | 12:10 | Print: Nifa Mayo |
| Company: Rick Engineering Company | | Company: EMA |
| Signature: | | Signature: |
| Print: | | Print: |
| Company: | | Company: |
| Signature: | | Signature: |
| Print: | | Print: |
| Company: | | Company: |

**Project/Sample Comments:**

[1]Additional costs may apply. Please note there is a $35 minimum charge for all clients.

[2]EMA reserves the right to return any samples that do not match our waste profile.

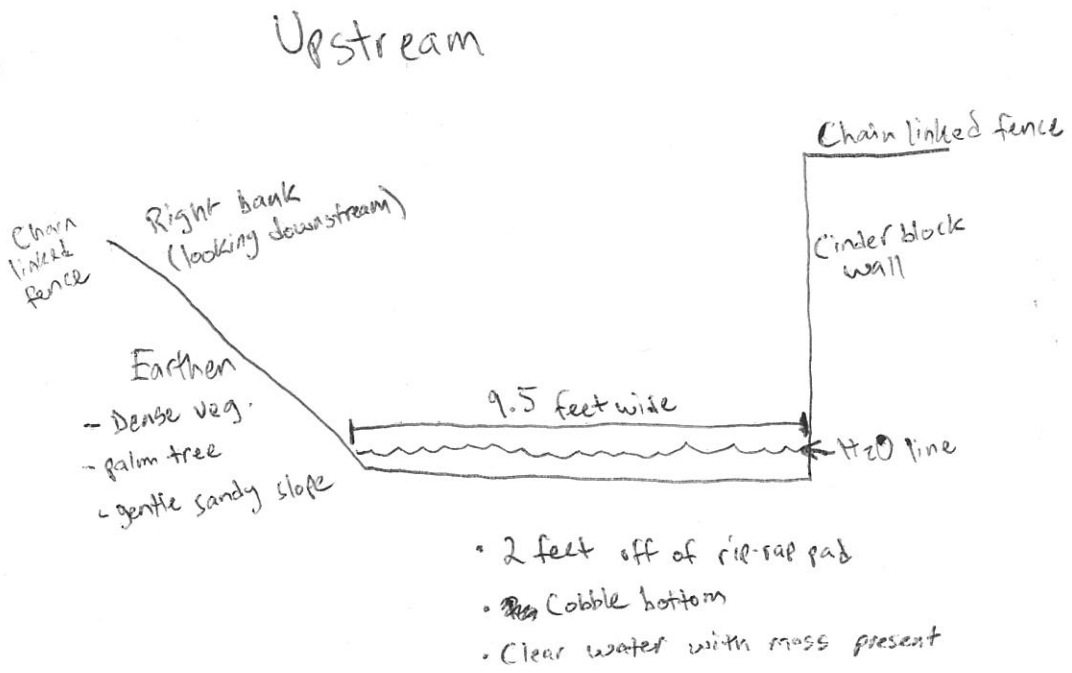
NOTE: By relinquishing samples to EMA, Inc., client agrees to pay for the services requested on this COC form and any additional analyses performed on this project. Payment for services is due within 30 days from date of invoice. Samples will be disposed of 7 days after report has been finalized unless otherwise noted. All work is subject to EMA's terms and conditions.

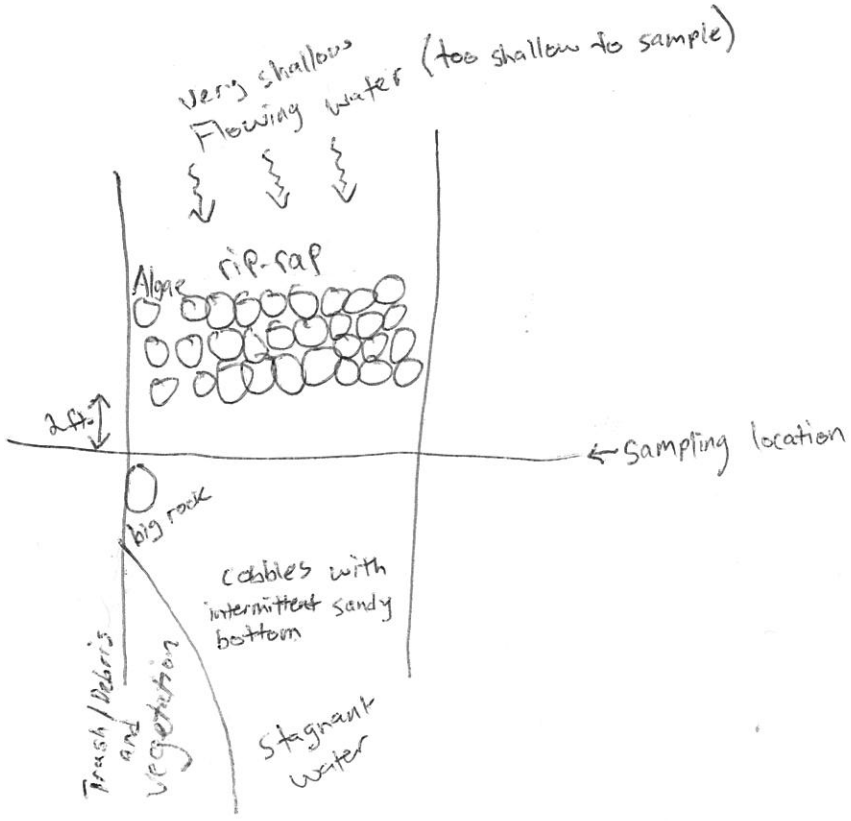
## Attachment 4: Flow Measurement Model

## Flow Measurement Field Sheets

South Chollas Creek Channel Map 101 - Flow Measurement Sample
Cross-section Sketch

Date: 3/9/17



## Cross Section Measurement Field Form

| | |
|---|---|
| Client: City of San Diego | Date/Time: 3/9/17 9:50 AM |
| Project Name: South Chollas Creek Channel Map 181 | Location Description: Upstream Sampling Location |
| Field Crew: Kelly Doyle, John Shokohi | Associated Sample ID: N/A |

### Cross Section Measurements

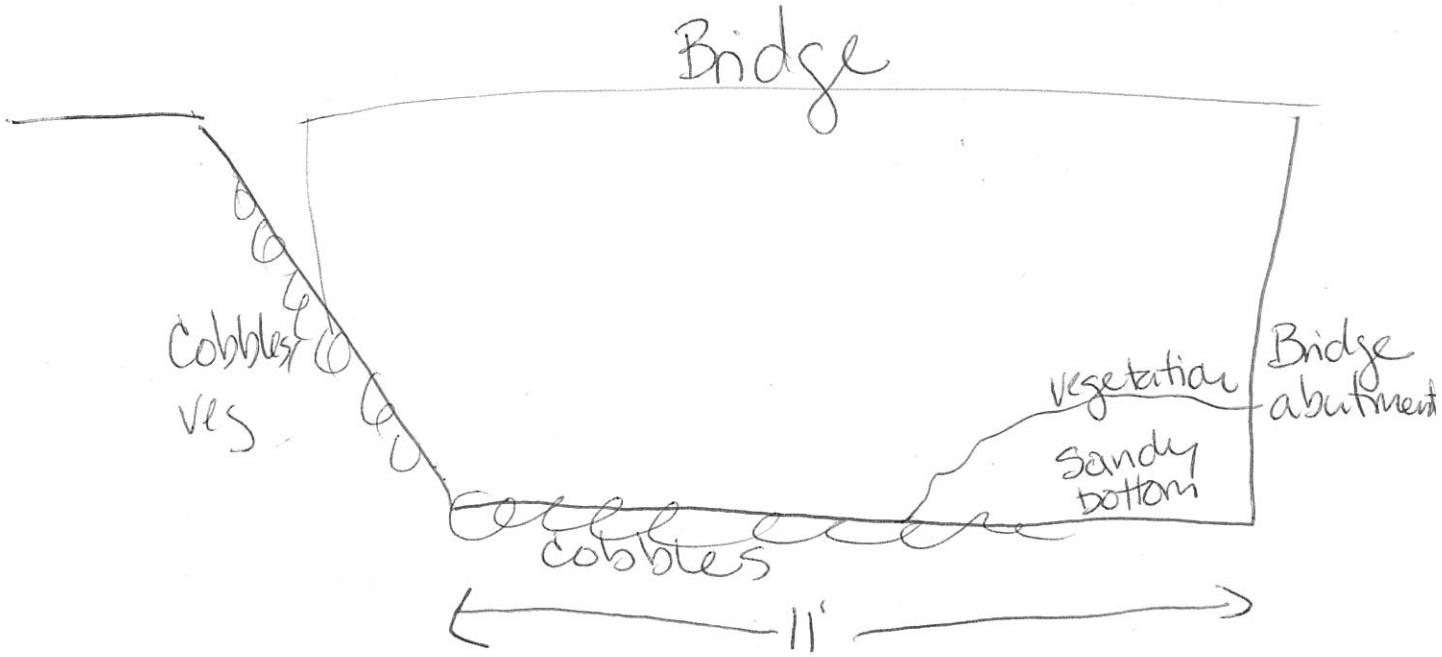
| X Measurement From Left Bank (ft) (Facing Upstream) | Y Depth of Water (inches) | Velocity (ft/sec) | Standard Deviation | Notes |
|---|---|---|---|---|
| 1 ft. | 0.72 in | -0.03 | N/A | Wetted channel = 9.5 - feet wide. Initial Point = 0 in. |
| | | | | ~9:50 AM 2 feet downstream of rip-rap pad |
| | | | | Clear water with moss present; Cobble bottom |
| 2 ft. | 0.68 in | 0.12 | N/A | ~9:50 AM 60% depth; light flow |
| | | | | |
| 3 ft. | 0.80 in | 0.03 | N/A | ~9:50 AM 60% depth; still on cobble |
| | | | | Algae growth on rocks. |
| 4 ft. | 0.96 in | -0.01 | N/A | ~9:50 AM 60% depth; stagnant water |
| | | | | still on cobble. |
| 5 ft. | 1.24 in | -0.02 | N/A | ~9:50 AM 60% depth; deeper water |
| | | | | still clear in color. |
| 6 ft. | 1.10 in | -0.04 | N/A | ~9:50 AM still on cobble; stagnant water |
| | | | | measured at 60% depth. |
| 7 ft. | 0.90 in | -0.02 | N/A | ~9:50 AM 60% depth; More sediment on channel |
| | | | | bottom; stagnant water. |
| 8 ft. | 0.75 in | 0.05 | N/A | ~9:50 AM 60% depth; very slow flowing water |
| | | | | |
| 9 ft. | 0.70 in | -0.02 | N/A | ~9:50 AM 60% depth; stagnant water; |
| | | | | sediment present on channel bottom |
| | | | | |
| | | | | - Cinder block wall on left side of channel |
| | | | | facing downstream |
| | | | | |
| | | | | - Earthen right bank (facing downstream) with dense |
| | | | | vegetation, palm tree, and sandy slope. |
| | | | | |

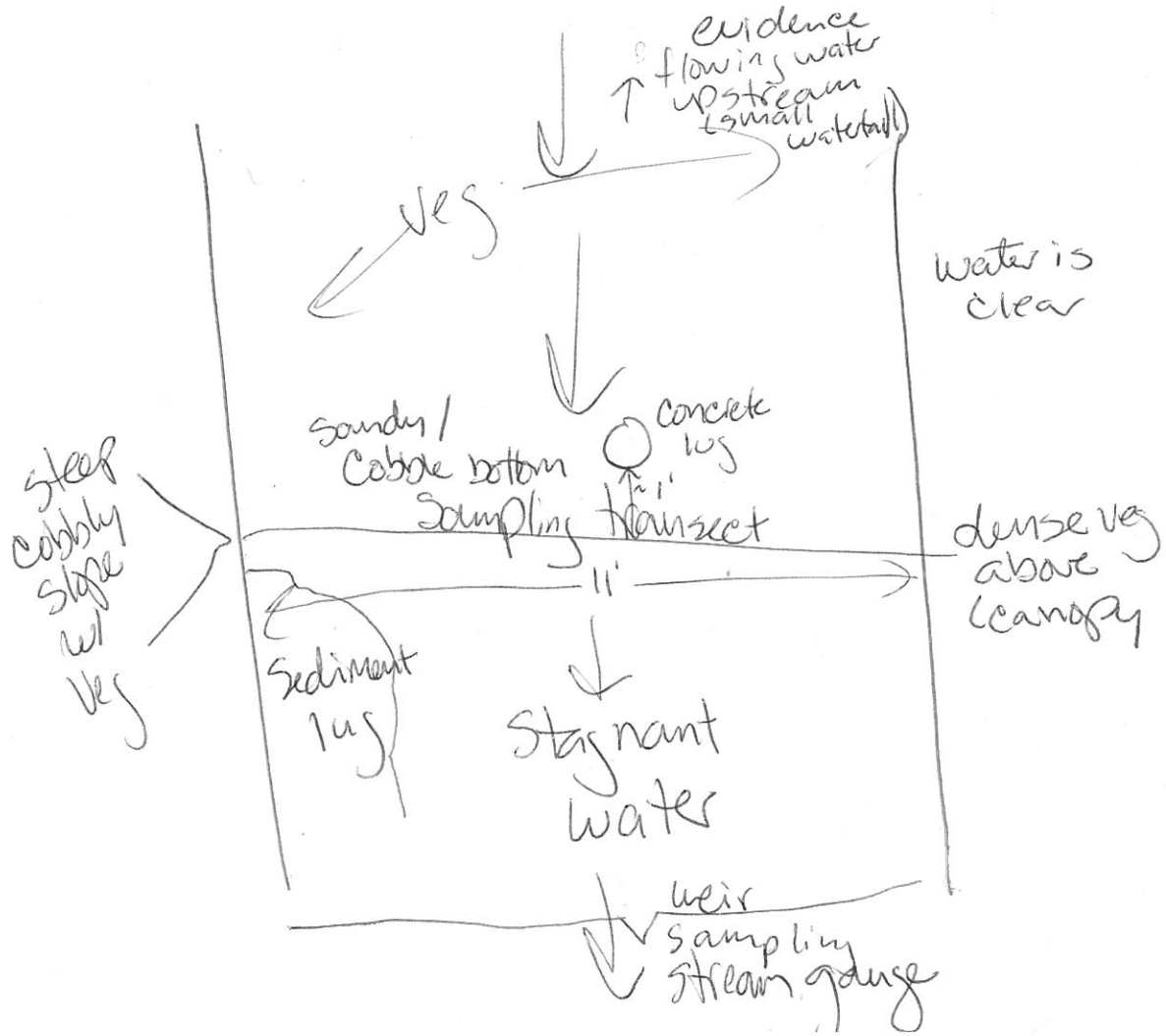
Left and Right Bank are determined when looking downstream
LWB = left wetted bank - where surface water terminates at the left bank
RWB = right wetted bank - where surface water terminates at the right bank
X Measurement = difference in horizontal distance from LWB
Y Depth of Water = difference in vertical distance from channel bottom to surface of water
Velocity - measured with YSI 556 (with flow cell) Flow Meter

South Chollas Creek Channel Map 101 - Flow Measurement Sample
Cross-section Sketch

Date: 3/9/17

left bank
looking upstream



## Cross Section Measurement Field Form

| | |
|---|---|
| Client: City of San Diego | Date/Time: 3/9/17 11:20 AM |
| Project Name: South Chollas Creek Channel Map 101 | Location Description: Downstream Sampling Location |
| Field Crew: Kelly Doyle, John Shokohi | Associated Sample ID: N/A |

### Cross Section Measurements

| X Measurement From Left Bank (ft) (Facing Upstream) | Y Depth of Water (inches) | Velocity (ft/sec) | Standard Deviation | Notes |
|---|---|---|---|---|
| 1 ft. | 0.38 in | -0.03 | N/A | Wetted Channel = 11-feet wide. Initial Point = 0 in. |
| | | | | ~11:20 AM just upstream of bridge at Federal Blvd. |
| | | | | 60% depth; cobble bottom |
| 2 ft. | 0.50 in | 0.05 | N/A | ~11:20 AM 60% depth; very light flow |
| | | | | still on cobble. |
| 3 ft. | 0.48 in | 0.09 | N/A | ~11:20 AM 60% depth; light flow |
| | | | | |
| 4 ft. | 0.52 in | 0.10 | N/A | ~11:20 AM 60% depth; still on cobble |
| | | | | light flow. |
| 5 ft. | 0.42 in | 0.10 | N/A | ~11:20 AM 60% depth; clear water |
| | | | | |
| 6 ft. | 0.30 in | 0.03 | N/A | ~11:20 AM 60% depth; still on cobble with |
| | | | | more sediment observed |
| 7 ft. | <0.10 in | N/A | N/A | - Water level too shallow for a measurable |
| | | | | velocity reading with the flow meter |
| 8 ft. | <0.10 in | N/A | N/A | - Water level too shallow for a measurable velocity |
| | | | | reading with the flow meter |
| 9 ft. | <0.10 in | N/A | N/A | - Water level too shallow for a measurable velocity |
| | | | | reading with the flow meter. |
| 10 ft. | <0.10 in | N/A | N/A | - Water level too shallow for a measurable velocity |
| | | | | reading with the flow meter. |
| 11 ft. | <0.10 in | N/A | N/A | - water level too shallow for a measurable |
| | | | | velocity reading with the flow meter. |
| | | | | |
| | | | | - Sediment and vegetation build up along the right side |
| | | | | (looking upstream) of the channel caused shallow depth. |

Left and Right Bank are determined when looking downstream
LWB = left wetted bank - where surface water terminates at the left bank
RWB = right wetted bank - where surface water terminates at the right bank
X Measurement = difference in horizontal distance from LWB
Y Depth of Water = difference in vertical distance from channel bottom to surface of water
Velocity - measured with YSI 556 (with flow cell) Flow Meter

## Flow Measurement Calculation Sheets

## Total Flow Calculations

| | |
|---|---|
| Location ID: | South Chollas Creek Map 101 Upstream |
| Date: | 3/9/2017 |
| Time: | ~9:50 AM |

| | |
|---|---|
| Average Channel Velocity( ft/s)= | 0.065 |
| Total Q (cfs)= | 0.15 |

| X Measurement from Left Bank (ft) | Water Depth (ft) | Velocity (ft/sec) | Effective Segment Area ($ft^2$) | Q (cfs) | Time sample was taken | Notes |
|---|---|---|---|---|---|---|
| 1 | 0.72 | -0.03 | 0 | 0.00 | ~9:50 AM | Slowly flowing, clear water, cobble and sandy bottom of creek, algae growing on cobble |
| 2 | 0.68 | 0.12 | 0.7 | 0.08 | ~9:50 AM | Same as above |
| 3 | 0.8 | 0.03 | 0.74 | 0.02 | ~9:50 AM | Same as above |
| 4 | 0.96 | -0.01 | 0 | 0.00 | ~9:50 AM | Same as above |
| 5 | 1.24 | -0.02 | 0 | 0.00 | ~9:50 AM | Same as above |
| 6 | 1.1 | -0.04 | 0 | 0.00 | ~9:50 AM | Same as above |
| 7 | 0.9 | -0.02 | 0 | 0.00 | ~9:50 AM | Same as above |
| 8 | 0.75 | 0.05 | 0.825 | 0.04 | ~9:50 AM | Same as above |
| 9 | 0.7 | -0.02 | 0 | 0.00 | ~9:50 AM | Same as above |

## Total Flow Calculations

| | |
|---|---|
| Location ID: | South Chollas Creek Map 101 Downstream |
| Date: | 3/9/2017 |
| Time: | ~11:20 AM |

| | |
|---|---|
| Average Channel Velocity( ft/s)= | 0.077 |
| Total Q (cfs)= | 0.17 |

| X Measurement from Left Bank (ft) | Water Depth (ft) | Velocity (ft/sec) | Effective Segment Area ($ft^2$) | Q (cfs) | Time sample was taken | Notes |
|---|---|---|---|---|---|---|
| 1 | 0.38 | -0.03 | 0 | 0.00 | ~11:20 AM | Cobble and sandy bottom, clear water, flowing slowly, |
| 2 | 0.5 | 0.05 | 0.44 | 0.02 | ~11:20 AM | Same as above |
| 3 | 0.48 | 0.09 | 0.49 | 0.04 | ~11:20 AM | Same as above |
| 4 | 0.52 | 0.1 | 0.5 | 0.05 | ~11:20 AM | Same as above |
| 5 | 0.42 | 0.1 | 0.47 | 0.05 | ~11:20 AM | Same as above |
| 6 | 0.3 | 0.03 | 0.36 | 0.01 | ~11:20 AM | Same as above |
| 7 | <0.1 | N/A | 0 | 0.00 | ~11:20 AM | Sandy bottom, water too shallow to measure flow, vegetation growing in this area |
| 8 | <0.1 | N/A | 0 | 0.00 | ~11:20 AM | Same as above |
| 9 | <0.1 | N/A | 0 | 0.00 | ~11:20 AM | Same as above |
| 10 | <0.1 | N/A | 0 | 0.00 | ~11:20 AM | Same as above |
| 11 | <0.1 | N/A | 0 | 0.00 | ~11:20 AM | Same as above |

## Attachment 5: Channel Wetland Assessment

## Wetland Land Assessment Scoring Field Notes (Existing Condition)

WATER QUALITY VALUE

| | | |
|---|---|---|
| **Vegetation – Vegetative cover of water surface, vertical density, & species diversity** | | |
| **0** | • No visible vegetation in wet areas | |
| **1** | • Young growth of new inhabitants<br>• Woody and terrestrial species present<br>• Minimal wetland species (submerged and/or emergent macrophytes)<br>• Low surface area coverage and density | 1 |
| **2** | • Mature population near carrying capacity<br>• >50% coverage of wet areas<br>• Both submerged and emergent wetland species | |
| **3** | • Young life-stage and population<br>• >75% coverage of wet areas<br>• Both submerged and emergent wetland species<br>• Wetland species that reproduce through tubers and/or rhizomes (e.g., *Spartina, Typha, Scirpus, Phragmites*) | |
| **Hydrosoil – Sample surficial sediments for ratio of sand to fines (Measure conductivity, redox, and/or pH)** | | |
| **0** | • Concrete or other impermeable substrate<br>• No sand and/or fines, organic carbon, detritus, and/or nutrient source | majority of channel |
| **1** | • Sand and cobble substrate<br>• No visible deposition of fines, organic carbon, and/or detritus<br>• pH<6 or >8<br>• Redox: +100 mV | 1 (average) |
| **2** | • Less than 50% sand<br>• Some visible deposition of fines, organic carbon, and/or detritus<br>• Neutral pH (6.0 to 8.5) pH 7.73-8.13<br>• Redox: -100 to +100 mV | |
| **3** | • Less than 25% sand<br>• Visible deposition of fines and other solids<br>• Neutral pH (6.0 to 8.5)<br>• Redox: < -100 mV | |
| **Hydroperiod – Observe water flow, hydraulic retention time, and depth (Measure conductivity, redox, and/or pH)** | | |
| **0** | • No visible surface water | |
| **1** | • Very deep (> 2-ft) or very shallow (< 0.5-ft)<br>• Fast flowing and channeling, no deposition of fines<br>• Redox: > +100 mV | |
| **2** | • Shallow (0.5 to 1-ft )<br>• Moderate and variable flow depending on volume inputs<br>• Observable HRT, some deposition of fines<br>• Redox: -100 to +100 mV | |
| **3** | • Moderate water depth (1 to 2-ft) could increase to 1.5-3ft<br>• Slow flow with a significant HRT (> 1 h), deposition of fines<br>• Redox: < -100 mV HRT= 4.79 hours | 3 |
| **Total score from all three categories 0-2 = poor, 3-4 = fair, 5-7 = good, 8-9 = best** | | 5 |

## Wetland Land Recovery Assessment Field Notes (Maintained Storm Water Facility)

RECOVERY VALUE & TIMELINE

Assumption: Removal of >75% of solids will result in:

- A change in vegetation density and population diversity?
- Decrease in available organic carbon, sand, nutrients, and detritus?
- Decrease in COC concentrations?
- A change in water depth, flow, HRT, deposition/settling rates?
- A change in substrate for vegetative repopulation?

| | | |
|---|---|---|
| **Vegetation – Timeline to mature life-stage with removal of >75% of sediment and standing crop** | | |
| **0** | • Will not recover in less than 10 years | |
| **1** | • Primarily trees and woody species<br>• Recovery: > 5 years<br>• Shift to a less desirable species diversity than current species | |
| **2** | • Mature habitat with mix of terrestrial and wetland species<br>• Recovery: 1-5 years<br>• Return to current standing crop and diversity | 2 |
| **3** | • Primarily emergent and submerged wetland species<br>• Recovery: approximately 1 year<br>• Return to species density and diversity | |
| **Hydrosoil – What is the sedimentation rate and timeline to return to current depth?** | | |
| **0** | • High flow area, narrow and/or shallow channel<br>• No deposition of organic carbon, nutrients and/or detritus | |
| **1** | • Flow is significant<br>• Primarily sand deposition in the short-term<br>• Fines and/or organic carbon will deposit over a > 5 year period | |
| **2** | • Heterogenous mix of sand, organic carbon, and fines in < 1 year | |
| **3** | • Heterogenous mix of sand, organic carbon, and fines in 1-5 years | 3 |
| **Hydroperiod – What is timeline for reaching optimal depth of 1 to 2-ft of overlying water?** | | |
| **0** | • Flow remains fast<br>• No evidence of deposition or re-establishment of vegetation<br>• No HRT | |
| **1** | • Some decrease of flow resulting in some deposition of sand and other coarse grain materials<br>• Some revegetation<br>• No HRT | |
| **2** | • Wide area of the channel<br>• Some deposition of fines and evidence of revegetation<br>• Overlying water depth is less than 1-ft<br>• HRT < 1-h | 2 |
| **3** | • Wide area of the channel<br>• Deposition of fines and organics<br>• Overlying water depth is greater than 1-ft<br>• HRT > 1-h | |
| **Total score from all three categories 0-2 = poor, 3-4 = fair, 5-7 = good, 8-9 = best** | | 7 |

## Attachment 6: Impact-Benefits Model

**Table 8S – Sediment Pollutant Loading Model for the South Bank of Channel (Benefit Load Removal in Sediment)**

**Table 8S - Sediment Pollutant Loading Model for the South Bank of Channel**

| SAMPLE NAME | MATRIX | SAMPLE DATE | ANALYTE | SURROGATE | RESULT | REPORTING LIMIT | UNITS | LOAD REMOVAL (mg) | LOAD REMOVAL (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| SO6331-1 | Soil | 3/9/2017 | % Solid | | 75.73 | 0.01 | % | NA | NA |
| SO6331-1 | Soil | 3/9/2017 | Manganese | | 95.1 | 0.7 | mg/kg | 73586275.33 | 162 |
| SO6331-1 | Soil | 3/9/2017 | Total Kjeldahl Nitrogen | | ND | 264 | mg/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Nitrate as N | | ND | 1 | mg/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Nitrite as N | | ND | 0.5 | mg/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Phosphorus, Total as P | | 117.5 | 6.5 | mg/kg | 90918899.59 | 200 |
| SO6331-1 | Soil | 3/9/2017 | Arsenic | | ND | 6.5 | mg/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Cadmium | | ND | 0.1 | mg/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Chromium | | 5.2 | 0.7 | mg/kg | 4023644.918 | 9 |
| SO6331-1 | Soil | 3/9/2017 | Copper | | 7.1 | 0.7 | mg/kg | 5493822.869 | 12 |
| SO6331-1 | Soil | 3/9/2017 | Nickel | | 2.3 | 0.7 | mg/kg | 1779689.098 | 4 |
| SO6331-1 | Soil | 3/9/2017 | Lead | | 8.7 | 3.3 | mg/kg | 6731867.459 | 15 |
| SO6331-1 | Soil | 3/9/2017 | Antimony | | ND | 6.5 | mg/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Selenium | | ND | 6.5 | mg/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Zinc | | 37.4 | 0.7 | mg/kg | 28939292.3 | 64 |
| SO6331-1 | Soil | 3/9/2017 | Malathion | | ND | 0.8 | ug/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Chlorpyrifos | | ND | 0.8 | ug/kg | - | - |
| SO6331-1 | Soil | 3/9/2017 | Diazinon | | ND | 0.8 | ug/kg | - | - |
| **SAMPLE NAME** | **MATRIX** | **SAMPLE DATE** | **ANALYTE** | **SURROGATE** | **RESULT** | **REPORTING LIMIT** | **UNITS** | **LOAD REMOVAL** | **UNITS** |
| SO6331-1 | Soil | 3/9/2017 | Enterobacteriaceae | | 32000 | 10 | cfu/g | 24760891.8 | cfu |
| SO6331-1 | Soil | 3/9/2017 | Fecal Coliforms | | 8 | 2 | MPN/g | 6190.222951 | MPN |
| SO6331-1 | Soil | 3/9/2017 | Total Coliforms | | 2400 | 3.6 | MPN/g | 1857066.885 | MPN |

Total Removal Volume Estimate at IMP stage

| | | |
|---|---|---|
| Total Removal Volume | 1,410 | yd3 |
| Number Sample Collected | 2 | unitless |
| Removal Fraction | 0.5 | |
| Removal Volume | 705.0 | $ft^3/yd$ |
| yd3 to ft3 | 27 | |
| Removal Volume | 19,035 | $ft^3$ |
| | | |
| $\rho_{solid}$ = | 165.4 | lbs/ft3 |
| $\rho_{water}$= | 62.4 | lbs/ft3 |
| Fraction Solid= | 0.7573 | unitless |
| $\rho_{dry\ insitu}$ = | 89.43058268 | lbs/ft3 |
| | | |
| $\%_{Finer}$= | 1 | decimal percent |
| $CF_{cobble}$= | 1 | unitless |
| Sediment Mass | 1,702,311 | lbs |
| lbs to kg | 0.4545455 | kg/lbs |
| ug to lbs | 2.2E-09 | lbs/ug |
| mg to lbs | 0.0000022 | lbs/mg |

**Table 8N – Sediment Pollutant Loading Model for the North Bank of Channel (Benefit Load Removal in Sediment)**

**Table 8N - Sediment Pollutant Loading Model for the North Bank of Channel**

| SAMPLE NAME | MATRIX | SAMPLE DATE | ANALYTE | SURROGATE | RESULT | REPORTING LIMIT | UNITS | LOAD REMOVAL (mg) | LOAD REMOVAL (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| SO6330-1 | Soil | 3/9/2017 | % Solid | | 85.76 | 1 | % | NA | NA |
| SO6330-1 | Soil | 3/9/2017 | Manganese | | 107.4 | 0.6 | mg/kg | 106725897 | 235 |
| SO6330-1 | Soil | 3/9/2017 | Total Kjeldahl Nitrogen | | ND | 233 | mg/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Nitrate as N | | ND | 1 | mg/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Nitrite as N | | ND | 0.2 | mg/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Phosphorus, Total as P | | 1453 | 5.8 | mg/kg | 1443880146 | 3177 |
| SO6330-1 | Soil | 3/9/2017 | Arsenic | | ND | 0.1 | mg/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Cadmium | | ND | 0.1 | mg/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Chromium | | 7.3 | 0.6 | mg/kg | 7254181.05 | 16 |
| SO6330-1 | Soil | 3/9/2017 | Copper | | 18.1 | 0.6 | mg/kg | 17986394.1 | 40 |
| SO6330-1 | Soil | 3/9/2017 | Nickel | | 3.2 | 0.6 | mg/kg | 3179914.98 | 7 |
| SO6330-1 | Soil | 3/9/2017 | Lead | | 20.5 | 2.9 | mg/kg | 20371330.4 | 45 |
| SO6330-1 | Soil | 3/9/2017 | Antimony | | ND | 5.8 | mg/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Selenium | | ND | 5.8 | mg/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Zinc | | 55.9 | 0.6 | mg/kg | 55549139.8 | 122 |
| SO6330-1 | Soil | 3/9/2017 | Malathion | | ND | 0.8 | ug/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Chlorpyrifos | | ND | 0.8 | ug/kg | - | - |
| SO6330-1 | Soil | 3/9/2017 | Diazinon | | ND | 0.8 | ug/kg | - | - |
| **SAMPLE NAME** | **MATRIX** | **SAMPLE DATE** | **ANALYTE** | **SURROGATE** | **RESULT** | **REPORTING LIMIT** | **UNITS** | **LOAD REMOVAL** | **UNITS** |
| SO6330-1 | Soil | 3/9/2017 | Enterobacteriaceae | | 9300 | 10 | cfu/g | 9241627.92 | cfu |
| SO6330-1 | Soil | 3/9/2017 | Fecal Coliforms | | 14 | 2 | MPN/g | 13912.128 | MPN |
| SO6330-1 | Soil | 3/9/2017 | Total Coliforms | | 750 | 3.6 | MPN/g | 745292.574 | MPN |

Total Removal Volume Estimate at IMP stage

| | | |
|---|---|---|
| Total Removal Volume | 1,410 | yd3 |
| Number Sample Collected | 2 | unitless |
| Removal Fraction | 0.5 | |
| Removal Volume | 705.0 | $ft^3/yd$ |
| yd3 to ft3 | 27 | |
| Removal Volume | 19,035 | $ft^3$ |
| | | |
| $\rho_{solid}$ = | 165.4 | lbs/ft3 |
| $\rho_{water}$= | 62.4 | lbs/ft3 |
| Fraction Solid= | 0.8576 | unitless |
| $\rho_{dry\ insitu}$ = | 114.8511338 | lbs/ft3 |
| | | |
| $\%_{Finer}$= | 1 | decimal percent |
| $CF_{cobble}$= | 1 | unitless |
| Sediment Mass | 2,186,191 | lbs |
| lbs to kg | 0.4545455 | kg/lbs |
| mg to lbs | 0.0000022 | lbs/mg |

**Table 9 – Comparison of Pollutant Concentrations to Human Health Screening Level**

**Table 9 - Comparison of Pollutant Concentrations to Human Health Screening Levels**

| Analyte | Concentration (mg/kg) | | | | | | | Human Health | |
|---|---|---|---|---|---|---|---|---|---|
| | Reach | | | | | | | | |
| | Downstream | Upstream | - | - | - | - | - | CHHSL/RSL (mg/kg) | |
| | Sample ID | | | | | | | | |
| | SO6331-1 | SO6330-1 | - | - | - | - | - | Residential | Commercial/Industrial |
| **General Physical** | | | | | | | | | |
| **% Solids** | 85.76 | 75.73 | - | - | - | - | - | NA | NA |
| **Inorganic Non-Metals** | | | | | | | | | |
| Total Kjeldahl Nitrogen | ND | ND | - | - | - | - | - | NA | NA |
| Nitrate as N | ND | ND | - | - | - | - | - | 130,000 | 1,900,000 |
| Nitrite as N | ND | ND | - | - | - | - | - | 7,800 | 120,000 |
| Phosphorus, Total as P | 117.5 | 1453.0 | - | - | - | - | - | 1.6 | 23 |
| **Metals** | | | | | | | | | |
| Manganese | 95.1 | 107.4 | - | - | - | - | - | 1,800 | 26,000 |
| Arsenic | ND | ND | - | - | - | - | - | 0.07 | 0.24 |
| Cadmium | ND | ND | - | - | - | - | - | 1.7 | 7.5 |
| Chromium * | 5.2 | 7.3 | - | - | - | - | - | 100,000 | 100,000 |
| Copper | 7.1 | 18.1 | - | - | - | - | - | 3,000 | 38,000 |
| Nickel | 2.3 | 3.2 | - | - | - | - | - | 1,600 | 16,000 |
| Lead | 8.7 | 20.5 | - | - | - | - | - | 80 | 320 |
| Antimony | ND | ND | - | - | - | - | - | 30 | 380 |
| Selenium | ND | ND | - | - | - | - | - | 380 | 4,800 |
| Zinc | 37.4 | 55.9 | - | - | - | - | - | 23,000 | 100,000 |
| **Organics** | | | | | | | | | |
| Malathion | ND | ND | - | - | - | - | - | 1,300 | 16,000 |
| Chlorpyrifos | ND | ND | - | - | - | - | - | 63 | 820 |
| Diazinon | ND | ND | - | - | - | - | - | 44 | 570 |
| **Microbiological** | | | | | | | | | |
| Total Coliforms | 2400.0 | 750.0 | - | - | - | - | - | N/A | N/A |
| Fecal Coliforms | 8.0 | 14.0 | - | - | - | - | - | N/A | N/A |
| Enterococcus | 32000.0 | 9300.0 | - | - | - | - | - | N/A | N/A |

**Notes:**

CHHSL - California Human Health Screening Level, Updated as of 2010

RSL- Regional Screening Level, USEPA Region 9

* Human Health Standards Listed for Chromium (III)

mg/kg - milligrams per kilogram

NA- No Human Level available

**Table 10U – Potential Water Quality Impacts Model for the Upstream Sampling Location**

**Table 10U -Water Quality Impacts Model - Upstream (Sheet 1 of 2)**

| SAMPLE NAME | MATRIX | SAMPLE DATE | ANALYTE | SURROGATE | RESULT | REPORTING LIMIT | UNITS | $E_{NTS}$ | Corr $E_{NTS}$ | NTS Removal (mg) | NTS Removal (lbs) | NTS Removal (lbs) existing per year | NTS Removal (lbs) existing per maintenance period | Corr $E_{NTS,}$ nyear = 1 | Corr $E_{NTS,}$ nyear = 2 | Corr $E_{NTS,}$ nyear = 3 | NTS Removal (lbs) maintaned nyear = 1 | NTS Removal (lbs) maintaned nyear = 2 | NTS Removal (lbs) maintaned nyear = 3 | NTS Removal (lbs) maintaned TOTAL | Sediment Removal (lbs) | Maintained Removal (lbs) | Maintained - Existing Removal (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Total Dissolved Solids | | - | - | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Total Suspended Solids | | ND | 20.0 | mg/l | 0.78 | 0.468 | - | - | - | - | 0.260 | 0.442 | 0.624 | - | - | - | - | NA | NA | NA |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Arsenic | | 0.011 | 0.01 | mg/l | 0.63 | 0.378 | 100912.2815 | 0.222007019 | 0.222007019 | 0.666021058 | 0.210 | 0.357 | 0.504 | 0.1 | 0.2 | 0.3 | 0.6 | ND | 1 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Cadmium | | ND | 0.01 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Chromium | | ND | 0.05 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | 24.81121713 | 25 | 24.8 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Copper | | ND | 0.05 | mg/l | 0.4 | 0.24 | - | - | - | - | 0.133 | 0.227 | 0.320 | - | - | - | - | 51.65647736 | 52 | 51.7 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Manganese | | ND | 0.03 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | 396.6867782 | 397 | 396.7 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Nickel | | ND | 0.05 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | 10.91112898 | 11 | 10.9 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Lead | | ND | 0.05 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | 59.62703518 | 60 | 59.6 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Antimony | | ND | 0.1 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Selenium | | 0.017 | 0.01 | mg/l | 0.63 | 0.378 | 155955.3441 | 0.343101757 | 0.343101757 | 1.029305271 | 0.210 | 0.357 | 0.504 | 0.2 | 0.3 | 0.5 | 1.0 | ND | 1 | -0.1 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Zinc | | ND | 0.05 | mg/l | 0.54 | 0.324 | - | - | - | - | 0.180 | 0.306 | 0.432 | - | - | - | - | 185.8745507 | 186 | 185.9 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Total Kjeldahl Nitrogen | | ND | 0.5 | mg/l | 0.15 | 0.09 | - | - | - | - | 0.050 | 0.085 | 0.120 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Nitrite as N | | ND | 0.05 | mg/l | 0.67 | 0.402 | - | - | - | - | 0.223 | 0.380 | 0.536 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Nitrate as N | | 0.21 | 0.25 | mg/l | 0.67 | 0.402 | 2048825.109 | 4.50741524 | 4.50741524 | 13.52224572 | 0.223 | 0.380 | 0.536 | 2.5 | 4.3 | 6.0 | 12.8 | ND | 13 | -0.8 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Phosphorus, Total as P | | 0.06 | 0.05 | mg/l | 0.51 | 0.306 | 445586.6975 | 0.980290735 | 0.980290735 | 2.940872204 | 0.170 | 0.289 | 0.408 | 0.5 | 0.9 | 1.3 | 2.8 | 3376.557901 | 3379 | 3376.4 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Malathion | Triphenyl phosphat | ND | 0.05 | ug/l | 0.5 | 0.3 | - | - | - | - | 0.167 | 0.283 | 0.400 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Chlorpyrifos | Triphenyl phosphat | ND | 0.05 | ug/l | 0.5 | 0.3 | - | - | - | - | 0.167 | 0.283 | 0.400 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Diazinon | Triphenyl phosphat | ND | 0.05 | ug/l | 0.5 | 0.3 | - | - | - | - | 0.167 | 0.283 | 0.400 | - | - | - | - | - | - | - |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Total Hardness | | 858 | 100 | mg $CaCO_3$/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Total Coliforms | | 5000 | 200 | MPN/100 mL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0 | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Fecal Coliforms | | 170 | 20 | MPN/100 mL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0 | 0 | 0.0 |
| South Chollas Creek Map 101 Upstream | Water | 3/9/2017 | Enterococcus | | 700 | 2 | MPN/100 mL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | | | | | | | | | | | | | | | | | | | | TOTAL= | 4105 |

| | | Units |
|---|---|---|
| Dry Weather Instantaneous Flow (upstream) | 0.15 | ft3/sec |
| Daily Flow | 12739.68 | ft3/day |
| Days of dry weather flow per year | 334 | days |
| Annual Treatment Flow | 4.3E+06 | ft3/year |
| | | |
| Total length | 1,225 | ft |
| Average channel velocity | 0.07102312 | ft/sec |
| HRT | 4.791084605 | hours |
| Retention Time Correction Factor | 0.199628525 | days |
| | | |
| Existing Vegetation Score | 1.0 | |
| Existing Hydrosoil Score | 1.0 | |
| Existing Hydroperiod Score | 3.0 | |
| Overall Existing Score | 5.0 | |
| Existing Efficiency Coefficient | 0.60 | |
| L to ft3 conversion | 0.035 | ft3/L |
| | | |
| | | |
| | | |
| | | |
| Overall Recovery Score | 7.0 | |
| Maintenance Period | 3 | years |

| nyear | Yearly Rec Score | Yearly Eff Coef |
|---|---|---|
| 1 | 2.3 | 0.333333333 |
| 2 | 4.7 | 0.566666667 |
| 3 | 7.0 | 0.8 |

**Table 10D – Potential Water Quality Impacts Model for the Downstream Sampling Location**

**Table 10D -Water Quality Impacts Model - Downstream (Sheet 2 of 2)**

This downstream Water Sample is optional and is not utilized in calculations. It is used primarily to aid in verifying the scoring system and calculation of flow, volume and retention time

| SAMPLE NAME | MATRIX | SAMPLE DATE | ANALYTE | SURROGATE | RESULT | REPORTING LIMIT | UNITS | $E_{NTS}$ | Corr $E_{NTS}$ | NTS Removal (mg) | NTS Removal (lbs) | NTS Removal (lbs) existing per year | NTS Removal (lbs) existing per maintenance period | Corr $E_{NTS}$, nyear = 1 | Corr $E_{NTS}$, nyear = 2 | Corr $E_{NTS}$, nyear = 3 | NTS Removal (lbs) maintened nyear = 1 | NTS Removal (lbs) maintened nyear = 2 | NTS Removal (lbs) maintened nyear = 3 | NTS Removal (lbs) maintened TOTAL | Sediment Removal (lbs) | Maintained Removal (lbs) | Maintained - Existing Removal (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Total Dissolved Solids | | - | - | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Total Suspended Solids | | 23 | 20 | mg/l | 0.78 | 0.468 | 10884838.44 | 23.94664458 | 23.94664458 | 71.83993374 | 0.260 | 0.442 | 0.624 | 13.3 | 22.6 | 31.9 | 67.8 | NA | NA | NA |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Arsenic | | ND | 0.01 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Cadmium | | ND | 0.01 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Chromium | | ND | 0.05 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | 24.81121713 | 25 | 24.8 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Copper | | ND | 0.05 | mg/l | 0.4 | 0.24 | - | - | - | - | 0.133 | 0.227 | 0.320 | - | - | - | - | 51.65647736 | 52 | 51.7 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Manganese | | 0.043 | 0.03 | mg/l | 0.63 | 0.378 | 16436.47009 | 0.036160234 | 0.036160234 | 0.108480703 | 0.210 | 0.357 | 0.504 | 0.0 | 0.0 | 0.0 | 0.1 | 396.6867782 | 397 | 396.7 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Nickel | | ND | 0.05 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | 10.91112898 | 11 | 10.9 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Lead | | ND | 0.05 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | 59.62703518 | 60 | 59.6 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Antimony | | ND | 0.1 | mg/l | 0.63 | 0.378 | - | - | - | - | 0.210 | 0.357 | 0.504 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Selenium | | 0.017 | 0.01 | mg/l | 0.63 | 0.378 | 6498.139339 | 0.014295907 | 0.014295907 | 0.04288772 | 0.210 | 0.357 | 0.504 | 0.0 | 0.0 | 0.0 | 0.0 | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Zinc | | ND | 0.05 | mg/l | 0.54 | 0.324 | - | - | - | - | 0.180 | 0.306 | 0.432 | - | - | - | - | 185.8745507 | 186 | 185.9 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Total Kjeldahl Nitrogen | | 0.5 | 0.5 | mg/l | 0.15 | 0.09 | 45505.17745 | 0.10011139 | 0.10011139 | 0.300334171 | 0.050 | 0.085 | 0.120 | 0.1 | 0.1 | 0.1 | 0.3 | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Nitrite as N | | ND | 0.05 | mg/l | 0.67 | 0.402 | - | - | - | - | 0.223 | 0.380 | 0.536 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Nitrate as N | | 0.87 | 0.05 | mg/l | 0.67 | 0.402 | 353666.2391 | 0.778065726 | 0.778065726 | 2.334197178 | 0.223 | 0.380 | 0.536 | 0.4 | 0.7 | 1.0 | 2.2 | ND | 2 | -0.1 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Phosphorus, Total as P | | 0.09 | 0.05 | mg/l | 0.51 | 0.306 | 27849.1686 | 0.061268171 | 0.061268171 | 0.183804513 | 0.170 | 0.289 | 0.408 | 0.0 | 0.1 | 0.1 | 0.2 | 3376.557901 | 3377 | 3376.5 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Malathion | Triphenyl Phosphate, T | ND | 0.05 | mg/l | 0.5 | 0.3 | - | - | - | - | 0.167 | 0.283 | 0.400 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Chlorpyrifos | Triphenyl Phosphate, T | ND | 0.05 | mg/l | 0.5 | 0.3 | - | - | - | - | 0.167 | 0.283 | 0.400 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Diazinon | Triphenyl Phosphate, T | ND | 0.05 | mg/l | 0.5 | 0.3 | - | - | - | - | 0.167 | 0.283 | 0.400 | - | - | - | - | ND | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Total Hardness | | 919 | 50 | mg $CaCO_3$/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Total Coliforms | | 8000 | 200 | MPN/100 mL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0 | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Fecal Coliforms | | 330 | 20 | MPN/100 mL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0 | 0 | 0.0 |
| South Chollas Map 101 Downstream | Water | 3/9/2017 | Enterococcus | | 240 | 2 | MPN/100 mL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | | | | | | | | | | | | | | | | | | | | TOTAL= | 4106 |

| | | Units |
|---|---|---|
| Dry Weather Instantaneous Flow (upstream) | 0.15 | ft3/sec |
| Daily Flow | 12739.68 | ft3/day |
| Days of dry weather flow per year | 334 | days |
| Annual Treatment Flow | 4.3E+06 | ft3/year |
| | | |
| Total length | 1225 | ft |
| Average channel velocity | 0.07102312 | ft/sec |
| HRT | 4.791084605 | hours |
| HRT- (based on velocity and length) | 0.199628525 | days |
| | | |
| Existing Vegetation Score | 1.0 | |
| Existing Hydrosoil Score | 1.0 | |
| Existing Hydroperiod Score | 3.0 | |
| Overall Existing Score | 5.0 | |
| Existing Efficiency Coefficient | 0.60 | |
| L to ft3 conversion | 0.035 | ft3/L |
| If Retention Time < 24 hrs: RT correction factor | 0.008317855 | |
| If Retention Time > 24 hrs: RT correction factor | 1 | |
| | | |
| | | |
| Overall Recovery Score | 7.0 | |
| Maintenance Period | 3 | years |

| nyear | Yearly Rec Score | Yearly Eff Coef |
|---|---|---|
| 1 | 2.3 | 0.333333333 |
| 2 | 4.7 | 0.566666667 |
| 3 | 7.0 | 0.8 |

**Table 11 – Comparison of Pollutant Concentrations to Water Quality Benchmarks for South Chollas Creek Channel Map 101**

**Table 11 - Comparison of Pollutant Concentrations to Water Quality Benchmarks**

| ANALYTE | Sample Date | CONCENTRATION | | Water Quality Benchmark | Benchmark Source | Units |
|---|---|---|---|---|---|---|
| | | Upstream | Downstream | | | |
| | | SAMPLE ID-UPSTREAM | SAMPLE ID-DOWNSTREAM | | | |
| **Wet Chemistry** | | | | | | |
| Total Suspended Solids (TSS) | 3/9/2017 | ND | 23 | NA | NA | mg/L |
| Total Hardness | 3/9/2017 | 858 | 919 | NA | NA | mg/L |
| Total Phosphorus as P | 3/9/2017 | 0.06 | 0.09 | 0.1 | Basin Plan page 3-9 | mg/L |
| Totak Kjeldahl Nitrogen (TKN) | 3/9/2017 | ND | 0.5 | NA | NA | mg/L |
| Nitrite as N | 3/9/2017 | ND | ND | 1 | Basin Plan page 3-26① | mg/L |
| Nitrate as N | 3/9/2017 | 0.21 | 0.87 | 10 | Basin Plan page 3-26① | mg/L |
| Total Nitrogen as N | 3/9/2017 | | | | | |
| **Total Metals** | | | | | | |
| Arsenic (As) | 3/9/2017 | 0.011 | ND | 0.05 | Basin Plan page 3-26① | mg/L |
| Antimony (Sb) | 3/9/2017 | ND | ND | 0.006 | Basin Plan page 3-26① | mg/L |
| Cadmium (Cd) | 3/9/2017 | ND | ND | 0.005 | Basin Plan page 3-26① | mg/L |
| Chromium* (Cr) | 3/9/2017 | ND | ND | 0.05 | Basin Plan page 3-26① | mg/L |
| Copper (Cu) | 3/9/2017 | ND | ND | 1 | Basin Plan page 3-31 | ug/L |
| Lead (Pb) | 3/9/2017 | ND | ND | 65/2.5 | 40 CFR 131.38 | mg/L |
| Manganese | 3/9/2017 | ND | 0.043 | 0.05 | Basin Plan page 3-31 | mg/L |
| Nickel (Ni) | 3/9/2017 | ND | ND | 0.1 | Basin Plan page 3-26① | mg/L |
| Selenium (Se) | 3/9/2017 | 0.017 | 0.017 | 0.05 | Basin Plan page 3-26① | mg/L |
| Zinc (Zn) | 3/9/2017 | ND | ND | 5 | Basin Plan page 3-31 | mg/L |
| **Microbiological** | | | | | | |
| Fecal Coliform | 3/9/2017 | 170 | 330 | 400 | Basin Plan page 3-7 | Organisms/100mL |
| Total Coliform | 3/9/2017 | 5000 | 8000 | 1,000 | Basin Plan page 3-7 | Organisms/100mL |
| Enterococcus | 3/9/2017 | 700 | 240 | 151 | Basin Plan page 3-7 | Colonies/100mL |
| **Organics** | | | | | | |
| Malathion | 3/9/2017 | ND | ND | 0.43 | CDFG (1998) | µg/L |
| Chlorpyrifos | 3/9/2017 | ND | ND | 0.02/0.014 | CDFG (2000) | µg/L |
| Diazinon | 3/9/2017 | ND | ND | 0.08/0.05 | Basin Plan page 7-3 | µg/L |

**Notes:**

**mg/L**- milligrams per liter
**µg/L** - micrograms per liter
**mL** - milliliters
**e** - estimated value
**NA** - No benchmark set
**0.43/0.1** - CMC /CCC (Acute/Chronic)
**MPN** - Most Probable Number
**CFU** - Colony Forming Units
**CMC**- Criteria Maximum Concentration
**CCC** - Continuous Criteria Concentration

① - Per California Code of Regulations, Title 22, Table 64431-A of section 64431

**Basin Plan** - Water Quality Control Plan for the San Diego Basin (9), September 8, 1994 (with amendments effective on or before April 4, 2011)
**40 CFR 131.38** - Establishment of numeric criteria for priority toxic pollutants for the State of California
**Calculated** - Per USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000
* Chromium benchmarks based on total chromium (Basin Plan) or chromium (III) (40 CFR 131.38)

**Table 12 – Comparison of Impacts to Benefits**

**Table 12 - Comparison of Impacts to Benefits**

| Analyte | Benefit | Units | Impact | | | | | Net Benefit vs. Impact (Maintained - Existing Load Removal (lbs) (Table 10U) |
|---|---|---|---|---|---|---|---|---|
| | **Benefit** [Estimated Sediment Pollutant Load Removal] (Tables 8S and 8N) | | **Estimated Annual Existing Pollutant Load Removal Capacity (Tables 10U and 10D)** | **Maintenance Period (yrs) (Tables 10U and 10D)** | **Estimated Existing Pollutant Load Removal Capacity per Maintenance Period (Existing Pollutant Removal)(lbs) (Table 10U)** | **Estimated Maintained Pollutant Load Removal Capacity per Maintenance Period (Maintained Pollutant Removal) (lbs) (Table 10U)** | **Impact** (Estimated Maintained Pollutant Load Removal Capacity - Estimated Existing Pollutant Load Removal Capacity per maintenace period) | |
| Arsenic | ND | Lb | 0.2 | 3 | 0.7 | 0.6 | 0.0 | 0.0 |
| Cadmium | ND | Lb | - | 3 | - | - | 0.0 | 0.0 |
| Chromium | 24.8 | Lb | - | 3 | - | - | 0.0 | 24.8 |
| Copper | 51.7 | Lb | - | 3 | - | - | 0.0 | 51.7 |
| Manganese | 396.7 | Lb | - | 3 | - | - | 0.0 | 396.7 |
| Nickel | 10.9 | Lb | - | 3 | - | - | 0.0 | 10.9 |
| Lead | 59.6 | Lb | - | 3 | - | - | 0.0 | 59.6 |
| Antimony | ND | Lb | - | 3 | - | - | 0.0 | 0.0 |
| Selenium | ND | Lb | 0.3 | 3 | 1.0 | 1.0 | -0.1 | -0.1 |
| Zinc | 185.9 | Lb | - | 3 | - | - | 0.0 | 185.9 |
| Total Kjeldahl Nitrogen | ND | Lb | - | 3 | - | - | 0.0 | 0.0 |
| Nitrite as N | ND | Lb | - | 3 | - | - | 0.0 | 0.0 |
| Nitrate as N | ND | Lb | 4.5 | 3 | 13.5 | 12.8 | -0.8 | -0.8 |
| Phosphorus, Total as P | 3376.6 | Lb | 1.0 | 3 | 2.9 | 2.8 | -0.2 | 3376.4 |
| Malathion | ND | Lb | - | 3 | - | - | 0.0 | 0.0 |
| Chlorpyrifos | ND | Lb | - | 3 | - | - | 0.0 | 0.0 |
| Diazinon | ND | Lb | - | 3 | - | - | 0.0 | - |
| Total Coliform | 2602359.5 | MPN/g | NA | 3 | NA | NA | 0.0 | NA |
| Fecal Coliform | 20102.4 | MPN/g | NA | 3 | NA | NA | 0.0 | NA |
| Enterococcus | 34002519.7 | CFU/g | NA | 3 | NA | NA | 0.0 | NA |

**Notes:**

ND - Not Detected above Laboratory Reporting Limit

--Analyte not detected in either sediment or water

## Attachment 7: Potential Mitigation Efforts Model

## Applicable PEIR Mitigation Measures

# CHAPTER 11.0 MITIGATION MONITORING AND REPORTING PROGRAM

Section 21081.6 of the State of California Public Resources Code requires a Lead or Responsible Agency that approves or carries out a project where an environmental impact report (EIR) has identified significant environmental effects to adopt a "reporting or monitoring program for adopted or required changes to mitigate or avoid significant environmental effects." The City of San Diego is the lead Agency for the Master Program PEIR, and, therefore, is responsible for implementation of the MMRP. Because the PEIR recommends measures to mitigate these impacts, an MMRP is required to ensure that adopted mitigation measures are implemented.

As Lead Agency for the proposed project under CEQA, the City of San Diego will administer the MMRP for the following environmental issue areas: biological resources, historical resources, land use policies, paleontological resources, and water quality.

## GENERAL

***General Mitigation 1:*** Prior to commencement of work, the ADD Environmental Designee of the Entitlements Division shall verify that mitigation measures for impacts to biological resources (Mitigation Measures 4.3.1 through 4.3.20), historical resources (Mitigation Measures 4.4.1 and 4.4.2), land use policy (Mitigation Measures 4.1.1 through 4.1.13), paleontological resources (Mitigation Measure 4.7.1), and water quality (Mitigation Measures 4.8.1 through 4.8.3) have been included in entirety on the submitted maintenance documents and contract specifications, and included under the heading, "Environmental Mitigation Requirements." In addition, the requirements for a Pre-maintenance Meeting shall be noted on all maintenance documents.

***General Mitigation 2:*** Prior to the commencement of work, a Pre-maintenance Meeting shall be conducted and include, as appropriate, the MMC, SWD Project Manager, Biological Monitor, Historical Monitor, Paleontological Monitor, Water Quality Specialist, and Maintenance Contractor, and other parties of interest.

***General Mitigation 3:*** Prior to the commencement of work, evidence of compliance with other permitting authorities is required, if applicable. Evidence shall include either copies of permits issued, letters of resolution issued by the Responsible Agency documenting compliance, or other evidence documenting compliance and deemed acceptable by the ADD Environmental Designee.

***General Mitigation 4:*** Prior to commencement of work and pursuant to Section 1600 et seq. of the State of California Fish & Game Code, evidence of compliance with Section 1605 is required, if applicable. Evidence shall include either copies of permits issued, letters of resolution issued by the Responsible Agency documenting compliance, or other evidence documenting compliance and deemed acceptable by the ADD Environmental Designee.

## WATER QUALITY

Potential impacts to water quality would be reduced to below a level of significance through implementation of the following mitigation measures.

***Mitigation Measure 4.8.1*:** Prior to commencement of any activity within a specific annual maintenance program, a qualified water quality specialist shall prepare an IWQA for each area proposed to be maintained. The IWQA shall be prepared in accordance with the specifications included in the Master Program. If the IWQA indicates that maintenance would impact a water pollutant where the existing level for that pollutant exceeds or is within 25 percent of the standard established by the San Diego Basin Plan, mitigation measures identified in Table 4.8-8 shall be incorporated into the IMP to reduce the impact to within the established standard for that pollutant.

**Table 4.8-8**
**MITIGATION MEASURES FOR REDUCED POLLUTANT REMOVAL CAPACITY**

| Mitigation Measure | Pollutant Type | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bacteria | Metals | Nutrients | Pesticides | Sediment | TDS/ Chloride Sulfates | Trash |
| Remove kelp on beaches | | | | | ● | ● | |
| Sweep streets | ● | ● | ● | ● | ● | ● | ● |
| Retrofit residential landscaping to reduce runoff | ● | ● | ● | | ● | | |
| Install artificial turf | ● | ● | ● | ● | ● | | ● |
| Install inlet devices on storm drains | | ● | ● | | ● | | |
| Replace impermeable surfaces with permeable surfaces | | ● | ● | | ● | | ● |

**Table 4.8-8 (cont.)**
**MITIGATION MEASURES FOR REDUCED POLLUTANT REMOVAL CAPACITY**

| Mitigation Measure | Pollutant Type | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bacteria | Metals | Nutrients | Pesticides | Sediment | TDS/ Chloride Sulfates | Trash |
| Install modular storm water filtration systems | | ● | ● | ● | ● | ● | ● |
| Install storm water retention basins | | ● | ● | ● | ● | ● | ● |
| Install catch basin media filters | | ● | ● | | ● | ● | ● |
| Create vegetated swales | ● | ● | ● | ● | ● | ● | ● |
| Restore wetlands | ● | ● | ● | ● | ● | ● | ● |
| Install check dams | | ● | | | ● | | ● |

***Mitigation Measure 4.8.2***: No maintenance activities within a proposed annual maintenance program shall be initiated before the City's ADD Environmental Designee and state and federal agencies with jurisdiction over maintenance activities have approved the IMPs and IWQAs including proposed mitigation and BMPs for each of the proposed activities. In their review, the ADD Environmental Designee and agencies shall also confirm that the appropriate maintenance protocols have been incorporated into each IMP.

***Mitigation Measure 4.8.3***: Prior to commencing any activity where the IWQA indicates significant water quality impacts may occur, a pre-maintenance meeting shall be held on site with following in attendance: City's SWD, MM, MMC, and MC. A qualified water quality specialist shall also be present. At this meeting, the water quality specialist shall identify and discuss mitigation measures, protocols and BMPs identified in the IWQA that must be carried out during maintenance. After the meeting, the water quality specialist shall provide DSD with a letter indicating that the applicable mitigation measures, protocols and BMPs identified in the IWQA have been appropriately implemented.