INDIVIDUAL WATER QUALITY ASSESSMENT REPORT
FOR
ALVARADO CHANNEL (LOWER PORTION)
MAP NUMBERS 59 AND 60

Job Number 17204-BA

June 3, 2015

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INDIVIDUAL WATER QUALITY ASSESSMENT REPORT

Site Name/Facility:	Alvarado Channel (Lower Portion)
Master Program Map No.:	Map Numbers 59 and 60
Date:	June 3, 2015
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Register Civil Engineer Number & Expiration Date (place stamp here):	R.C.E. 70649 Exp. 06/17

REGISTERED PROFESSIONAL ENGINEER
JAYNE MARIE JANDA-TIMBA
NO. 70649
EXP. 6/17
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

The City of San Diego (City) has developed the Master Storm Water System Maintenance Program (Master 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) activities conducted within the lower portion of The Alvarado Channel (henceforth referred to as "Lower Alvarado Channel") in order to comply with the MMP's Programmatic Environmental Impact Report (PEIR) and the MMP.

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 both determine the pollutant load removed, and therefore water quality benefits, resulting from sediment excavation during maintenance 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 impacts of channel maintenance. Channel maintenance eliminates the potential for accumulated pollutants from returning into the water, via natural vegetation decomposition and channel scour. In addition, periodic maintenance facilitates optimal sorption of pollutants in vegetation. Additional factors are also presented, including a suite of water quality improvement activities the City will implement within the San Diego River Watershed.

The IWQA procedures are documented in the Standard Operating Procedure (SOP) to Conduct Water Quality Assessment and Quantification Model for Flood Channel Maintenance found in Appendix A of the Water Quality Assessment, written by Weston Solutions in March 2011, Appendix F of the PEIR (herein referred to as the 'White Paper'). The SOP identifies two criteria that must be met for IWQA component implementation: 1) the storm water facility must have fairly consistent dry weather (low) flows, and 2) it must have vegetation capable of assimilation of pollutants. Both of these criteria are met by the sections of Lower Alvarado Channel designated for maintenance at this time. The results of the IWQA procedures established in the White Paper are considered below as one of several lines of evidence assessing the overall water quality benefits and impacts associated with channel maintenance.

Project Description:

The area of study extends from the location where the Alvarado Channel transitions from an underground culvert north east of Fairmount Avenue and flows in a westerly direction for approximately 3,520 feet to a point where the channel confluences with San Diego River west of Mission Gorge Road. The lower portion of the channel is aligned north of Alvarado Canyon Road just west of Fairmount Avenue. The central and upper portions of Lower Alvarado Channel are bounded by Mission Gorge Road and Mission Gorge Place to the north and Alvarado Canyon Road to the south (see Figure 1 located in Attachment 1 for a general project location)

The proposed maintenance activities will assist in reducing the flooding issues, but the maintenance will not eliminate the occurrence of flooding in this area. The associated Lower Alvarado Channel IHHA report, and the corresponding analyses, concludes that the proposed maintenance method, sediment and vegetation removal in City of San Diego maintained portions of the Lower Alvarado Channel will not increase the capacity of the channel to be above a 2-year storm capacity throughout the length of the channel. The proposed maintenance method will include sediment and vegetation removal in the bottom of the concrete lined section of the channel and bank to bank in the rock lined section of the channel, at the downstream side of the reinforced concrete box underneath Fairmont Avenue.

The area of study has been divided into four reaches: Reach 1, Reach 2, Reach 3, and Reach 4. For analytical purposes, Reaches 2 and 3 are subdivided into reaches 2a, 2b, 3a and 3b respectively. Reach 1 is the most downstream reach of the channel.

General descriptions of each reach are provided below:

Reach 1

Reach 1 extends from the downstream limits of the area of study (at the confluence with the San Diego River), and continues upstream for approximately 450 feet. The downstream portion of Reach 1 consists of an earthen portion with rock lined slopes (approximately 180 feet), and a naturally lined portion (approximately 250 feet), that confluences with the San Diego River. Reach 1 consists of very dense vegetation and is bounded by parking lots and commercial buildings to the north and south. Reach 1 is maintained by Willis Enterprises Incorporated and is not a part of proposed channel maintenance.

Reach 2

Reach 2 is subdivided into Reaches 2a and 2b. Reach 2a consists of approximately 100 feet of earthen channel with rock lined slopes downstream, and 300 feet of concrete lined channel upstream. Reach 2a is bounded by parking lots and commercial buildings to the north and south. Reach 2b consists of approximately 220' of concrete lined channel. At the downstream limits of Reach 2b, there is a triple 8'W x12'H reinforced concrete box (RCB) culvert crossing under Fairmount Avenue. This reinforced concrete box is included in Reach 2b. Reach 2b has moderate vegetation and is bounded by commercial buildings to the north and Alvarado Canyon Road to the south. The City of San Diego maintains Reach 2 (2a and 2b).

Reach 3

Reach 3 is subdivided into Reaches 3a and 3b. Reach 3a is an earthen channel with moderate vegetation, approximately 530 feet in length. Reach 3a is bounded by the commercial buildings and parking lot to the north and south. Reach 3b is an earthen channel approximately 770 feet in length with very dense vegetation. It is bounded by the commercial buildings and parking lot to the north and south. Reach 3 (3a and 3b) is maintained by the San Diego Metropolitan Transit Development Board and is not proposed for channel maintenance.

Reach 4

Reach 4 is the most upstream reach with moderate to dense vegetation growth, and extends for approximately 500 feet in length. Reach 4 is concrete lined and maintained by the City of San Diego. Reach 4 is bounded by the commercial buildings to the north and south, Mission George and Mission Gorge Place to the north, and Alvarado Canyon Road to the south. As recommended in the Lower Alvarado Channel IHHA, Reach 4 requires soil and vegetation removal to retain the as-built storm water conveyance capacity.

The Lower Alvarado Channel area is mapped within the Federal Emergency Management Agency's (FEMA) flood areas; all reaches are within the FEMA Special Flood Hazard Areas Subject to inundation by the 1-percent Annual Chance Flood (100-year floodplain) designated Zone AE. Most of the adjacent buildings to the channel are also mapped within FEMA Special Flood Hazard Area Zone AE, a small area of buildings on the northern side of the upstream end of Lower Alvarado Channel are within Zone AO.

The overall channel maintenance areas are not within the City of San Diego Multiple Species Conservation Program's Multi-Habitat Planning Area (MHPA). The closest Multi-Habitat Planning Area is approximately 270 feet from the downstream end of the channel, within the San Diego River.

The Lower Alvarado Channel had maintenance (full vegetation and sediment removal) done by the City of San Diego in February 2011. During this instance, only Reach 2b and Reach 4 had maintenance. Since then, there has been reported flooding of the area around Reach 4.

The maintenance activities proposed for the designated extents of Reaches 2 and 4 of the Lower Alvarado Channel include removal of sediment and vegetation.

All channel reaches are briefly described above; however Reaches 2a, 2b, and 4 are the focal point of this assessment, as they are the only reaches that are proposed for maintenance. As such, from this point on only Reaches 2a, 2b, and 4 will be referred to and assessed in the report.

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

Reach 2:
Lower Alvarado Channel – concrete channel (MMP Map 59): Reach 2 is subdivided into Reaches 2a and 2b. Reach 2a consists of approximately 100 feet of earthen channel with rock lined slopes downstream, and 300 feet of concrete lined channel upstream. At the downstream limits of Reach 2b, there is a triple 8 feet wide by 12 feet high Reinforced Concrete Box (RCB) culvert crossing under Fairmount Avenue. Reach 2b consists of approximately 220 feet of concrete lined channel and includes the RCB at its downstream limits. Reach 2 (2a and 2b) is maintained by the City of San Diego. The proposed maintenance area for Reach 2 (2a and 2b) is approximately 400 feet in length by 30 feet wide by 0.1 feet of sediment depth, occupying approximately 0.3 acres. Channel construction was performed February 18, 1957, per the As-Built Plans I-172(12). As recommended in the Lower Alvarado Channel IHHA, Reach 2 (2a and 2b) requires soil and vegetation removal to retain the as-built storm water conveyance capacity.

Reach 4:
Lower Alvarado Channel – concrete channel (MMP Map 60): Reach 4 is the most upstream reach. It is entirely concrete lined and maintained by the City of San Diego. Maintenance is proposed to be done through the entire length of the Reach 4 channel area. The proposed maintenance area for Reach 4 is approximately 500 feet in length, 25 feet wide by 0.5 feet to 1.2 feet of sediment depth, occupying approximately 0.3 acres. Channel construction was performed February 18, 1957, per the As-Built Plans I-172(12). As recommended in the Lower Alvarado Channel IHHA, Reach 4 requires soil and vegetation removal to retain the as-built storm water conveyance capacity.

Existing Conditions
Reaches 2 (2a and 2b) and 4 of the Lower Alvarado Channel are located within the San Diego River Watershed Management Area (WMA), Hydrologic Area (HA) 907.1 (Lower San Diego), Hydrologic Subarea 907.11 (Mission San Diego) (City of San Diego, 2008). Surface waters in the San Diego River WMA, and elsewhere are subject to comply with the Water Quality Control Plan for the San Diego Basin (Basin Plan, San Diego RWQCB 1994) which designates beneficial uses and established water quality objectives. The San Diego River Watershed Urban Runoff Management Plan (SDR-WURMP, City of San Diego, 2008) identifies the following priority pollutant loading reductions".

- Bacteria Indicators
- Phosphorous
- Total Dissolved Solids (TDS)
- Low Dissolved Oxygen
- Turbidity

The SDR-WURMP identifies residential, park/municipal, commercial and industrial land uses as suspected contributors to discharges of these priority pollutants within the Lower San Diego HA (City of San Diego, 2008).

Alvarado Channel is a tributary to the lower San Diego River. In accordance with the Water Quality Control Policy for Developing California's Clean Water Act Section 303 (d) List (SWRCB, 2004), the Lower San Diego River is 303(d) list 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 for the segment. The pollutants listed for the lower San

Diego River on the 303(d) list are indicated in Table 1.

TABLE 1. 303(d) Listed Pollutants for the Lower San Diego River

Pollutant	Current TMDL (Yes or No)	Current or Anticipated TMDL Date
Enterococcus	No	2021
Fecal Coliform	Yes	2009
Low Dissolved Oxygen (lower 6 miles)	No	2019
Manganese	No	2021
Nitrogen	No	2021
Phosphorous	No	2019
Total Dissolved Solids (TDS)	No	2019
Toxicity*	No	2021

*This pollutant was not sampled for due to the scope of the project.

On May 8, 2013, the Regional Water Quality Control Board San Diego Region (RWQCB) approved a new Municipal Storm Water Permit for San Diego, southern Orange, and southwestern Riverside Counties (San Diego RWQCB, 2013). 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, 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 (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 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 stormwater 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 as part of the Regional MS4 Permit, may lead to long-term reductions in the need for channel maintenance activities.

Unknown point and nonpoint sources, urban runoff/storm sewers, wastewater, natural resources, and flow regulation/modification are listed among the potential sources for these pollutants.

During background research for this IWQA is was noted particular reaches of Lower Alvarado Channel are adjacent to Closed and Cleanup Completed Leaking Underground Storage Tank (LUST) Cleanup Sites (Geotracker). Located along the southern bank of Reach 1 there is an existing car wash station, located at 4282 Camino Del Rio North San Diego, California 92108, in which there is a listed Closed and Cleanup Completed Leaking Underground Storage Tank (LUST) Cleanup Site (Geotracker). Reach 3 is bounded to the south by an undeveloped lot which also has a listed Closed and Cleanup Completed Leaking Underground Storage Tank (LUST) Cleanup Site (Geotracker).

Dry weather historical monitoring data for the San Diego River have been required under the regional municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) permit R9-2007-0001 (San Diego RWQB 2007) issued to the 21 Municipal Copermitties in San Diego County, including the City of San Diego. The data compiled under this permit was reviewed during the background investigation for this IWQA. Under this historical monitoring, dry weather flow concentrations of total phosphorous, dissolved phosphorous and TDS exceeded water quality benchmarks established in the Basin Plan at least once between January 2010 and May 2012 (Project Clean Water, 2012).

Since there are two maintenance areas in Lower Alvarado Channel separated by 1,300 feet, calculations and assessments for each maintenance area were performed separately. The maintenance area consisting of Reach 2a and Reach 2b is referred to as “Lower Alvarado West Area” and the maintenance area consisting of Reach 4 is referred to as “Lower Alvarado East Area”. Although both areas are within the Lower Alvarado Channel area of study, separate models were made for each area.

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

AGE personnel collected two sediment samples from Lower Alvarado Channel (LAC-1 and LAC-2) on December 22, 2014. LAC-1 is the sample taken representing The Lower Alvarado East Area, and LAC-2 is the sample taken to represent The Lower Alvarado West Area. The samples were collected from locations deemed the best representation of their respective channel area conditions. The sampling locations are shown on Figure 4 in Attachment 3. The sampling activities were performed in general accordance with the Standard Operating Procedures (SOP) to Conduct Water Quality Assessment and Quantification Model for Flood Channel Maintenance (Weston Solutions, 2011).

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

A stainless steel hand auger was used to collect the analytical sample from location LAC-2. The sediment at the sampling location LAC-1 contains abundant cobbles. Therefore, sampling for the analytical sample at location LAC-1 was performed with a clean shovel. A mound of sediment had accumulated near the center of the channel and at the time of sampling activities, the top of the existing sediment mound was above the water level in the channel.

The sediment samples were placed in individual sealed plastic bags. Preliminary screening for the potential presence of organic vapors was performed using a MiniRAE 3000 Volatile Organic Compound Gas Monitor. The samples were then labeled with the sample ID, collection date, project number and sampling personnel name. The samples were 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 and American Scientific Laboratories, LLC of Los Angeles. The sediment samples were tested for the constituents listed in table A-3 of the SOP with the exception of Total Dissolved Solids (TDS) which is not applicable to sediment matrix samples. The test results are presented in Attachment 3.

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

On December 11, 2014, field personnel measured instantaneous flow during dry weather flow conditions at four cross sections along Lower Alvarado Channel. The upstream and downstream flow measurement locations surrounding the proposed maintenance area were chosen following Standard Operating Procedure Guidelines. The locations are referred to as Sampling Location 1 – 4, with 1 representing the most downstream location and 4 representing the most upstream location. Permission to access the locations was obtained from the City of San Diego prior to conducting flow measurement activities. Due to access restrictions to Sampling Locations 2 through 4, City of San Diego maintenance workers assisted personnel in access to the location and remained on-site during the sampling activities. Coordinates of each sampling location were marked with a hand-held GPS device. These locations are indicated in Figure 4 of Attachment 3.

A site northwest of the intersection of Fairmont Avenue and Alvarado Canyon Road was selected as Sampling Location 1 (the most downstream sampling location). This sampling location is bounded to the north by an existing new car lot and to the south by commercial buildings and their association parking lots. A trolley overpass crosses overhead just upstream of Sampling Location 1.

A site just northeast of the intersection of Fairmont Avenue and Alvarado Canyon Road was selected as Sampling Location 2 (located upstream of Sampling Location 1). Sampling Location 2 is bounded to the north by an existing used car lot and to the south by Alvarado Canyon Road. A trolley overpass crosses overhead just upstream, as well as downstream, of Sampling Location 2. A site south of Mission Gorge Place was selected as Sampling Location 3. This sampling location is bounded to the north and south by existing commercial buildings and their associated parking lots. A site south of Mission Gorge Place (upstream of Location 3) was selected as Sampling Location 4. This sampling location is bounded to the north and south by existing commercial buildings and their associated parking lots.

Upon entering the channel, field personnel extended a measuring tape across the full width of the wetted channel and measured the width of the cross section in total feet. The width was measured from the waterline of the south bank to the waterline of the north bank. Flow velocity was measured using the Marsh McBirney Flow-Mate 2000 Flow Meter at regular horizontal intervals. The flow meter was set at 60% depth for water depth less than 1.5 feet, or 20% and 80% depth for stages greater than 1.5 feet (USGS, 1976). For stages where water depth was greater than 1.5 feet and measurements were taken at 20% and 80% depth, an average of the measurements was calculated to solve for velocity at 60% depth. To minimize interference with flow meter readings, personnel stood downstream and slightly off to the side of the flow meter while facing upstream. The 10 second average flow velocity was recorded at each interval. Distance from the left wetted bank (southern wetted bank) and the 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 Sampling Location 1, the total width of the wetted channel measured 15.0 feet across. A total of five flow measurements, at a distance of two foot horizontal spacing, were recorded along the width of the wetted downstream channel. Although the width of the wetted downstream channel allowed for seven flow measurements, field personal could only retrieve five recordable measurements due to dense vegetation and the water being too shallow at the sixth and seventh flow measurement locations for measurable readings by the flow meter.

At Sampling Location 2, the total width of the wetted channel measured 11.16 feet across. A total of four flow measurements, at a distance of two foot horizontal spacing, were recorded along the width of the wetted downstream channel. Although the width of the wetted downstream channel allowed for five flow measurements, field personal could only retrieve four recordable measurements due to the water being too shallow at the first flow measurement location for a measurable reading by the flow meter.

At Sampling Location 3, the total width of the wetted channel measured 4.0 feet across. A total of three flow measurements, at a distance of one foot horizontal spacing, were recorded along the width of the wetted downstream channel. Although the width of the wetted downstream channel allowed for four flow measurements, field personal could only retrieve three recordable measurements due to the water being too shallow at the fourth flow measurement location for a measurable reading by the flow meter.

At Sampling Location 4, the total width of the wetted channel measured 13.5 feet across. A total of six flow measurements, at a distance of two foot horizontal spacing, were recorded along the width of the wetted downstream channel.

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 location is as follows: Sampling Location 1 had a discharge of 0.46 cubic feet per second (cfs), Sampling Location 2 had a discharge of 0.57 cfs, Sampling Location 3 had a discharge of 0.52 cfs and Sampling Location 4 had a discharge of 0.10 cfs. An example of the Excel spreadsheet used to calculate the total discharge rate 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 volumes, the volume of water in one year that discharges into each maintenance area (East Area and West Area) of the Lower Alvarado Channel due to low flow conditions, was estimated following the White Paper's 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 County of San Diego's Project Clean Water website. Rainfall data, between 1968 and 2008, from the Fashion Valley ALERT Station (Sensor ID 32) 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 The Lower Alvarado 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 White Paper'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 1968-2008, it is estimated that the Lower Alvarado

Channel experiences 320 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 discharges in both the Lower Alvarado East Area and West Area. For the Lower Alvarado East Area, 25,056 cubic feet per day (0.29 cfs) was multiplied by 320 dry days per year, resulting in approximately 8,000,000 cubic feet (ft^3) or 60 million gallons per year (See Table 10E in Attachment 6 for annual treatment volume in the Lower Alvarado East Area). For the Lower Alvarado West Area, 49,248 cubic feet per day (0.57 cfs) was multiplied by 320 dry days per year, resulting in approximately 16,000,000 cubic feet (ft^3) or 120 million gallons per year (See Table 10W in Attachment 6 for annual treatment volume in the Lower Alvarado West Area).

Hydraulic residence time (HRT) for the Lower Alvarado West Area was determined by dividing the length of the maintenance area, 750 feet, by the average of the upstream and downstream velocity in the west area, which averages to 0.17 feet per second (ft/s). Similarly, the HRT for Lower Alvarado East Area was determined by dividing the length of the maintenance area, 500 feet, by 0.36 ft/s, the average of the upstream and downstream velocity in the East Area. This method is employed by Caltrans when determining the HRT of water quality or bio filtration swale following the Caltrans Storm Water Quality Handbook (Caltrans, 2011). Using the average velocities of each area, a HRT of 1.22 hours was determined for the West area, and a HRT of 0.39 hours was determined for the East area.

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

On December 11, 2014 field personnel collected surface water grab samples during dry weather conditions following SOP guidelines and Surface Water Collection SOP #EH-01 (Syracruse Research Corporation, 2003). Samples were collected at upstream and downstream locations surrounding each of the two proposed maintenance areas along Lower Alvarado Channel.

Lower Alvarado West Area is downstream of Lower Alvarado East Area, and therefore sampling surrounding the proposed maintenance in Lower Alvarado West Area occurred before sampling in the Lower Alvarado East Area. Sampling Location 1, the most downstream location of the proposed maintenance within the Lower Alvarado West Area, was collected first and was followed by sampling at Sampling Location 2 (the upstream sampling location of the proposed maintenance within the Lower Alvarado West Area). Sampling at Sampling Location 2 was followed by sampling at Sampling Location 3 (the downstream sampling location of the proposed maintenance in the Lower Alvarado East Area) and was followed by sampling at Sampling Location 4 (the upstream sampling location of the proposed maintenance in the Lower Alvarado East Area).

For each sample collected, the sampler stood in the horizontal center of the channel, downstream of the sampling location facing upstream. 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, project, and name of sampling personnel, were completed, capped and immediately placed on ice within an insulated cooler with ice, 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, a thorough review of the 303(d) pollutants listed in Table 1, and TMDLs in the local surface waters. Water sample chemical analyses were conducted by Enviromatrix of San Diego, California, a state-accredited laboratory. The laboratory analytical results can be found in Attachment 3 and tabulated analysis in Tables 10E and 10W of Attachment 6.

Within the Lower Alvarado East Area all constituents analyzed were below their respective water quality values with the exception of Total Dissolved Solids (TDS), Phosphorous, and Total Nitrogen. The upstream concentration of TDS (1,860 mg/L) exceeds the water quality benchmark 1,500 mg/L established by the Basin Plan. The upstream concentration of Phosphorous (0.11mg/L) exceeds the water quality benchmark 0.05 mg/L. The upstream concentration of Total Nitrogen (1.7mg/L) exceeds the water quality benchmark of 1.0 mg/L.

Within the Lower Alvarado East Area all constituents analyzed were below their respective water quality values with the exception of Total Dissolved Solids (TDS), Enterococcus, and Fecal Coliform. The upstream concentration of TDS (1,800 mg/L) exceeds the water quality benchmark of 1,500 mg/L established by the Basin Plan. The upstream concentration of Enterococcus (1,600 CFU/100 mL) exceeds the water quality benchmark of 151 CFU/100 mL. The upstream concentration of Fecal Coliform (240 MPN/100 mL) exceeds the water quality benchmark of 200 MPN/100 mL. Within the Lower Alvarado West Area all constituents analyzed were below their respective water quality values with the exception of Total Dissolved Solids (TDS), Enterococcus, and Fecal Coliform. The upstream concentration of TDS (1,880 mg/L) exceeds the water quality benchmark of 1,500 mg/L established by the Basin Plan. The upstream

concentration of Enterococcus (1,600 CFU/100 mL) exceeds the water quality benchmark of 151 CFU/100 mL. The upstream concentration of Fecal Coliform (240 MPN/100 mL) exceeds the water quality benchmark of 200 MPN/100 mL (see Tables 11E and 11W in Attachment 6 for a comparison of pollutant concentrations to water quality benchmarks).

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

An assessment of existing wetland conditions of the Lower Alvarado creek channel (specifically western reaches 2A and 2B, and eastern reach 4) 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 one identified in the Water Quality Assessment and Quantification Model for Flood Channel Maintenance White Paper prepared for the Master Stormwater Maintenance PEIR (Weston 2011). Field observations made during water quality and sediment sampling activities on December 10, 2014 as well as information obtained from the IBA site survey on November 5, 2014 were considered in carrying out 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.

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The Lower Alvarado Creek IBA presents the acreage of each vegetation community or land cover type surveyed within each reach that will be impacted by maintenance activities in the channel. A total of four vegetation communities are identified in the IBA for Reaches 2A, 2B, and 4 of the Lower Alvarado Creek including freshwater marsh, southern willow scrub, non-native riparian (dominated by giant reed [*Arundo donax*]), non-native vegetation/ornamental, and two land cover types: open water and 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 1 below.

Table 2
EXISTING Vegetation Community/Land Use Type Scoring

Vegetation Community or Land Cover Type (Holland)	Acres*				Vegetation Score	Scoring Rationale
	West		East	Sub-total		
	R2A	R2B	R4			
Freshwater marsh	0.15	0.09	0.09	0.33	3	Dominance (> 75%) of emergent wetland species (i.e., *Typha*)
Southern willow scrub	0.08	0.14	0.14	0.36	2	Mature wetland population
Open water	0.02	--	--	0.02	0	No visible vegetation
Non-native Riparian	--	--	0.02	0.02	1	Monotypic stands of invasive species (i.e. giant reed [*Arundo donax*])
Non-native Vegetation/Ornamental	0.04	--	--	0.04	1	Adjacent upland species
Developed/Concrete channel	0.02	0.05	0.04	0.11	0	No visible vegetation
TOTAL	**0.31**	**0.28**	**0.29**	**0.88**		
Overall Existing Vegetation Score (West/ East)					**2.03 / 1.97**	

*Divided into western reaches 2A and 2B , and eastern reach 4

Using the acreage identified in the IBA for each reach, an area-weighted average vegetation score was determined to be 2 for the Lower Alvarado creek channel (2.03 for western reaches 2A and 2B, and 1.97 for eastern reach 4) which would mean that the current vegetation condition is expected to return within 1-5 years.

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 on water depth, flow, hydraulic retention time (HRT), and deposition/settling rates. The evaluation is also based on 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 the western (R2A and R2B) and eastern reaches (R4) of Lower Alvarado Creek channel based on the type of substrate and deposition, pH, and Redox value. An existing hydrosoil score of 2 was assigned to the western reach (reaches 2A and 2B) based on comprising primarily silty sand with visible deposition of fines and a neutral pH (7.94). An existing hydrosoil score of 1 was assigned to the eastern reach (reach 4) based on comprising primarily poorly graded gravel with some but limited deposition of fines and having a basic pH (8.81). An overall existing hydrosoil score of 1.5 was assigned to the lower Alvarado creek channel, based upon the combined average scores for the western and eastern reaches (Table 2). A hydrosoil score of 1.5 corresponds to short-term sand deposition and indicates that fines may or may not accumulate in the next 5 years.

Table 3
EXISTING HYDROSOIL Scoring

Reach	Hydrosoil Score	Scoring Rationale
Western (R2A and R2B)	2	Primarily silty sand with some deposition of fines/detritus, neutral pH
Eastern (R4)	1	Primarily poorly graded gravel, pH > 8
Overall Score	**1.5**	

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 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 overall existing hydroperiod score of 2 was assigned to the Lower Alvarado Creek channel, based upon the combined average scores for the western (R2A and R2B) and eastern (R4) reaches. Both the western and eastern reaches had shallow water depth (0.5 to 1 ft.), slow flow (velocity of 0.017 and 0.39 ft/sec, respectively) but likely dependent on volume inputs, and observable HRT. Based on this score, moderate sediment deposition is expected to occur.

Table 4 EXISTING HYDROPERIOD Scoring			
Reach	**Average Water Depth (ft.)**	**Hydrosoil Score**	**Scoring Rationale**
Western (R2A and R2B)	0.74	2	Primarily shallow water (0.5 – 1 ft.), HRT > 1 hr
Eastern (R4)	0.57	2	Primarily shallow water (0.5 – 1 ft.), Redox 62 mV
Overall Score		2	

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 Lower Alvarado Creek channel results in an overall existing score of 5.5 (6.03 for the western reaches and 4.97 for the eastern reach) for the existing wetlands which indicates good wetland quality and health (Table 4).

Table 5 EXISTING Wetland Macrofeature Assessment Scoring			
Wetland Macrofeature	**Score**		
	West	**East**	**Overall**
Vegetation	2.03	1.97	**2**
Hydrosoil	2	1	**1.5**
Hydroperiod	2	2	**2**
Overall Existing Wetland Score	6.03	4.97	**5.5**

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 2.34 for the Lower Alvarado 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 5 below.

Table 6
RECOVERY Vegetation Community Scoring

Vegetation Community or Land Cover Type (Holland)	Acres*				Vegetation Score	Scoring Rationale
	West		East	Sub-total		
	R2A	R2B	R4			
Freshwater marsh	0.15	0.09	0.09	0.33	3	Emergent wetland species (i.e., *Typha*) will exhibit regrowth within 1 year
Southern willow scrub	0.08	0.14	0.14	0.36	2	Recovery of mixed vegetation (i.e., *Salix* and *Typha*) will take 1-5 years
Non-native Riparian	--	--	0.02	0.02	1	Recovery of existing vegetation (i.e., *Arundo*) will take 1-5 years
Non-native Vegetation/Ornamental	0.04	--	--	0.04	1	Recovery of encroachment from adjacent upland species will take 1-5 years
TOTAL	**0.27**	**0.23**	**0.25**	**0.75**		
Overall Existing Vegetation Score (West/ East)					**2.40 / 2.28**	

*Divided into western reaches 2A and 2B , and eastern reach 4

Hydrosoil

A recovery hydrosoil score of 1.5 was calculated for the Lower Alvarado Creek channel and represents a combined average for the western and eastern reaches. This assignment was based on the fact that the sediment currently deposited in the channel primarily consists of sand with limited fines and that flow is either high (during storms) or low which would result in little deposition within five years of maintenance activities.

Hydroperiod

A recovery hydroperiod score of 1.5 was calculated for the Lower Alvarado Creek channel and represents a combined average for the western and eastern reaches. The western reach scored higher due to its greater HRT (> 1 hour) and greater accumulation of fines and revegetation.

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 5.34 which is comparable to the existing condition, and indicates good water quality and health (Table 6). In summary, the likely sediment redeposition and recovery of wetland species, including *Typha*, is expected to occur within one to five years.

Table 7
RECOVERY Wetland Macrofeature Assessment Scoring

Wetland Macrofeature	Score		
	West	East	Overall
Vegetation	2.40	2.28	**2.34**
Hydrosoil	2	1	**1.5**
Hydroperiod	2	1	**1.5**
Overall Existing Wetland Score	6.40	4.28	**5.34**

Sediment Pollutant Loading Estimates:

Pollutant loading estimates were performed following the guidelines outlined in the SOP. Sediment volumes were split into two areas, Lower Alvarado West Area and Lower Alvarado East Area. A total sediment volume of approximately 309 yd^3 are scheduled to be removed from the Lower Alvarado West Area and a total sediment volume of approximately 336 yd^3 are scheduled to be removed from the Lower Alvarado East Area. These removal volumes were applied to the 1 sample taken for each area (LAC-1 and LAC-2). LAC-2 was taken within for the West Area, and LAC-1 was taken from the East Area. Load removal estimates are corrected for the presence of cobble larger than 1.5 inches in accordance with the SOP. A correction factor of 0.75 was applied to LAC-1 as the presence cobbles was observed at the sediment sampling location and in the sieve test results, see Attachment 3 for full sieve test results. No correction factor was applied to LAC-2 as no cobbles was 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 8E and 8W 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 both proposed channel maintenance areas, East and West, of the Lower Alvarado 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 Tables 12E and 12W in Attachment 6. The results of this comparison show for each constituent that the estimated maintained pollutant removal exceeds the estimated existing pollutant removal, with the exception of nitrate. A difference of six pounds (lbs) of impact on nitrate load removal, over the three year maintenance period, is estimated in the Lower Alvarado West Area (see Table 12W in Attachment 6 for a comparison of impacts to benefits in the West Area). A difference of one pound (lb) of impact on nitrate load removal, over the three year maintenance period, is estimated in the Lower Alvarado East Area (see Table 12E in Attachment 6 for a comparison of impacts to benefits in the East Area). The water quality benchmark for Nitrate as listed in the San Diego Basin Plan is 10 mg/L. The concentration of Nitrate in the water column sample taken at the upstream end of the West Area is 0.29 mg/L. The concentration of Nitrate in the water column sample taken at the upstream end of the East Area is 0.40 mg/L (for comparisons of each constituent to the listed benchmark in the San Diego Basin Plan see Tables 11W and 11E in Attachment 6).

Nitrate was found to have a potential impact greater than the benefit in both the East Area and West Area. However, as discussed below, a potential temporary increase in water column nitrate concentrations does not represent a significant impact to the water quality.

The anaerobic sediments typical of wetland environments allow for the process of denitrification, in which nitrate is converted to nitrogen gases that are released to the atmosphere. Removal of sediment and vegetation from the East and West maintenance areas in the Lower Alvarado Channel will temporarily disturb this denitrification process and nitrate assimilation by wetland plants, potentially resulting in a temporary increase to water column nitrate concentrations. However, as specified in the White Paper and other publications the removal of vegetation is beneficial to water quality. Periodic removal of vegetation prevents the reintegration of nitrate into the water via natural decomposition of vegetation that is carrying collected nitrate. In addition the regrowth phase of vegetation, facilitated by periodic

vegetation removal, allows for optimal sorption rates of pollutants in the vegetation, including nitrate. Lastly, since the measured water column nitrate concentration is below the suggested benchmarks established in the Basin Plan, this temporary disruption does not pose a risk to the water quality.

These results of the water quality impact analysis outlined by the SOP suggest that overall the proposed sediment removal during maintenance of the Lower Alvarado 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 an 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 removal as a result of the proposed maintenance activities, and therefore no additional mitigation measures are necessary. For the constituents analyzed, all but nitrate show and increase in estimated maintained pollutant removal. However, as stated in the SOP, "In cases where the impact is greater than the benefit, but the measured concentrations are less than the water quality objectives established by the San Diego Basin Plan for the water body segment in which the maintenance would occur no risk to the beneficial uses exist. In order to take a conservative approach, maintained channels that result in water column concentrations of the specific pollutants that are monitored under the NPDES Permit that exceed, or are within 25 percent of the water quality objectives established by the San Diego Basin Plan for the water body segment in which the maintenance would occur should have mitigation. In cases where the impact is greater than the benefit, but the maintained channel water column concentrations of the specific pollutants that are monitored under the NPDES Permit will be less than the lower limits described above (25 percent below the water quality objectives), no risk to the beneficial uses exist, and therefore no mitigation is necessary."

Nitrate has a listed water quality objective in the San Diego basin plan of 10 mg/L. The highest result of Nitrate concentration, out of both the West Area and the East Area, measured in the water column sample is 0.40 mg/L and since this measured concentration is less than 25 percent of the established water quality objective in the San Diego Basin Plan (10 mg/l), no mitigation for Nitrate is necessary.

Despite the fact that no additional mitigation is necessary pursuant to the White Paper, 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.

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SWRCB, 2010. 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) – Statewide, accessed from: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml May 2013

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

LIST OF ATTACHMENTS (Check All That Apply):

Attachment 1: Channel Exhibits

- ❑ Figure 1 – Vicinity Map
- ❑ Figure 2 – Channel Reach Exhibit

Attachment 2: Site Photos

- ❑ Figure 3 - Photo map exhibit
- ❑ Site Photographic Log

Attachment 3: Analytical Sampling Results

- ❑ Figure 4 – Sediment and Water Sampling Locations Map
- ❑ Chain of Custody Sheet(s) for Sediment Sampling
- ❑ Analytical Results of Sediment Sample(s)
- ❑ Sieve Analysis Laboratory Results of Sediment Samples
- ❑ Chain of Custody Sheet(s) for Water Column Sampling
- ❑ Analytical Results of Water Column Sample(s)

Attachment 4: Flow Measurement Model

- ❑ Flow Measurement Field Sheets
- ❑ Flow Measurement Calculation Sheets

Attachment 5: Channel Wetland Assessment

- ❑ Wetland Land Assessment Scoring Field Notes (Existing Condition)
- ❑ Wetland Land Recovery Assessment Field Notes (Maintained Storm Water Facility)

Attachment 6: Impact-Benefits Model

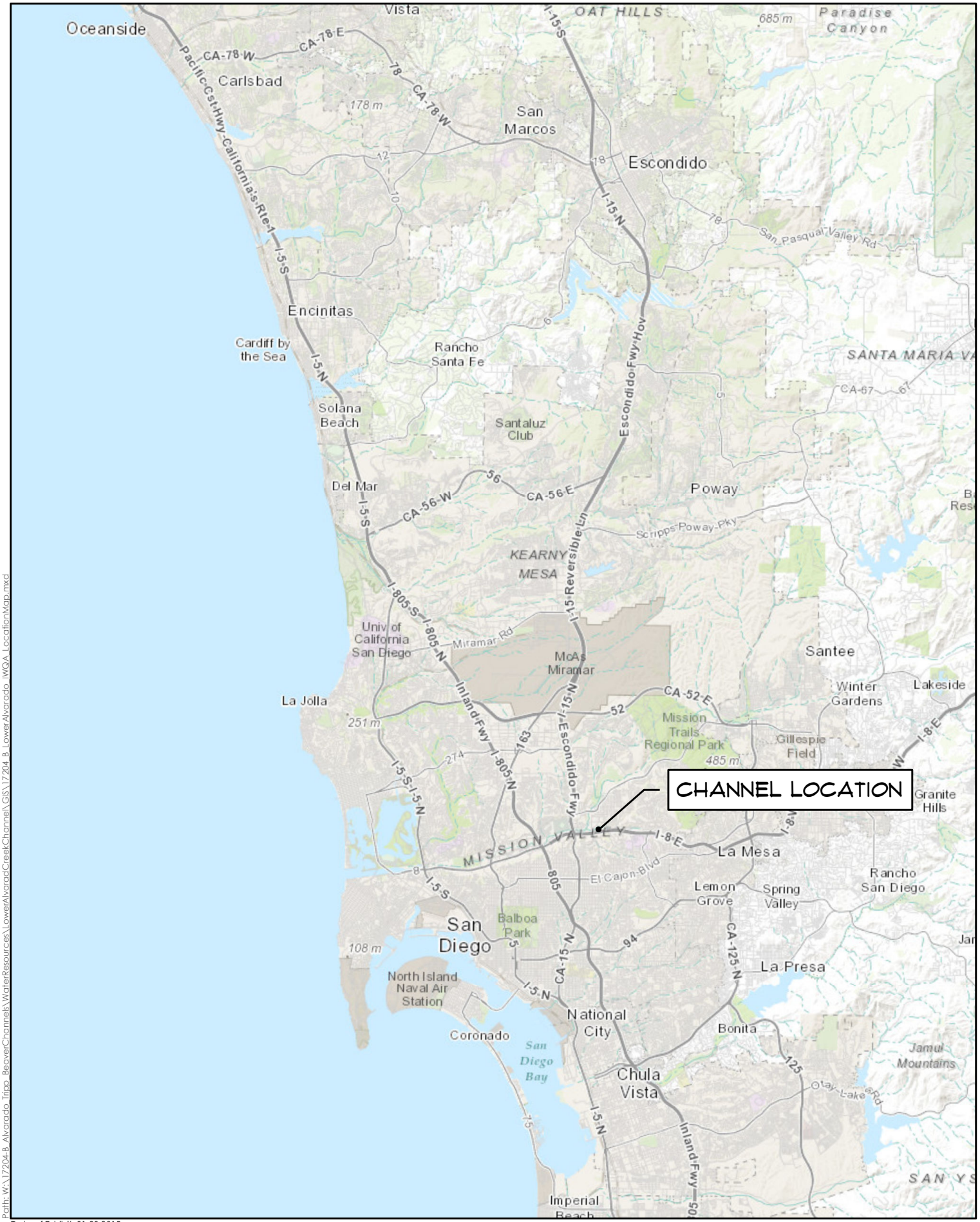
- ❑ Table 8E- Sediment Pollutant Loading Model for the East Area(Benefit Load Removal in Sediment)
- ❑ Table 8W- Sediment Pollutant Loading Model for the West Area(Benefit Load Removal in Sediment)
- ❑ Table 9E – Comparison of pollutant concentrations to Human Health Screening Level for the East Area
- ❑ Table 9W – Comparison of pollutant concentrations to Human Health Screening Level for the West Area
- ❑ T able 10E - Potential Water Quality Impacts Model for the East Area
- ❑ Table 10W - Potential Water Quality Impacts Model for the West Area
- ❑ Table 11E – Comparison of Pollutant Concentrations to Water Quality Benchmarks for the East Area
- ❑ Table 11W – Comparison of Pollutant Concentrations to Water Quality Benchmarks for the West Area
- ❑ T able 12E - Comparison of Impacts to Benefits for the East Area
- ❑ Table 12W - Comparison of Impacts to Benefits for the West Area

Attachment 7: Potential Mitigation Efforts Model

- ❑ Applicable PEIR Mitigation Measures

ATTACHMENT 1 – CHANNEL EXHIBITS

FIGURE 1 – VICINITY MAP



Path: W:\17204-B Alvarado Trlpp BeaverChannels\WaterResources\LowerAlvaradCreekChannel\GIS\17204_B_LowerAlvarado_IWQA_LocationMap.mxd

Date of Exhibit: 01.30.2015
Source: ESRI World Topographic Baselayer

RICK ENGINEERING COMPANY

Miles
0 2.5 5
North

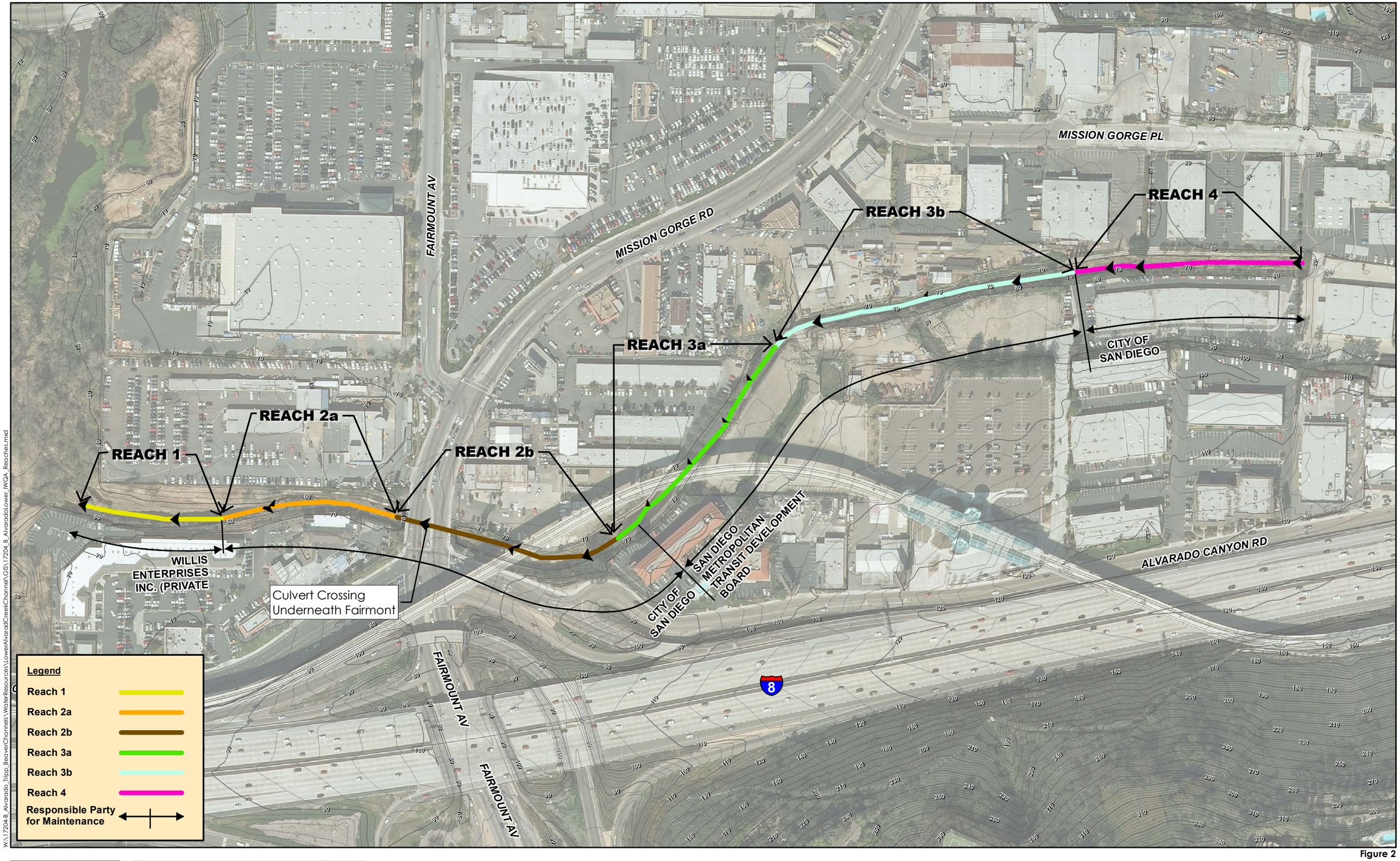
Figure 1

IWQA Report - Project Vicinity Map

Lower Alvarado Channel

J-17204 BA

FIGURE 2 – CHANNEL REACH EXHIBIT



W:\17204-B_Alvarado_Tripp_BeaverChannels\WaterResources\LowerAlvaradCreekChannel\GIS\17204_B_AlvaradoLower_IWQA_Reaches.mxd

Figure 2

Lower Alvarado Channel

IWQA Report - Channel Reaches

17204-BA

RICK ENGINEERING COMPANY

Scale in Feet: 0, 200, 400

North

Date of Exhibit: 01.30.2015
DigitalGlobe Aerial Image: 04.2013

ATTACHMENT 2 - SITE PHOTOS

FIGURE 3 – PHOTO MAP EXHIBIT

W:\17204-B_Alvarado_Tripp_BeaverChannels\WaterResources\LowerAlvaradCreekChannel\GIS\17204_B_AlvaradoLower_IWQA_PhotoLocations.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 200 400
North

Date of Exhibit: 01.30.2015
DigitalGlobe Aerial Image: 04.2013

Figure 3

Lower Alvarado Channel

IWQA Report - Photo Locations

17204-BA

SITE PHOTOGRAPHIC LOG

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1045	**12/11/14**

Direction Photo Taken

North

Description

Southern dirt bank and northern concrete bank, as well as vegetation, upstream of Photo Location 1.

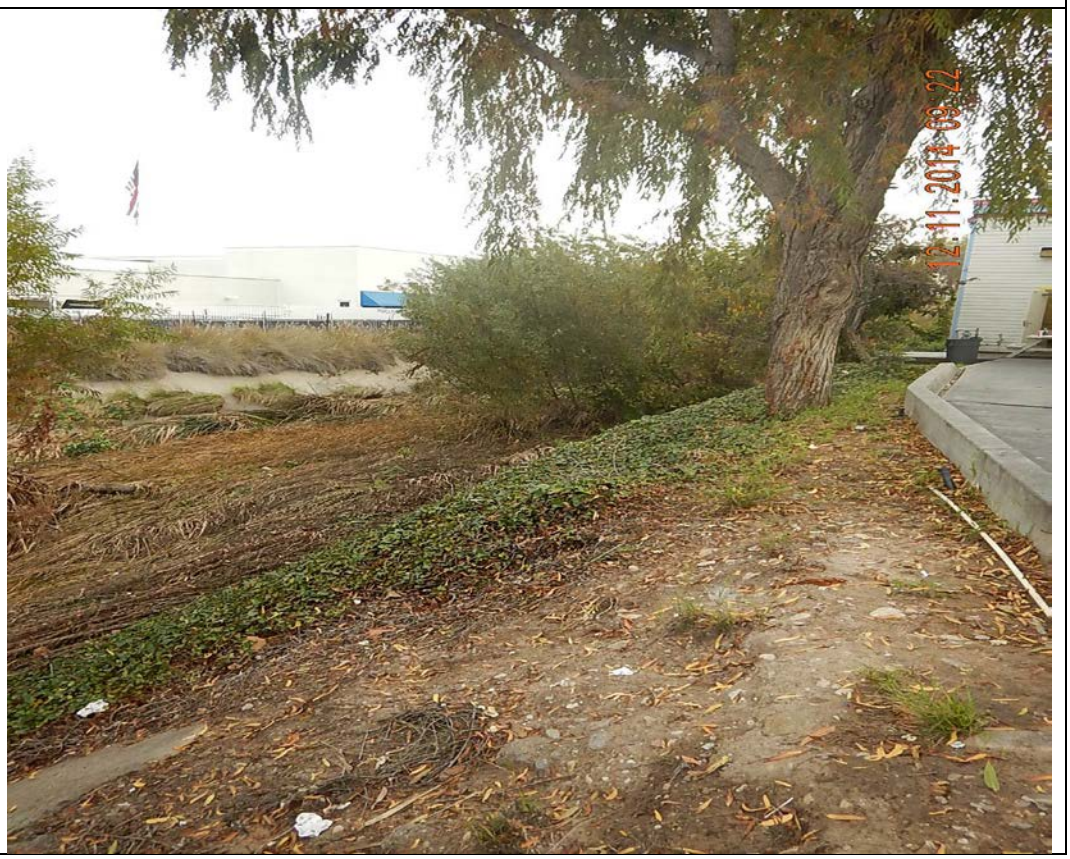
Photo No.	Date
1048	**12/11/14**

Direction Photo Taken

Northeast

Description

Southern dirt bank and concrete berm along the perimeter of the car wash station, located just northeast of Photo Location 1.



IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1053	**12/11/14**

Direction Photo Taken

East

Description

Upstream view of vegetation and flowing stream from Photo Location 1.

Photo No.	Date
1054	**12/11/14**

Direction Photo Taken

Northwest

Description

Sampler collected data from YSI 556 Multi-Probe System (MPS) at Photo Location 1.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1065	**12/11/14**

Direction Photo Taken

Northwest

Description

Sampler collecting velocity measurements using the Marsh-McBirney Flow Mate 2000 at Photo Location 1.

Photo No.	Date
1071	**12/11/14**

Direction Photo Taken

North

Description

Upstream view of vegetation and large cobble from Photo Location 1.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1073	**12/11/14**

Direction Photo Taken

South

Description

South bank along Photo Location 2.

Photo No.	Date
1074	**12/11/14**

Direction Photo Taken

Northwest

Description

North bank along Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1077	**12/11/14**

Direction Photo Taken

Northeast

Description

Upstream view of vegetation, south bank, and overhead trolley tracks from Photo Location 2.

Photo No.	Date
1087	**12/11/14**

Direction Photo Taken

West

Description

View looking downstream at Photo Location 2.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1101	**12/11/14**

Direction Photo Taken

South

Description

Vegetative growth within cracks of the concrete channel bottom by Photo Location 2.

Photo No.	Date
1109	**12/11/14**

Direction Photo Taken

South

Description

Vegetative growth within channel, just east of Photo Location 3.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1110	**12/11/14**

Direction Photo Taken

Southeast

Description

Vegetative growth within channel east of vegetation in Photo DSCN1109LR and east of Photo Location 3.

Photo No.	Date
1112	**12/11/14**

Direction Photo Taken

Southeast

Description

Vegetation on the north bank of the channel alongside Photo Location 4.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1118	**12/11/14**

Direction Photo Taken

Description

Culverts and substrate lining the channel upstream of Photo Location 2.

Photo No.	Date
1123	**12/11/14**

Direction Photo Taken

Northwest

Description

Concrete lined north bank of the channel and overhanging vegetative growth.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1125	**12/11/14**

Direction Photo Taken

East

Description

Substrate and low water level within culvert box upstream of Photo Location 4.

Photo No.	Date
1127	**12/11/14**

Direction Photo Taken

Southwest

Description

Sampler collecting velocity measurements using the Marsh-McBirney Flow Mate 2000 at Photo Location 4.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1133	**12/11/14**

Direction Photo Taken

Southwest

Description

Concrete lined south bank of the channel and inlet alongside Photo Location 4.

Photo No.	Date
1135	**12/11/14**

Direction Photo Taken

West

Description

Downstream view from Photo Location 4.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1140	**12/11/14**

Direction Photo Taken

East

Description

View of sampler collecting GIS data at Photo Location 4.

Photo No.	Date
1142	**12/11/14**

Direction Photo Taken

West

Description

Substrate on channel bottom and bubbles along the top of the water column at Photo Location 4.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1146	**12/11/14**

Direction Photo Taken

East

Description

Vegetation upstream of Photo Location 3.

Photo No.	Date
1153	**12/11/14**

Direction Photo Taken

Northeast

Description

Substrate along the bottom of the channel and vegetation upstream of Photo Location 3.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1157	**12/11/14**

Direction Photo Taken

Northeast

Description

View of northern concrete lined bank upstream of Photo Location 3.

Photo No.	Date
1173	**12/11/14**

Direction Photo Taken

East

Description

View west of Photo Location 3 looking upstream.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1176	**12/11/14**

Direction Photo Taken

Southwest

Description

Soil sampler and equipment at Photo Location 3.

Photo No.	Date
1179	**12/11/14**

Direction Photo Taken

West

Description

Sampler preparing to use Marsh-McBirney Flow Mate 2000 at Photo Location 3.

IWQA Photographic Log

Client Name	Site Location	Project No.
City of San Diego	Lower Alvarado Channel	**17204-BA**

Photo No.	Date
1180	**12/11/14**

Direction Photo Taken

West

Description

View downstream from Photo Location 3.

ATTACHMENT 3 – ANALYTICAL SAMPLING RESULTS

FIGURE 4 – SEDIMENT AND WATER SAMPLING LOCATIONS MAP

W:\17204-B_Alvarado_Tripp_BeaverChannels\WaterResources\LowerAlvaradoCreekChannel\GIS\17204_B_AlvaradoLower_IWQA_Sampling.mxd

RICK ENGINEERING COMPANY

Scale in Feet: 0 — 200 — 400

North

Date of Exhibit: 01.30.2015
DigitalGlobe Aerial Image: 04.2013

Figure 4

Lower Alvarado Channel

IWQA Report - Sampling Locations

17204-BA

CHAIN OF CUSTODY SHEET(S) FOR SEDIMENT SAMPLING

ASC JOB # 63209

Clarkson Laboratory & Supply Inc.	Client's Name:
Phone (619) 425-1993 Fax (619)425-7917	Address
www.clarksonlab.com	Tel./Fax
E-mail Laura Torres laura@clarksonlab.com	Contact Person: LAURA TORRES

Chain-of-Custody Record

PO# 50082

Survey				Samplers: CUSTOMER					
Station Number	Station Location/Sample ID	Date	Time	Sample Type			Sample Size	No. Of Containers	Analysis Required
				Water		Other			
				Comp	Grab				
1	SO5532-1 326445								
	TCC-1	12/20/14	9:45			Sed	1602	2	
2	SO5532-2-326446								
	LAC-2	12/20/14	11:20			Sed	1602	2	
3	SO5532-3 326447								
	LAC-1	12/20/14	12:00			Sed	1602	2	
4	SO5532-4 326448								
	UAC-1	12/20/14	12:45			Sed	1202	2	

Table A-3 List attached for Organics run EPA 8270C instead of 8310. Report Moisture

Relinquished by: Laura Torres	Received by:	Date/Time 12/20/14 @ 3pm.
Relinquished by:	Received by:	Date/Time
Relinquished by:	Received by:	Date/Time
Relinquished by:	Received by:	Date/Time

Method of Shipment:

Method Preserved: HCl __ HNO_3 ___ H_2SO_4 ___ Ice ___ None X Other ___

Comments:

PLEASE E-MAIL RESULTS

Distribution: Original.--Must Accompany Shipment, 1 Copy--Client (Relinquishing Samples)

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CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: **14-12-2232**

DATE: 12/24/14

PAGE: 1 OF 1

LABORATORY CLIENT: AMERICAN SCIENTIFIC LABS

ADDRESS: 2520 N. San Fernando Road

CITY: Los Angeles | STATE: CA | ZIP: 90065

TEL: 323-223-9700 | E-MAIL: alen@asllab.com

CLIENT PROJECT NAME / NUMBER: 63209

P.O. NO.:

PROJECT CONTACT: Alen Hosepians

QUOTE NO.

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"): 10 Days

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ ~~5~~ DAYS (STANDARD)

☐ COELT EDF | GLOBAL ID: | LOG CODE:

SPECIAL INSTRUCTIONS: 10 Days.
Analysis: TKN, 8141A and metals by 6020
Total phosphorus

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TKN mg/kg	8141A mg/kg	Total Phosphorus SM4500 P E	Antimony, Arsenic, Cadmium,	Chromium, Copper, Lead,	Manganese, Nickel, Selenium,	Zinc by 6020
1	326445	12/22/14	9:45	Sediment	1				X	X	X	X	X	X	X
2	326446	↓	11:20	↓	1				X	X	X	X	X	X	X
3	326447		12:00		1				X	X	X	X	X	X	X
4	326448		12:45		1				X	X	X	X	X	X	X

Relinquished by: (Signature) Alex	Received by: (Signature/Affiliation) ECI	Date: 12-24-14	Time: 1440
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

01/01/14 Revision

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ANALYTICAL RESULTS OF SEDIMENT SAMPLE(S)

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone (619)425-1993
Attn Laura Torres

Number of Pages 4
Date Received 12/23/2014
Date Reported 01/09/2015

Job Number	Ordered	Client
63209	12/23/2014	CLSI

Project ID: S05532-1/2/3/4
Project Name:

Enclosed are the results of analyses on 4 samples analyzed as specified on attached chain of custody.

Wendy Lu
Organics Supervisor

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone: (619)425-1993
Attn: Laura Torres

Project ID: S05532-1/2/3/4

ASL Job Number	Submitted	Client
63209	12/23/2014	CLSI

Method: 300, Nitrite by Ion Chromatography

QC Batch No: 122414-1

Our Lab I.D.		**326445**	**326446**	**326447**	**326448**	
Client Sample I.D.		S05532-1	S05532-2	S05532-3	S05532-4	
Date Sampled		**12/22/2014**	**12/22/2014**	**12/22/2014**	**12/22/2014**	
Date Prepared		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Preparation Method						
Date Analyzed		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Matrix		Sediment	Sediment	Sediment	Sediment	
Units		mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Nitrite as N	**0.500**	**ND**	**0.960**	**0.860**	**ND**	

QUALITY CONTROL REPORT

QC Batch No: 122414-1

Analytes	LCS % REC	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit					
Conventionals										
Nitrite as N	**93**	**95**	**1.9**	**80-120**	**20**					

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone: (619)425-1993
Attn: Laura Torres

Project ID: S05532-1/2/3/4

ASL Job Number	Submitted	Client
63209	12/23/2014	CLSI

Method: 300, Nitrate by Ion Chromatography

QC Batch No: 122414-1

Our Lab I.D.		**326445**	**326446**	**326447**	**326448**	
Client Sample I.D.		S05532-1	S05532-2	S05532-3	S05532-4	
Date Sampled		**12/22/2014**	**12/22/2014**	**12/22/2014**	**12/22/2014**	
Date Prepared		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Preparation Method						
Date Analyzed		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Matrix		Sediment	Sediment	Sediment	Sediment	
Units		mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Nitrate as N	**1.00**	**ND**	**ND**	**ND**	**ND**	

QUALITY CONTROL REPORT

QC Batch No: 122414-1

Analytes	LCS % REC	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit					
Conventionals										
Nitrate as N	**101**	**101**	**<1**	**80-120**	**20**					

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

Clarkson Laboratory & Supply, Inc.
350 Trousdale Drive
Chula Vista, CA 91910-

Telephone: (619)425-1993
Attn: Laura Torres

Project ID: S05532-1/2/3/4

ASL Job Number	Submitted	Client
63209	12/23/2014	CLSI

Method: SM2540-G, Percent Solids

QC Batch No: 122414-1

Our Lab I.D.		**326445**	**326446**	**326447**	**326448**	
Client Sample I.D.		S05532-1	S05532-2	S05532-3	S05532-4	
Date Sampled		**12/22/2014**	**12/22/2014**	**12/22/2014**	**12/22/2014**	
Date Prepared		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Preparation Method						
Date Analyzed		**12/24/2014**	**12/24/2014**	**12/24/2014**	**12/24/2014**	
Matrix		Sediment	Sediment	Sediment	Sediment	
Units		percent(%)	percent(%)	percent(%)	percent(%)	
Dilution Factor		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
% Solids	**1.00**	**18.4**	**59.4**	**60.4**	**50.1**	

QUALITY CONTROL REPORT

QC Batch No: 122414-1

Analytes	SM Result	SM DUP Result	RPD %	SM RPD % Limit						
Conventionals										
% Solids	**18.4**	**18.1**	**1.6**	**20**						

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Contents

Client Project Name: 63209
Work Order Number: 14-12-2232

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Work Order Narrative

Work Order: 14-12-2232 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 12/24/14. They were assigned to Work Order 14-12-2232.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

New York NELAP air certification does not certify for all reported methods and analytes, reference the accredited items here: http://www.calscience.com/PDF/New_York.pdf

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

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Sample Summary

Client:	American Scientific Laboratories, LLC	Work Order:	14-12-2232
	2520 North San Fernando Road	Project Name:	63209
	Los Angeles, CA 90065-1324	PO Number:	
		Date/Time Received:	12/24/14 14:40
		Number of Containers:	4
Attn:	Alen Hosepians		

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
3264445	14-12-2232-1	12/22/14 09:45	1	Sediment
3264446	14-12-2232-2	12/22/14 11:20	1	Sediment
3264447	14-12-2232-3	12/22/14 12:00	1	Sediment
3264448	14-12-2232-4	12/22/14 12:45	1	Sediment

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 N Org B (M)
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	1200	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	620	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	810	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	1700	100	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-025-2225**	**N/A**	**Solid**	**BUR05**	**12/26/14**	**12/26/14 16:00**	**E1226TKNB1**

Parameter	Result	RL	DF	Qualifiers
Total Kjeldahl Nitrogen	ND	10	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 P B/E (M)
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	91	25	50.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	110	25	50.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	91	25	50.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	280	50	100	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-001-5246**	**N/A**	**Solid**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Result	RL	DF	Qualifiers
Phosphorus, Total	ND	0.10	0.200	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:25**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	0.545	0.500	1.00	
Arsenic	1.36	0.100	1.00	
Cadmium	1.17	0.100	1.00	
Chromium	9.35	0.100	1.00	
Copper	39.1	0.100	1.00	B
Lead	10.4	0.100	1.00	
Manganese	36.3	0.500	1.00	
Nickel	10.2	0.100	1.00	
Selenium	6.55	0.100	1.00	
Zinc	147	1.00	1.00	B

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:29**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	2.69	0.100	1.00	
Cadmium	0.121	0.100	1.00	
Chromium	4.23	0.100	1.00	
Copper	11.6	0.100	1.00	B
Lead	11.3	0.100	1.00	
Manganese	389	0.500	1.00	
Nickel	3.05	0.100	1.00	
Selenium	0.396	0.100	1.00	
Zinc	93.5	1.00	1.00	B

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:32**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	2.64	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	3.18	0.100	1.00	
Copper	11.3	0.100	1.00	B
Lead	6.84	0.100	1.00	
Manganese	242	0.500	1.00	
Nickel	3.50	0.100	1.00	
Selenium	0.231	0.100	1.00	
Zinc	95.9	1.00	1.00	B

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 02:35**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	7.33	0.100	1.00	
Cadmium	0.174	0.100	1.00	
Chromium	4.48	0.100	1.00	
Copper	15.3	0.100	1.00	B
Lead	10.6	0.100	1.00	
Manganese	561	0.500	1.00	
Nickel	4.00	0.100	1.00	
Selenium	0.294	0.100	1.00	
Zinc	112	1.00	1.00	B

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-254-278**	**N/A**	**Solid**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:49**	**141226L01E**

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.500	1.00	
Arsenic	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	ND	0.100	1.00	
Copper	0.160	0.100	1.00	
Lead	ND	0.100	1.00	
Manganese	ND	0.500	1.00	
Nickel	ND	0.100	1.00	
Selenium	ND	0.100	1.00	
Zinc	1.09	1.00	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264445	**14-12-2232-1-A**	**12/22/14 09:45**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 12:00**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	61	30-130	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264446	**14-12-2232-2-A**	**12/22/14 11:20**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 12:46**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	66	30-130	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264447	**14-12-2232-3-A**	**12/22/14 12:00**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 13:32**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	60	30-130	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
3264448	**14-12-2232-4-A**	**12/22/14 12:45**	**Sediment**	**GC 35**	**12/26/14**	**01/08/15 14:29**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	68	30-130	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A
Units: mg/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-973-147**	**N/A**	**Solid**	**GC 35**	**01/07/15**	**01/09/15 02:01**	**141226L06**

Parameter	Result	RL	DF	Qualifiers
Atrazine	ND	0.50	1.00	
Azinphos Methyl	ND	0.50	1.00	
Bolstar	ND	0.50	1.00	
Chlorpyrifos	ND	0.50	1.00	
Coumaphos	ND	0.50	1.00	
Demeton-o/s	ND	0.50	1.00	
Diazinon	ND	0.50	1.00	
Dichlorvos	ND	0.50	1.00	
Dimethoate	ND	0.50	1.00	
Disulfoton	ND	0.50	1.00	
Ethion	ND	0.50	1.00	
Ethoprop	ND	0.50	1.00	
Famphur	ND	0.50	1.00	
Fensulfothion	ND	0.50	1.00	
Fenthion	ND	0.50	1.00	
Malathion	ND	0.50	1.00	
Merphos	ND	0.50	1.00	
Methyl Parathion	ND	0.50	1.00	
Mevinphos	ND	0.50	1.00	
Naled	ND	4.0	1.00	
Parathion	ND	0.50	1.00	
Phorate	ND	0.50	1.00	
Ronnel	ND	0.50	1.00	
Simazine	ND	0.50	1.00	
Stirophos	ND	2.0	1.00	
Thionazin	ND	0.50	1.00	
Tokuthion	ND	0.50	1.00	
Trichloronate	ND	0.50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Tributylphosphate	117	30-130	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Quality Control - Spike/Spike Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 P B/E (M)
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
3264445	**Sample**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPS2**
3264445	**Matrix Spike**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPS2**
3264445	**Matrix Spike Duplicate**	**Sediment**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPS2**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Phosphorus, Total	91.48	100.0	189.5	98	190.5	99	70-130	1	0-25	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
14-12-2197-1	**Sample**	**Sediment**	**ICP/MS 04**	**12/26/14**	**01/05/15 16:00**	**141226S01**
14-12-2197-1	**Matrix Spike**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:59**	**141226S01**
14-12-2197-1	**Matrix Spike Duplicate**	**Sediment**	**ICP/MS 04**	**12/26/14**	**12/27/14 01:41**	**141226S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	ND	25.00	7.640	31	7.377	30	80-120	4	0-20	3
Arsenic	5.927	25.00	31.30	101	30.58	99	80-120	2	0-20	
Cadmium	0.1701	25.00	25.75	102	26.19	104	80-120	2	0-20	
Chromium	40.47	25.00	69.09	114	62.64	89	80-120	10	0-20	
Copper	25.90	25.00	51.83	104	49.27	93	80-120	5	0-20	
Lead	11.84	25.00	37.42	102	36.78	100	80-120	2	0-20	
Manganese	215.2	25.00	227.8	4X	232.3	4X	80-120	4X	0-20	Q
Nickel	45.00	25.00	66.59	86	66.93	88	80-120	1	0-20	
Selenium	0.2939	25.00	26.89	106	27.53	109	80-120	2	0-20	
Zinc	59.53	25.00	83.69	97	81.45	88	80-120	3	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
14-12-2146-24	**Sample**	**Solid**	**GC 35**	**12/26/14**	**01/09/15 05:05**	**141226S06**
14-12-2146-24	**Matrix Spike**	**Solid**	**GC 35**	**12/26/14**	**01/09/15 03:33**	**141226S06**
14-12-2146-24	**Matrix Spike Duplicate**	**Solid**	**GC 35**	**12/26/14**	**01/09/15 04:19**	**141226S06**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Azinphos Methyl	ND	4.000	2.863	72	1.819	45	30-130	45	0-30	4
Bolstar	ND	4.000	3.022	76	1.941	49	30-130	44	0-30	4
Chlorpyrifos	ND	4.000	2.937	73	1.717	43	30-130	52	0-30	4
Coumaphos	ND	4.000	2.936	73	1.883	47	30-130	44	0-30	4
Diazinon	ND	4.000	2.989	75	1.933	48	30-130	43	0-30	4
Disulfoton	ND	4.000	3.140	78	1.929	48	30-130	48	0-30	4
Ethoprop	ND	4.000	3.142	79	1.948	49	30-130	47	0-30	4
Fensulfothion	ND	4.000	3.244	81	2.063	52	30-130	44	0-30	4
Fenthion	ND	4.000	3.066	77	1.897	47	30-130	47	0-30	4
Merphos	ND	4.000	3.561	89	2.556	64	30-130	33	0-30	4
Methyl Parathion	ND	4.000	3.167	79	1.914	48	30-130	49	0-30	4
Phorate	ND	4.000	3.288	82	2.073	52	30-130	45	0-30	4
Ronnel	ND	4.000	3.050	76	1.861	47	30-130	48	0-30	4
Stirophos	ND	4.000	1.931	48	1.163	29	30-130	50	0-30	3,4
Tokuthion	ND	4.000	2.917	73	1.859	46	30-130	44	0-30	4
Trichloronate	ND	4.000	2.915	73	1.723	43	30-130	51	0-30	4

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - PDS

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
14-12-2197-1	**Sample**	**Sediment**	**ICP/MS 04**	**12/26/14 00:00**	**01/05/15 16:00**	**141226S01**
14-12-2197-1	**PDS**	**Sediment**	**ICP/MS 04**	**12/26/14 00:00**	**12/27/14 01:44**	**141226S01**

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	%Rec. CL	Qualifiers
Antimony	ND	25.00	25.62	102	75-125	
Arsenic	5.927	25.00	30.83	100	75-125	
Cadmium	0.1701	25.00	25.47	101	75-125	
Chromium	40.47	25.00	63.56	92	75-125	
Copper	25.90	25.00	48.75	91	75-125	
Lead	11.84	25.00	37.11	101	75-125	
Manganese	215.2	25.00	241.6	4X	75-125	Q
Nickel	45.00	25.00	67.08	88	75-125	
Selenium	0.2939	25.00	28.01	111	75-125	
Zinc	59.53	25.00	82.17	91	75-125	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Sample Duplicate

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 N Org B (M)
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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
3264448	**Sample**	**Sediment**	**BUR05**	**12/26/14 00:00**	**12/26/14 16:00**	**E1226TKND1**
3264448	**Sample Duplicate**	**Sediment**	**BUR05**	**12/26/14 00:00**	**12/26/14 16:00**	**E1226TKND1**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Total Kjeldahl Nitrogen	1708	1764	3	0-25	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: N/A
Method: SM 4500 P B/E (M)
Page 1 of 3

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-05-001-5246	**LCS**	**Solid**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**
099-05-001-5246	**LCSD**	**Solid**	**UV 7**	**12/31/14**	**12/31/14 15:39**	**E1231TPL2**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Phosphorus, Total	2.000	1.935	97	1.900	95	80-120	2	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3050B
Method: EPA 6020

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-254-278	**LCS**	**Solid**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:53**	**141226L01E**
099-15-254-278	**LCSD**	**Solid**	**ICP/MS 04**	**12/26/14**	**12/27/14 00:56**	**141226L01E**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	25.00	25.81	103	25.54	102	80-120	1	0-20	
Arsenic	25.00	27.00	108	27.15	109	80-120	1	0-20	
Cadmium	25.00	25.29	101	25.37	101	80-120	0	0-20	
Chromium	25.00	29.17	117	28.23	113	80-120	3	0-20	
Copper	25.00	27.72	111	27.19	109	80-120	2	0-20	
Lead	25.00	26.60	106	26.51	106	80-120	0	0-20	
Manganese	25.00	25.01	100	24.99	100	80-120	0	0-20	
Nickel	25.00	25.05	100	25.06	100	80-120	0	0-20	
Selenium	25.00	28.12	112	28.51	114	80-120	1	0-20	
Zinc	25.00	29.18	117	27.04	108	80-120	8	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

American Scientific Laboratories, LLC
2520 North San Fernando Road
Los Angeles, CA 90065-1324

Project: 63209

Date Received: 12/24/14
Work Order: 14-12-2232
Preparation: EPA 3545
Method: EPA 8141A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-973-147	**LCS**	**Solid**	**GC 35**	**01/07/15**	**01/09/15 02:47**	**141226L06**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	ME CL	Qualifiers
Azinphos Methyl	4.000	3.784	95	30-130	13-147	
Bolstar	4.000	3.986	100	30-130	13-147	
Chlorpyrifos	4.000	3.780	94	30-130	13-147	
Coumaphos	4.000	3.977	99	30-130	13-147	
Diazinon	4.000	3.583	90	30-130	13-147	
Disulfoton	4.000	4.207	105	30-130	13-147	
Ethoprop	4.000	3.913	98	30-130	13-147	
Fensulfothion	4.000	4.404	110	30-130	13-147	
Fenthion	4.000	4.078	102	30-130	13-147	
Merphos	4.000	4.687	117	30-130	13-147	
Methyl Parathion	4.000	4.252	106	30-130	13-147	
Phorate	4.000	4.294	107	30-130	13-147	
Ronnel	4.000	3.950	99	30-130	13-147	
Stirophos	4.000	2.318	58	30-130	13-147	
Tokuthion	4.000	3.882	97	30-130	13-147	
Trichloronate	4.000	3.753	94	30-130	13-147	

Total number of LCS compounds: 16
Total number of ME compounds: 0
Total number of ME compounds allowed: 1
LCS ME CL validation result: Pass

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RPD: Relative Percent Difference. CL: Control Limits

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Sample Analysis Summary Report

Work Order: 14-12-2232 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
EPA 6020	EPA 3050B	598	ICP/MS 04	1
EPA 8141A	EPA 3545	886	GC 35	1
SM 4500 N Org B (M)	N/A	685	BUR05	1
SM 4500 P B/E (M)	N/A	848	UV 7	1

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Glossary of Terms and Qualifiers

Work Order: 14-12-2232 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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WORK ORDER #: 14-12-[12323]2

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: ASL

DATE: 12/24/14

TEMPERATURE: Thermometer ID: SC2 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 2.9 °C - 0.2 °C (CF) = 2.7 °C ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter **Checked by:** 3W

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Checked by:** 3W

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Checked by:** 3W

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☐	☐	☑
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Aqueous samples received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfides ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☑8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Aqueous: ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** 3W

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** 3W

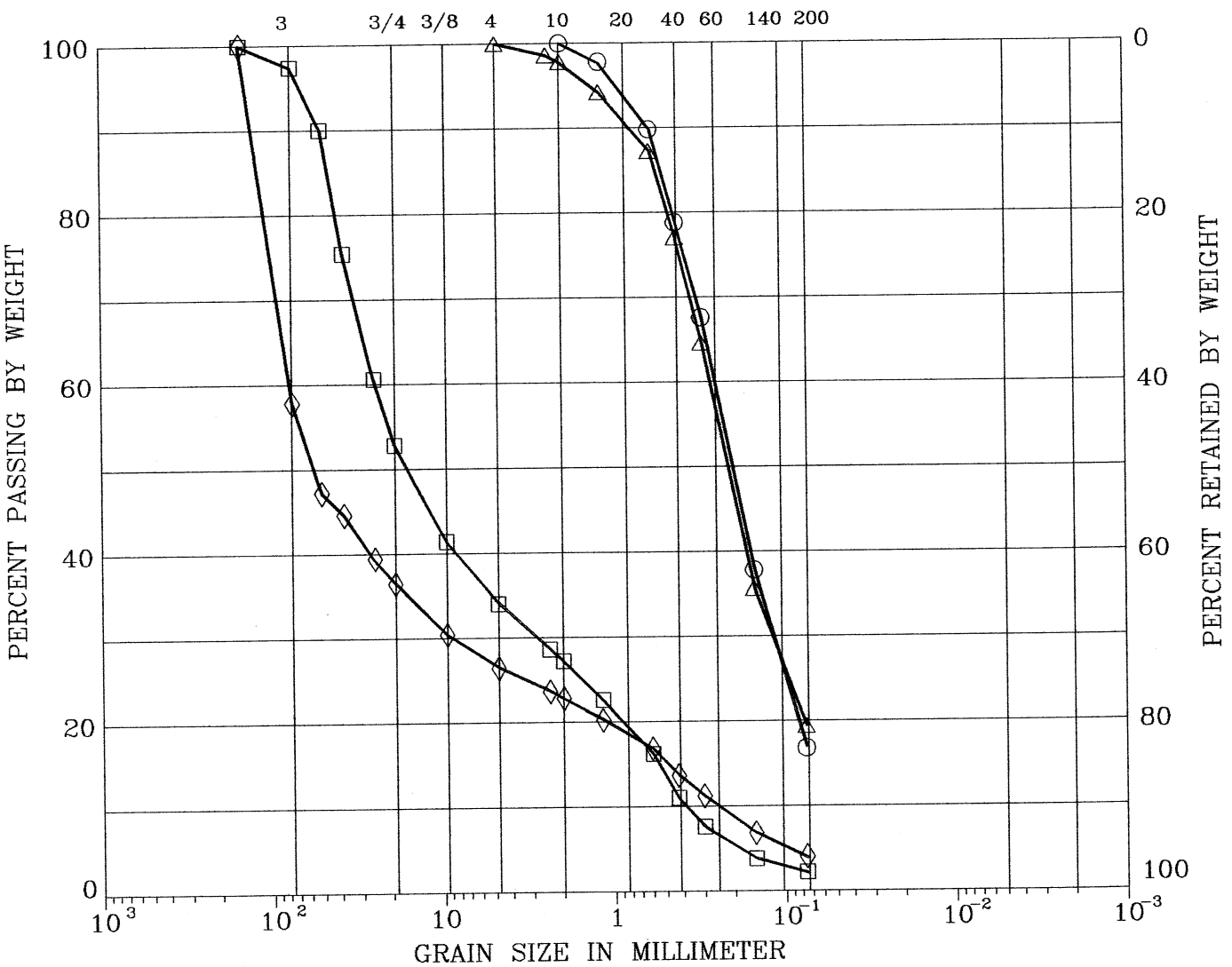
Preservative: **h:** HCL **n:** HNO_3 **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** 3W

Return to Contents

SIEVE ANALYSIS LABORATORY RESULTS OF SEDIMENTS SAMPLES

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	TCC−1				SILTY SAND (SM)
□	LAC−1				POORLY GRADED GRAVEL (GP)
△	LAC−2				SILTY SAND (SM)
◇	UAC−1				POORLY GRADED GRAVEL (GP)

Remark :

Project 154 GS−13	CHANNEL MAINTENANCE PROJECT
ALLIED GEOTECHNICAL ENGINEERS, INC.	GRAIN SIZE DISTRIBUTION Figure No.

SUMMARY OF GRAIN SIZE DISTRIBUTION
CITY OF SAN DIEGO CHANNEL MAINTENANCE PROJECT

		% Passing			
	Sample ID	TCC-1	LAC-1	LAC-2	UAC-1
	6"				
	5"				100
	4"		100		75.5
	3"		97.4		57.9
	2"		90		47.1
	1.5"		75.3		44.6
	1"		60.6		39.3
	0.75"		52.8		36.5
U.S. STD.	**0.5"**		45.2		32.3
Sieve	**0.375"**		41.3		30.4
Size	**#4**		34.1	100	26.5
	#8		28.6	98.6	23.6
	#10	100	27.2	97.8	22.8
	#16	97.7	22.6	94.2	20.3
	#30	88.9	16.2	87.3	16.8
	#40	78.9	10.9	77	13.7
	#50	67.6	7.6	64.6	11.2
	#100	37.9	3.8	35.6	6.8
	#200	16.9	2.1	19.4	3.9
Cu		19.5	64.3	29	317.6
Cc		4.1	0.8	5.6	4

TCC = Trip Court Channel
LAC = Lower Alvarado Channel
UAC = Upper Alvarado Channel
Cu = Coefficient of Uniformity
Cc = Coefficient of Curvature

CHAIN OF CUSTODY SHEETS(S) FOR WATER COLUMN SAMPLING

CHAIN-OF-CUSTODY RECORD

14L0494

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 & Chelsea Ohanesian

Address: 5620 Friars Road
San Diego, CA 92110

Phone: (619) 908-3588 Fax: (619) 291-4165

Email: Rdoyle@rickengineering.com

Billing Address: 5620 Friars Road
San Diego, CA 92110

Project ID: Lower Alvarado IWQA

Project #: 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 X TDS	X Nitrate X TKN □ NH3	CAC Title 22/CAM17 Metals □ TTLC □ STLC	TCLP (RCRA) □ Metals □ Organics	(Cd) (Cr) (Cu) (Pb) (Ni) Ag (Zn) □ Dissolved	Coliform, X Total (MTF) X Fecal (MTF)	Coliert, T+E.Coli □ P/A □ Enumeration	Enterococcus, X MTF □ Enterolert	Heterotrophic Plate Count (HPC)	□ BOD □ COD □ Cyanide	DO, Se, Mn, N, Sb, As Hardness, Total Phos			
1	Lower Alvarado Location 1	12/11/14	8:24am	SW	7							X		X	X			X	X		X			X			
2	Lower Alvarado Location 2	12/11/14	9:49am	SW	7							X		X	X			X	X		X			X			
3	Lower Alvarado Location 3	12/11/14	12:39pm	SW	7							X		X	X			X	X		X			X			
4	Lower Alvarado Location 4	12/11/14	11:09am	SW	7							X		X	X			X	X		X			X			
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: 5.0 °C ICE
COC/Labels Agree: Yes No N/A	Sampled By: Client EMA Autosampler

RELINQUISHED BY	DATE/TIME	RECEIVED BY
Signature: Chelsea Ohanesian	1500	Signature:
Print: Chelsea Ohanesian	12/11/14	Print:
Company: Rick Engineering		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.

23 December 2014

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

EMA Log #: 14L0494

Project Name: Lower Alvarado IWQA

Enclosed are the results of analyses for samples received by the laboratory on 12/11/14 15:00. 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
Project Name: Lower Alvarado IWQA

EMA Log #: 14L0494

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Lower Alvarado Location 1	14L0494-01	Stormwater	12/11/14 08:24	12/11/14 15:00
Lower Alvarado Location 2	14L0494-02	Stormwater	12/11/14 09:49	12/11/14 15:00
Lower Alvarado Location 3	14L0494-03	Stormwater	12/11/14 12:39	12/11/14 15:00
Lower Alvarado Location 4	14L0494-04	Stormwater	12/11/14 11:08	12/11/14 15:00

Client Name: Rick Engineering Company
Project Name: Lower Alvarado IWQA

EMA Log #: 14L0494

Total Metals by EPA 200 Series Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Lower Alvarado Location 1 (14L0494-01) Stormwater Sampled: 12/11/14 08:24 Received: 12/11/14 15:00									
Arsenic	ND	0.010	mg/l	1	4121579	12/15/14	12/19/14	EPA 200.7	
Zinc	ND	0.05	"	"	"	"	12/17/14	"	
Nickel	ND	0.05	"	"	"	"	"	"	
Lead	ND	0.05	"	"	"	"	"	"	
Copper	ND	0.05	"	"	"	"	"	"	
Chromium	ND	0.05	"	"	"	"	"	"	
Cadmium	ND	0.01	"	"	"	"	"	"	
Manganese	**0.144**	0.030	"	"	"	"	12/17/14	"	
Antimony	ND	0.100	"	"	"	"	12/17/14	"	
Selenium	ND	0.010	"	"	"	"	"	"	
Lower Alvarado Location 2 (14L0494-02) Stormwater Sampled: 12/11/14 09:49 Received: 12/11/14 15:00									
Arsenic	ND	0.010	mg/l	1	4121579	12/15/14	12/19/14	EPA 200.7	
Lead	ND	0.05	"	"	"	"	12/17/14	"	
Nickel	ND	0.05	"	"	"	"	"	"	
Zinc	ND	0.05	"	"	"	"	"	"	
Chromium	ND	0.05	"	"	"	"	"	"	
Cadmium	ND	0.01	"	"	"	"	"	"	
Copper	ND	0.05	"	"	"	"	12/17/14	"	
Manganese	**0.302**	0.030	"	"	"	"	"	"	
Antimony	ND	0.100	"	"	"	"	12/17/14	"	
Selenium	ND	0.010	"	"	"	"	"	"	
Lower Alvarado Location 3 (14L0494-03) Stormwater Sampled: 12/11/14 12:39 Received: 12/11/14 15:00									
Arsenic	ND	0.010	mg/l	1	4121579	12/15/14	12/19/14	EPA 200.7	
Cadmium	ND	0.01	"	"	"	"	12/17/14	"	
Chromium	ND	0.05	"	"	"	"	"	"	
Copper	ND	0.05	"	"	"	"	"	"	
Lead	ND	0.05	"	"	"	"	"	"	
Zinc	ND	0.05	"	"	"	"	"	"	
Nickel	ND	0.05	"	"	"	"	"	"	
Manganese	**0.039**	0.030	"	"	"	"	12/17/14	"	
Antimony	ND	0.100	"	"	"	"	12/17/14	"	
Selenium	ND	0.010	"	"	"	"	"	"	

Client Name: Rick Engineering Company
Project Name: Lower Alvarado IWQA

EMA Log #: 14L0494

Total Metals by EPA 200 Series Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Lower Alvarado Location 4 (14L0494-04) Stormwater Sampled: 12/11/14 11:08 Received: 12/11/14 15:00									
Arsenic	ND	0.010	mg/l	1	4121579	12/15/14	12/19/14	EPA 200.7	
Chromium	ND	0.05	"	"	"	"	12/17/14	"	
Cadmium	ND	0.01	"	"	"	"	"	"	
Nickel	ND	0.05	"	"	"	"	"	"	
Zinc	**0.07**	0.05	"	"	"	"	"	"	
Lead	ND	0.05	"	"	"	"	"	"	
Copper	ND	0.05	"	"	"	"	"	"	
Manganese	**0.111**	0.030	"	"	"	"	12/17/14	"	
Antimony	ND	0.100	"	"	"	"	12/17/14	"	
Selenium	ND	0.010	"	"	"	"	"	"	

Client Name: Rick Engineering Company **EMA Log #: 14L0494**
Project Name: Lower Alvarado IWQA

Organophosphorus Pesticides by EPA Method 8141A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Lower Alvarado Location 1 (14L0494-01) Stormwater Sampled: 12/11/14 08:24 Received: 12/11/14 15:00									
Chlorpyrifos	ND	0.05	ug/l	1	4121217	12/16/14	12/17/14	EPA 8141A	
Diazinon	ND	0.05	"	"	"	"	"	"	
Malathion	ND	0.05	"	"	"	"	"	"	
Surrogate: Triphenyl phosphate		*116 %*	*60-130*		"	"	"	"	
Surrogate: Tribuytlphosphate		*112 %*	*60-130*		"	"	"	"	
Lower Alvarado Location 2 (14L0494-02) Stormwater Sampled: 12/11/14 09:49 Received: 12/11/14 15:00									
Chlorpyrifos	ND	0.05	ug/l	1	4121217	12/16/14	12/17/14	EPA 8141A	
Diazinon	ND	0.05	"	"	"	"	"	"	
Malathion	ND	0.05	"	"	"	"	"	"	
Surrogate: Triphenyl phosphate		*108 %*	*60-130*		"	"	"	"	
Surrogate: Tribuytlphosphate		*108 %*	*60-130*		"	"	"	"	
Lower Alvarado Location 3 (14L0494-03) Stormwater Sampled: 12/11/14 12:39 Received: 12/11/14 15:00									
Chlorpyrifos	ND	0.05	ug/l	1	4121217	12/16/14	12/17/14	EPA 8141A	
Diazinon	ND	0.05	"	"	"	"	"	"	
Malathion	ND	0.05	"	"	"	"	"	"	
Surrogate: Triphenyl phosphate		*116 %*	*60-130*		"	"	"	"	
Surrogate: Tribuytlphosphate		*100 %*	*60-130*		"	"	"	"	
Lower Alvarado Location 4 (14L0494-04) Stormwater Sampled: 12/11/14 11:08 Received: 12/11/14 15:00									
Chlorpyrifos	ND	0.05	ug/l	1	4121217	12/16/14	12/17/14	EPA 8141A	
Diazinon	ND	0.05	"	"	"	"	"	"	
Malathion	ND	0.05	"	"	"	"	"	"	
Surrogate: Triphenyl phosphate		*96 %*	*60-130*		"	"	"	"	
Surrogate: Tribuytlphosphate		*104 %*	*60-130*		"	"	"	"	

Client Name: Rick Engineering Company
Project Name: Lower Alvarado IWQA

EMA Log #: 14L0494

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Lower Alvarado Location 1 (14L0494-01) Stormwater Sampled: 12/11/14 08:24 Received: 12/11/14 15:00									
Hardness (Total)	**809**	100	mg CaCO3/L	10	4121579	12/15/14	12/16/14	EPA 200.7	
Nitrate as N	**0.32**	0.05	mg/l	1	4122227	12/20/14	12/20/14	SM4500 NO3 E	W-02
Nitrate/Nitrite as N	**0.32**	0.05	"	"	"	"	"	"	
Nitrite as N	ND	0.05	"	"	4121422	12/12/14	12/12/14	SM4500 NO2 B	
Total Kjeldahl Nitrogen	**0.9**	0.5	"	"	4121941	12/18/14	12/19/14	SM4500 N C	
Total Nitrogen	**1.2**	0.5	"	"	4122254	12/22/14	12/22/14	Calculation	
Dissolved Oxygen	**10.0**	0.10	"	"	4121128	12/11/14	12/11/14	SM4500-O G	HT-15
Phosphorus, Total	**0.08**	0.05	"	"	4122027	12/20/14	12/20/14	SM4500 P B, E	
Total Dissolved Solids	**1800**	20.0	"	"	4121576	12/15/14	12/16/14	SM2540 C	
Lower Alvarado Location 2 (14L0494-02) Stormwater Sampled: 12/11/14 09:49 Received: 12/11/14 15:00									
Hardness (Total)	**821**	100	mg CaCO3/L	10	4121579	12/15/14	12/16/14	EPA 200.7	
Nitrate as N	**0.29**	0.05	mg/l	1	4122227	12/20/14	12/20/14	SM4500 NO3 E	W-02
Nitrate/Nitrite as N	**0.29**	0.05	"	"	"	"	"	"	
Nitrite as N	ND	0.05	"	"	4121422	12/12/14	12/12/14	SM4500 NO2 B	
Total Kjeldahl Nitrogen	**1.3**	0.5	"	"	4121941	12/18/14	12/19/14	SM4500 N C	
Total Nitrogen	**1.6**	0.5	"	"	4122254	12/22/14	12/22/14	Calculation	
Dissolved Oxygen	**6.31**	0.10	"	"	4121128	12/11/14	12/11/14	SM4500-O G	HT-15
Phosphorus, Total	**0.10**	0.05	"	"	4122027	12/20/14	12/20/14	SM4500 P B, E	
Total Dissolved Solids	**1880**	20.0	"	"	4121576	12/15/14	12/16/14	SM2540 C	
Lower Alvarado Location 3 (14L0494-03) Stormwater Sampled: 12/11/14 12:39 Received: 12/11/14 15:00									
Hardness (Total)	**731**	100	mg CaCO3/L	10	4121579	12/15/14	12/16/14	EPA 200.7	
Nitrate as N	**0.27**	0.05	mg/l	1	4122227	12/20/14	12/20/14	SM4500 NO3 E	W-02
Nitrate/Nitrite as N	**0.27**	0.05	"	"	"	"	"	"	
Nitrite as N	ND	0.05	"	"	4121422	12/12/14	12/12/14	SM4500 NO2 B	
Total Kjeldahl Nitrogen	**1.1**	0.5	"	"	4121941	12/18/14	12/19/14	SM4500 N C	
Total Nitrogen	**1.4**	0.5	"	"	4122254	12/22/14	12/22/14	Calculation	
Dissolved Oxygen	**5.72**	0.10	"	"	4121128	12/11/14	12/11/14	SM4500-O G	HT-15
Phosphorus, Total	**0.06**	0.05	"	"	4122027	12/20/14	12/20/14	SM4500 P B, E	
Total Dissolved Solids	**1790**	20.0	"	"	4121576	12/15/14	12/16/14	SM2540 C	

Client Name: Rick Engineering Company
Project Name: Lower Alvarado IWQA

EMA Log #: 14L0494

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Lower Alvarado Location 4 (14L0494-04) Stormwater	**Sampled: 12/11/14 11:08**	**Received: 12/11/14 15:00**							
Hardness (Total)	**765**	100	mg CaCO3/L	10	4121579	12/15/14	12/16/14	EPA 200.7	
Nitrate as N	**0.40**	0.05	mg/l	1	4122227	12/20/14	12/20/14	SM4500 NO3 E	W-02
Nitrate/Nitrite as N	**0.40**	0.05	"	"	"	"	"	"	
Nitrite as N	ND	0.05	"	"	4121422	12/12/14	12/12/14	SM4500 NO2 B	
Total Kjeldahl Nitrogen	**1.3**	0.5	"	"	4121941	12/18/14	12/19/14	SM4500 N C	
Total Nitrogen	**1.7**	0.5	"	"	4122254	12/22/14	12/22/14	Calculation	
Dissolved Oxygen	**6.35**	0.10	"	"	4121128	12/11/14	12/11/14	SM4500-O G	HT-15
Phosphorus, Total	**0.11**	0.05	"	"	4122027	12/20/14	12/20/14	SM4500 P B, E	
Total Dissolved Solids	**1860**	20.0	"	"	4121576	12/15/14	12/16/14	SM2540 C	

Client Name: Rick Engineering Company **EMA Log #: 14L0494**
Project Name: Lower Alvarado IWQA

Microbiological Parameters by Standard Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Lower Alvarado Location 1 (14L0494-01) Stormwater		**Sampled: 12/11/14 08:24**			**Received: 12/11/14 15:00**				
Total Coliforms	**1600**	2	MPN/100 ml	1	4121122	12/11/14	12/15/14	SM 9221 B, E	A-01a
Fecal Coliforms	**240**	2	"	"	"	"	12/14/14	"	
Enterococcus	**1600**	2	"	"	4121123	"	12/15/14	SM 9230 A, B	
Lower Alvarado Location 2 (14L0494-02) Stormwater		**Sampled: 12/11/14 09:49**			**Received: 12/11/14 15:00**				
Total Coliforms	**1600**	2	MPN/100 ml	1	4121122	12/11/14	12/15/14	SM 9221 B, E	A-01a
Fecal Coliforms	**1600**	2	"	"	"	"	12/14/14	"	
Enterococcus	**1600**	2	"	"	4121123	"	12/15/14	SM 9230 A, B	A-01
Lower Alvarado Location 3 (14L0494-03) Stormwater		**Sampled: 12/11/14 12:39**			**Received: 12/11/14 15:00**				
Total Coliforms	**1600**	2	MPN/100 ml	1	4121122	12/11/14	12/15/14	SM 9221 B, E	A-01a
Fecal Coliforms	**170**	2	"	"	"	"	12/14/14	"	
Enterococcus	**500**	2	"	"	4121123	"	12/15/14	SM 9230 A, B	
Lower Alvarado Location 4 (14L0494-04) Stormwater		**Sampled: 12/11/14 11:08**			**Received: 12/11/14 15:00**				
Total Coliforms	**1600**	2	MPN/100 ml	1	4121122	12/11/14	12/15/14	SM 9221 B, E	A-01a
Fecal Coliforms	**240**	2	"	"	"	"	12/14/14	"	
Enterococcus	**1600**	2	"	"	4121123	"	12/15/14	SM 9230 A, B	

Client Name: Rick Engineering Company **EMA Log #: 14L0494**
Project Name: Lower Alvarado IWQA

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 4121579										
Blank (4121579-BLK1)				Prepared: 12/15/14 Analyzed: 12/16/14						
Chromium	ND	0.05	mg/l							
Lead	ND	0.05	"							
Manganese	ND	0.030	"							
Nickel	ND	0.05	"							
Zinc	ND	0.05	"							
Antimony	ND	0.100	"							
Copper	ND	0.05	"							
Cadmium	ND	0.01	"							
Selenium	ND	0.010	"							
Arsenic	ND	0.010	"							
LCS (4121579-BS1)				Prepared: 12/15/14 Analyzed: 12/16/14						
Manganese	0.813	0.030	mg/l	1.00		81	75-125			
Nickel	0.89	0.05	"	1.00		89	75-125			
Zinc	0.85	0.05	"	1.00		85	75-125			
Cadmium	0.85	0.01	"	1.00		85	75-125			
Copper	0.88	0.05	"	1.00		88	75-125			
Chromium	0.87	0.05	"	1.00		87	75-125			
Antimony	0.872	0.100	"	1.00		87	75-125			
Lead	0.90	0.05	"	1.00		90	75-125			
Arsenic	0.866	0.010	"	1.00		87	75-125			
Selenium	0.858	0.010	"	1.00		86	75-125			
LCS Dup (4121579-BSD1)				Prepared: 12/15/14 Analyzed: 12/16/14						
Antimony	0.901	0.100	mg/l	1.00		90	75-125	3	20	
Manganese	0.863	0.030	"	1.00		86	75-125	6	20	
Cadmium	0.87	0.01	"	1.00		87	75-125	2	20	
Copper	0.90	0.05	"	1.00		90	75-125	2	20	
Chromium	0.90	0.05	"	1.00		90	75-125	2	20	
Lead	0.92	0.05	"	1.00		92	75-125	3	20	
Nickel	0.91	0.05	"	1.00		91	75-125	2	20	
Zinc	0.87	0.05	"	1.00		87	75-125	3	20	
Selenium	0.886	0.010	"	1.00		89	75-125	3	20	
Arsenic	0.895	0.010	"	1.00		90	75-125	3	20	

Client Name: Rick Engineering Company **EMA Log #: 14L0494**
Project Name: Lower Alvarado IWQA

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 4121579										
Duplicate (4121579-DUP1)		**Source: 14L0512-01**		Prepared: 12/15/14	Analyzed: 12/17/14					
Nickel	ND	0.05	mg/l		ND				20	
Antimony	ND	0.100	"		ND				20	
Cadmium	0.001	0.01	"		ND				20	
Copper	0.01	0.05	"		0.01			18	20	
Chromium	0.002	0.05	"		ND				20	
Lead	ND	0.05	"		ND				20	
Zinc	0.27	0.05	"		0.28			3	20	
Manganese	0.051	0.030	"		0.056			9	20	
Arsenic	ND	0.010	"		ND				20	
Selenium	ND	0.010	"		0.008				20	
Matrix Spike (4121579-MS1)		**Source: 14L0512-01**		Prepared: 12/15/14	Analyzed: 12/17/14					
Nickel	1.04	0.05	mg/l	1.00	ND	104	75-125			
Manganese	1.06	0.030	"	1.00	0.056	101	75-125			
Zinc	1.28	0.05	"	1.00	0.28	100	75-125			
Chromium	1.00	0.05	"	1.00	ND	100	75-125			
Lead	1.00	0.05	"	1.00	ND	100	75-125			
Copper	1.04	0.05	"	1.00	0.01	103	75-125			
Cadmium	1.01	0.01	"	1.00	ND	101	75-125			
Antimony	1.01	0.100	"	1.00	ND	101	75-125			
Arsenic	1.04	0.010	"	1.00	ND	104	75-125			
Selenium	0.981	0.010	"	1.00	0.008	97	75-125			
Matrix Spike (4121579-MS2)		**Source: 14L0600-01**		Prepared: 12/15/14	Analyzed: 12/17/14					
Manganese	1.07	0.030	mg/l	1.00	0.048	102	75-125			
Chromium	1.02	0.05	"	1.00	0.005	102	75-125			
Copper	1.06	0.05	"	1.00	0.02	103	75-125			
Zinc	1.16	0.05	"	1.00	0.13	103	75-125			
Nickel	1.03	0.05	"	1.00	ND	103	75-125			
Lead	1.01	0.05	"	1.00	0.01	100	75-125			
Antimony	1.07	0.100	"	1.00	ND	107	75-125			
Cadmium	1.01	0.01	"	1.00	ND	101	75-125			
Arsenic	1.02	0.010	"	1.00	ND	102	75-125			
Selenium	0.984	0.010	"	1.00	ND	98	75-125			

Client Name: Rick Engineering Company **EMA Log #: 14L0494**
Project Name: Lower Alvarado IWQA

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 4121579										
Matrix Spike Dup (4121579-MSD1)		**Source: 14L0512-01**		Prepared: 12/15/14	Analyzed: 12/17/14					
Chromium	1.02	0.05	mg/l	1.00	ND	102	75-125	2	20	
Lead	0.90	0.05	"	1.00	ND	90	75-125	10	20	
Cadmium	0.93	0.01	"	1.00	ND	93	75-125	9	20	
Copper	1.08	0.05	"	1.00	0.01	107	75-125	4	20	
Antimony	0.934	0.100	"	1.00	ND	93	75-125	8	20	
Zinc	1.75	0.05	"	1.00	0.28	147	75-125	31	20	QM-06
Nickel	1.02	0.05	"	1.00	ND	102	75-125	2	20	
Manganese	5.80	0.030	"	1.00	0.056	574	75-125	138	20	QM-06
Selenium	0.914	0.010	"	1.00	0.008	91	75-125	7	20	
Arsenic	0.970	0.010	"	1.00	ND	97	75-125	7	20	

Client Name: Rick Engineering Company
Project Name: Lower Alvarado IWQA

EMA Log #: 14L0494

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 4121217										
Blank (4121217-BLK1)				Prepared: 12/16/14 Analyzed: 12/17/14						
Chlorpyrifos	ND	0.05	ug/l							
Diazinon	ND	0.05	"							
Malathion	ND	0.05	"							
Surrogate: Triphenyl phosphate	*0.190*		*"*	*0.250*		*76*	*60-130*			
Surrogate: Tribuytlphosphate	*0.210*		*"*	*0.250*		*84*	*60-130*			
LCS (4121217-BS1)				Prepared: 12/16/14 Analyzed: 12/17/14						
Bolstar	0.40	0.10	ug/l	0.500		80	60-130			
Diazinon	0.44	0.05	"	0.500		88	60-130			
Ethoprop	0.42	0.05	"	0.500		84	60-130			
Mevinphos	0.42	0.25	"	0.500		84	60-130			
Methyl parathion	0.40	0.10	"	0.500		80	60-130			
Phorate	0.43	0.05	"	0.500		86	60-130			
Ronnel	0.59	0.25	"	0.500		118	60-130			
Trichlorinate	0.46	0.05	"	0.500		92	60-130			
Surrogate: Triphenyl phosphate	*0.200*		*"*	*0.250*		*80*	*60-130*			
Surrogate: Tribuytlphosphate	*0.250*		*"*	*0.250*		*100*	*60-130*			
LCS Dup (4121217-BSD1)				Prepared: 12/16/14 Analyzed: 12/17/14						
Bolstar	0.42	0.10	ug/l	0.500		84	60-130	5	30	
Diazinon	0.47	0.05	"	0.500		94	60-130	7	30	
Ethoprop	0.43	0.05	"	0.500		86	60-130	2	30	
Mevinphos	0.42	0.25	"	0.500		84	60-130	0	30	
Methyl parathion	0.43	0.10	"	0.500		86	60-130	7	30	
Phorate	0.41	0.05	"	0.500		82	60-130	5	30	
Ronnel	0.50	0.25	"	0.500		100	60-130	17	30	
Trichlorinate	0.46	0.05	"	0.500		92	60-130	0	30	
Surrogate: Triphenyl phosphate	*0.180*		*"*	*0.250*		*72*	*60-130*			
Surrogate: Tribuytlphosphate	*0.220*		*"*	*0.250*		*88*	*60-130*			

Client Name: Rick Engineering Company **EMA Log #: 14L0494**
Project Name: Lower Alvarado IWQA

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 4121128										
Duplicate (4121128-DUP1)		**Source: 14L0494-01**		Prepared & Analyzed: 12/11/14						
Dissolved Oxygen	10.0	0.10	mg/l		10.0			0.4	20	
Duplicate (4121128-DUP2)		**Source: 14L0494-02**		Prepared & Analyzed: 12/11/14						
Dissolved Oxygen	6.27	0.10	mg/l		6.31			0.6	20	
Duplicate (4121128-DUP3)		**Source: 14L0494-03**		Prepared & Analyzed: 12/11/14						
Dissolved Oxygen	5.69	0.10	mg/l		5.72			0.5	20	
Duplicate (4121128-DUP4)		**Source: 14L0494-04**		Prepared & Analyzed: 12/11/14						
Dissolved Oxygen	6.27	0.10	mg/l		6.35			1	20	
Batch 4121422										
Blank (4121422-BLK1)				Prepared & Analyzed: 12/12/14						
Nitrite as N	ND	0.05	mg/l							
LCS (4121422-BS1)				Prepared & Analyzed: 12/12/14						
Nitrite as N	0.10	0.05	mg/l	0.100		103	80-120			
LCS Dup (4121422-BSD1)				Prepared & Analyzed: 12/12/14						
Nitrite as N	0.10	0.05	mg/l	0.100		102	80-120	1	20	
Duplicate (4121422-DUP1)		**Source: 14L0499-01**		Prepared & Analyzed: 12/12/14						
Nitrite as N	ND	0.05	mg/l		ND				20	
Matrix Spike (4121422-MS1)		**Source: 14L0499-01**		Prepared & Analyzed: 12/12/14						
Nitrite as N	0.11	0.05	mg/l	0.100	ND	106	80-120			

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 #: 14L0494**
Project Name: Lower Alvarado IWQA

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 4121422										
Matrix Spike Dup (4121422-MSD1)		**Source: 14L0499-01**		Prepared & Analyzed: 12/12/14						
Nitrite as N	0.10	0.05	mg/l	0.100	ND	103	80-120	3	20	
Batch 4121576										
Blank (4121576-BLK1)				Prepared: 12/15/14 Analyzed: 12/16/14						
Total Dissolved Solids	ND	20.0	mg/l							
Duplicate (4121576-DUP1)		**Source: 14L0469-01**		Prepared: 12/15/14 Analyzed: 12/16/14						
Total Dissolved Solids	1810	20.0	mg/l		1770			2	20	
Reference (4121576-SRM1)				Prepared: 12/15/14 Analyzed: 12/16/14						
Total Dissolved Solids	326	20.0	mg/l	370		88	7.84-112.1			
Batch 4121579										
Blank (4121579-BLK1)				Prepared: 12/15/14 Analyzed: 12/16/14						
Hardness (Total)	ND	10	mg CaCO3/L							
Duplicate (4121579-DUP1)		**Source: 14L0512-01**		Prepared: 12/15/14 Analyzed: 12/16/14						
Hardness (Total)	17	10	mg CaCO3/L		17			2	20	
Batch 4121941										
Blank (4121941-BLK1)				Prepared: 12/18/14 Analyzed: 12/19/14						
Total Kjeldahl Nitrogen	ND	0.5	mg/l							

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 #: 14L0494**
Project Name: Lower Alvarado IWQA

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 4121941										
LCS (4121941-BS1)				Prepared: 12/18/14		Analyzed: 12/19/14				
Total Kjeldahl Nitrogen	4.8	0.5	mg/l	5.00		97	80-120			
LCS Dup (4121941-BSD1)				Prepared: 12/18/14		Analyzed: 12/19/14				
Total Kjeldahl Nitrogen	4.8	0.5	mg/l	5.00		96	80-120	0.7	20	
Duplicate (4121941-DUP1)		**Source: 14L0494-04**		Prepared: 12/18/14		Analyzed: 12/19/14				
Total Kjeldahl Nitrogen	1.4	0.5	mg/l		1.3			2	20	
Matrix Spike (4121941-MS1)		**Source: 14L0494-04**		Prepared: 12/18/14		Analyzed: 12/19/14				
Total Kjeldahl Nitrogen	6.1	0.5	mg/l	5.00	1.3	95	80-120			
Matrix Spike Dup (4121941-MSD1)		**Source: 14L0494-04**		Prepared: 12/18/14		Analyzed: 12/19/14				
Total Kjeldahl Nitrogen	6.0	0.5	mg/l	5.00	1.3	94	80-120	1	20	
Batch 4122027										
Blank (4122027-BLK1)				Prepared & Analyzed: 12/20/14						
Phosphorus, Total	ND	0.05	mg/l							
LCS (4122027-BS1)				Prepared & Analyzed: 12/20/14						
Phosphorus, Total	0.51	0.05	mg/l	0.500		101	80-120			
LCS Dup (4122027-BSD1)				Prepared & Analyzed: 12/20/14						
Phosphorus, Total	0.52	0.05	mg/l	0.500		104	80-120	3	20	
Duplicate (4122027-DUP1)		**Source: 14L0469-01**		Prepared & Analyzed: 12/20/14						
Phosphorus, Total	0.36	0.05	mg/l		0.38			8	20	

Client Name: Rick Engineering Company **EMA Log #: 14L0494**
Project Name: Lower Alvarado IWQA

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 4122027										
Matrix Spike (4122027-MS1)		**Source: 14L0469-01**		Prepared & Analyzed: 12/20/14						
Phosphorus, Total	0.81	0.05	mg/l	0.500	0.38	85	80-120			
Matrix Spike Dup (4122027-MSD1)		**Source: 14L0469-01**		Prepared & Analyzed: 12/20/14						
Phosphorus, Total	0.79	0.05	mg/l	0.500	0.38	81	80-120	3	20	
Batch 4122227										
Blank (4122227-BLK1)				Prepared & Analyzed: 12/20/14						
Nitrate/Nitrite as N	ND	0.05	mg/l							
Nitrate as N	ND	0.05	"							
LCS (4122227-BS1)				Prepared & Analyzed: 12/20/14						
Nitrate/Nitrite as N	0.52	0.05	mg/l	0.500		103	80-120			
Nitrate as N	0.52	0.05	"	0.500		103	80-120			
LCS Dup (4122227-BSD1)				Prepared & Analyzed: 12/20/14						
Nitrate/Nitrite as N	0.51	0.05	mg/l	0.500		102	80-120	1	20	
Nitrate as N	0.51	0.05	"	0.500		102	80-120	1	20	
Duplicate (4122227-DUP1)		**Source: 14L0499-06**		Prepared & Analyzed: 12/20/14						
Nitrate/Nitrite as N	23.0	5.00	mg/l		22.7			1	20	
Nitrate as N	22.9	5.00	"		22.6			1	20	
Matrix Spike (4122227-MS1)		**Source: 14L0499-06**		Prepared & Analyzed: 12/20/14						
Nitrate/Nitrite as N	72.9	5.00	mg/l	50.0	22.7	100	80-120			
Nitrate as N	72.8	5.00	"	50.0	22.6	100	80-120			

Client Name: Rick Engineering Company
Project Name: Lower Alvarado IWQA

EMA Log #: 14L0494

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 4122227										
Matrix Spike Dup (4122227-MSD1)		**Source: 14L0499-06**		Prepared & Analyzed: 12/20/14						
Nitrate/Nitrite as N	73.5	5.00	mg/l	50.0	22.7	102	80-120	0.8	20	
Nitrate as N	73.4	5.00	"	50.0	22.6	102	80-120	0.8	20	

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.
QM-06	Due to noted non-homogeneity of the QC sample matrix, the MS/MSD did not provide reliable results for accuracy and precision. Sample results for the QC batch were accepted based on LCS/LCSD percent recoveries and RPD values.
HT-15	This sample was received outside of the EPA's recommended 15 minute holding time for this analysis. However, the sample was analyzed immediately upon receipt.
A-01a	>1600 MPN/100 mL
A-01	>1600 MPN/ mL
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

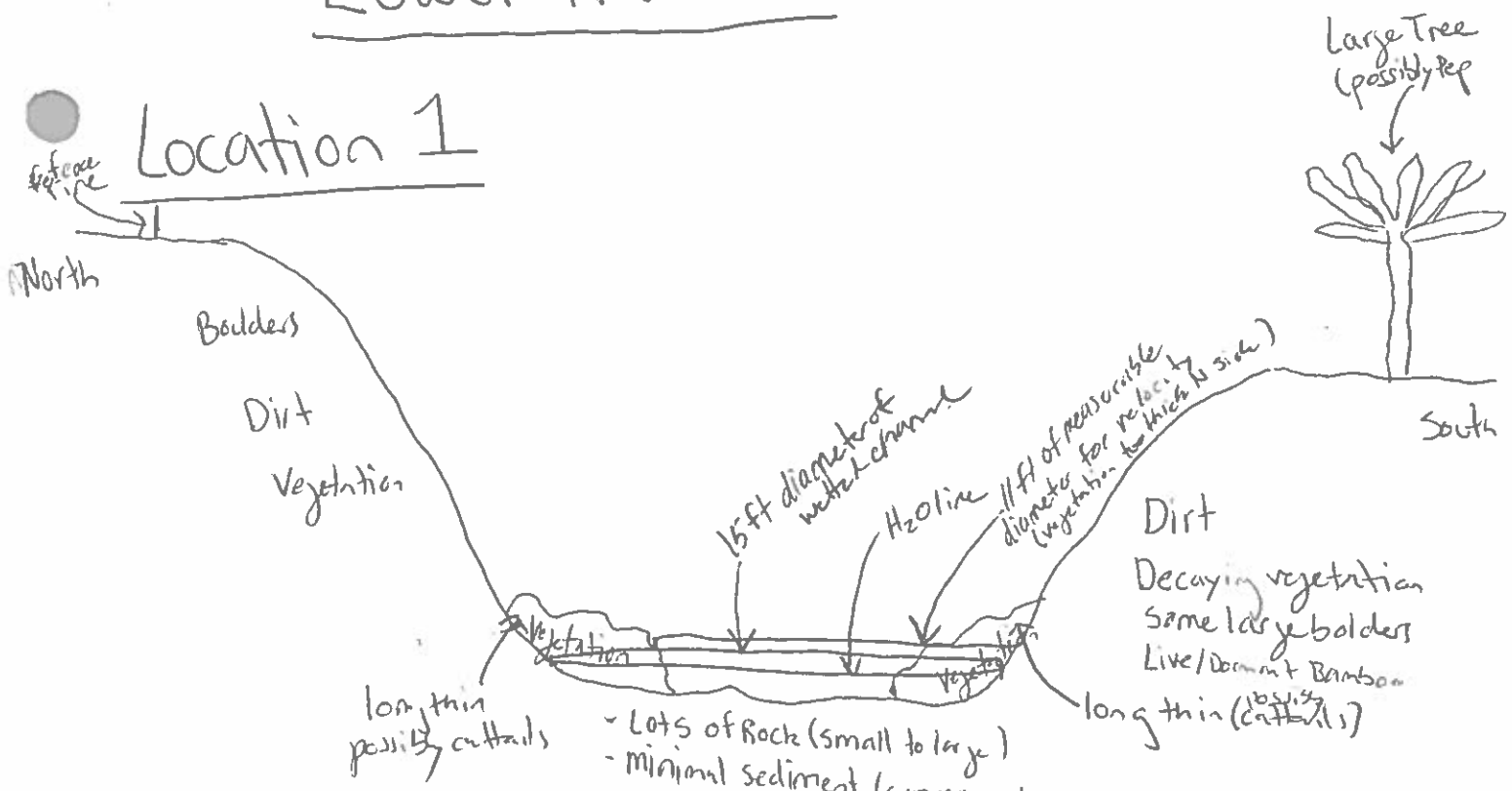
ATTACHMENT 4 - FLOW MEASUREMENT MODEL

FLOW MEASUREMENT FIELD SHEETS

Lower Alvarado

12/11/14

Location 1



- Lots of Rock (small to large)
- Minimal sediment (appears sandy)
- Vegetation flattened on each side
- Water has a very steady flow
- water clear
- no fish

- upstream is concrete, turns to soil & then large angular rip rap along north bank

- upstream channel is choked out, narrow defined channel against vegetation & rock channel widens out where we are sampling
- flow appears more stagnant immediately downstream

P01

Cross Section Measurement Field Form

Client:

Project Name: Lower Alvarado Location 1

Field Crew: Kelly Doyle
Chelsea Chavesian

Date/Time: 12/11/19 8:38 am

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
	[redacted]			
1ft	0.8	0.06		- on small rock approx 1 inch in size, close to dirt bank 8:38am no algal, clear water, no leaf litter
2ft	0.95	0.09		- on medium sized rock approx 5 inch rock, small amount of leaf litter. no algae, clear water, no fish 8:43
3ft	0.90	0.15		- adjacent to large rock, on top of rock, rocks surround, meter, water clear 8:45
4ft	0.60	0.10		- on top of very large rock, large boulder to south 8:47
5ft	1.15	0.11		- on rock, cattails immediately upstream (approx 4ft away) appear to be in fastest & deepest part of channel, cattails 2 feet north 8:49
6ft	1.3	0.04		- on rock, tips of cattail approx 1 ft away to the north 8:52
7ft	1.3	-0.10		- on rock, cattail edges now touching velocity rod 8:54
8ft	1.2	-0.11		- flow blocked by cattails upstream

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg, if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

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

Cross Section Measurement Field Form

Client:

Project Name: Lower Alvarado Location 1

Field Crew: Kelly, Doyle, Chelsea, Charissa

Date/Time: 12/11/14 8:38

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
9ft	1.1	-0.11		-on rock, midst of end of cattails, surrounds, velocity and flow blocked by vegetation 8:57
10ft	1.0	-0.10		-on rock, midst of end of cattails, surrounding velocity and flow blocked by vegetation 8:58
11ft	1.3	-0.10		-on edge of vegetation, flow blocked by vegetation 9:00
				* end time 9:00 am

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg, if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

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

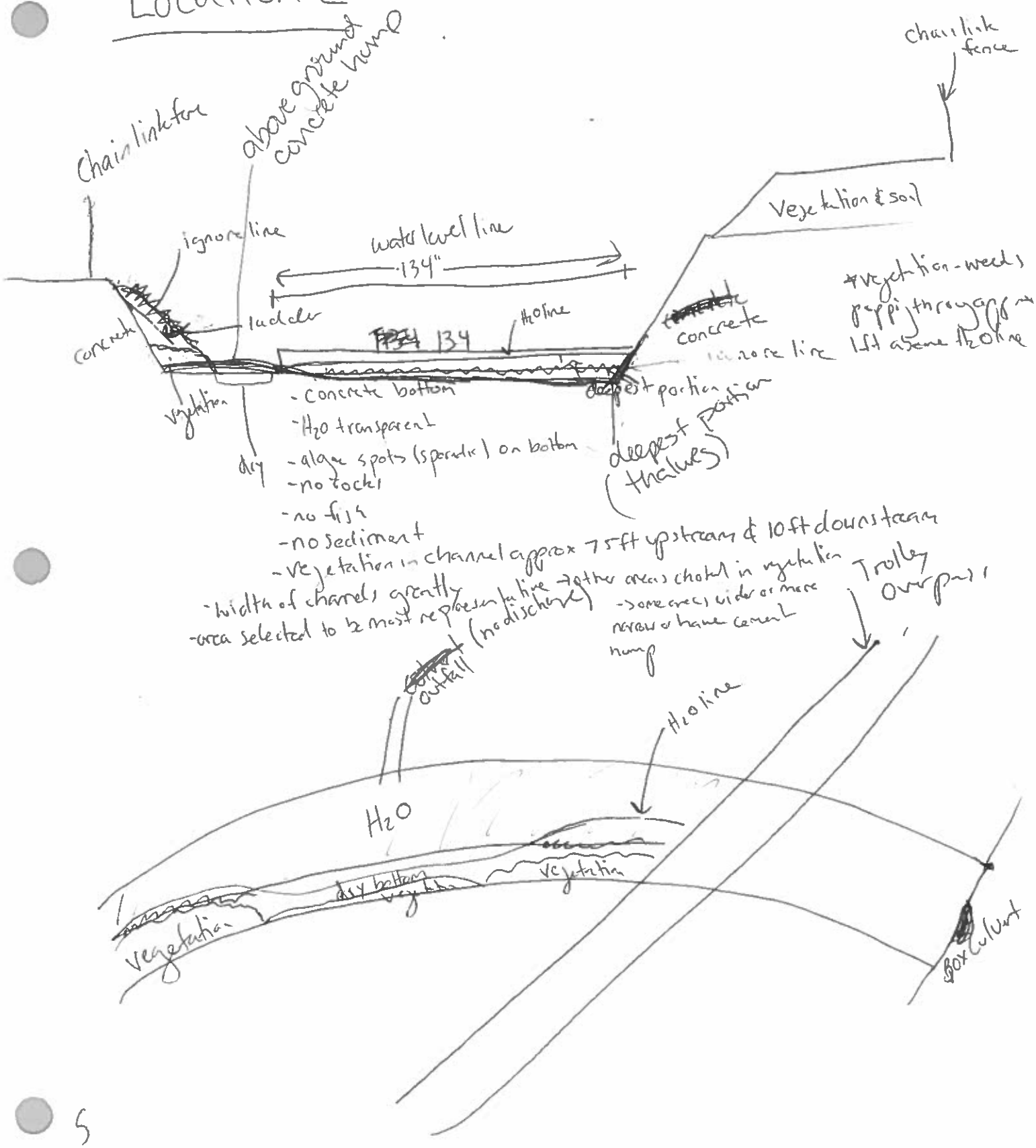
X Measurement = difference in horizontal distance from LWB

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

vegetation type?

Location 2



S

E W

Cross Section Measurement Field Form

Client:

Project Name: Lower Alhambra Location 2

Field Crew: Kelly Doyle
Chelsea Arnesian

Date/Time: 12/11/14

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
1ft	0.15	=		10:06 too shallow no readi-
2ft	0.10	=		10:07 too shallow for reading, on cement
3ft	0.19	=		10:08 too shallow for reading, on cement
4ft	0.23	-0.14		10:11 on cement, small plant debris
				vemt sensor on bottom of concrete
5ft	0.30	-0.13		10:14 on cement, water clear
6ft	0.40	0.07		10:16 on cement, water clear
7ft	0.45	0.17		10:18 on cement, water clear
8ft	0.50	0.24		10:21 on cement, water clear
9ft	0.55	0.30		10:23 on cement, water clear
10ft	0.5	0.39		10:25
11ft	< .2	=		too shallow 10:28
				end time = 10:28am

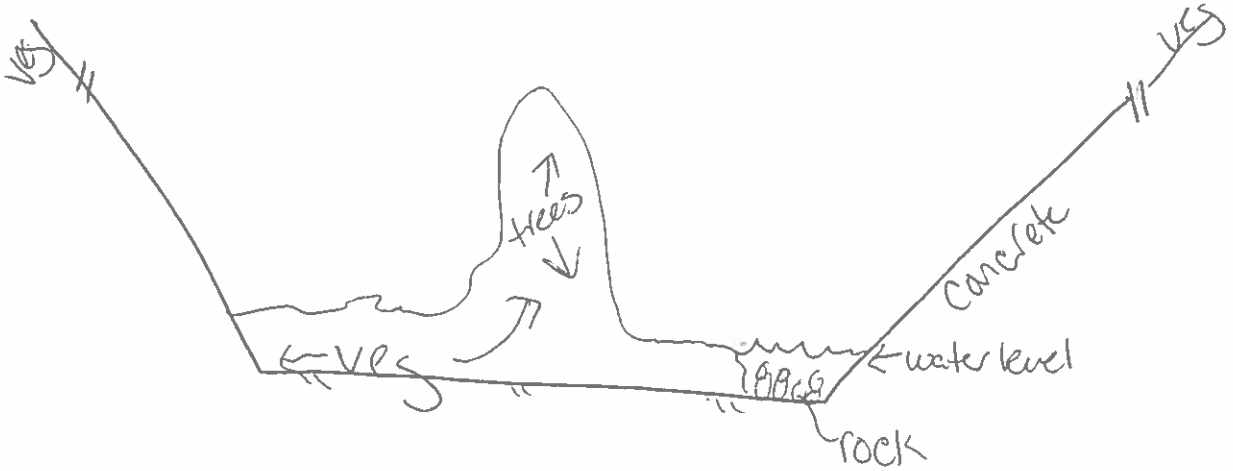
NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg, if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

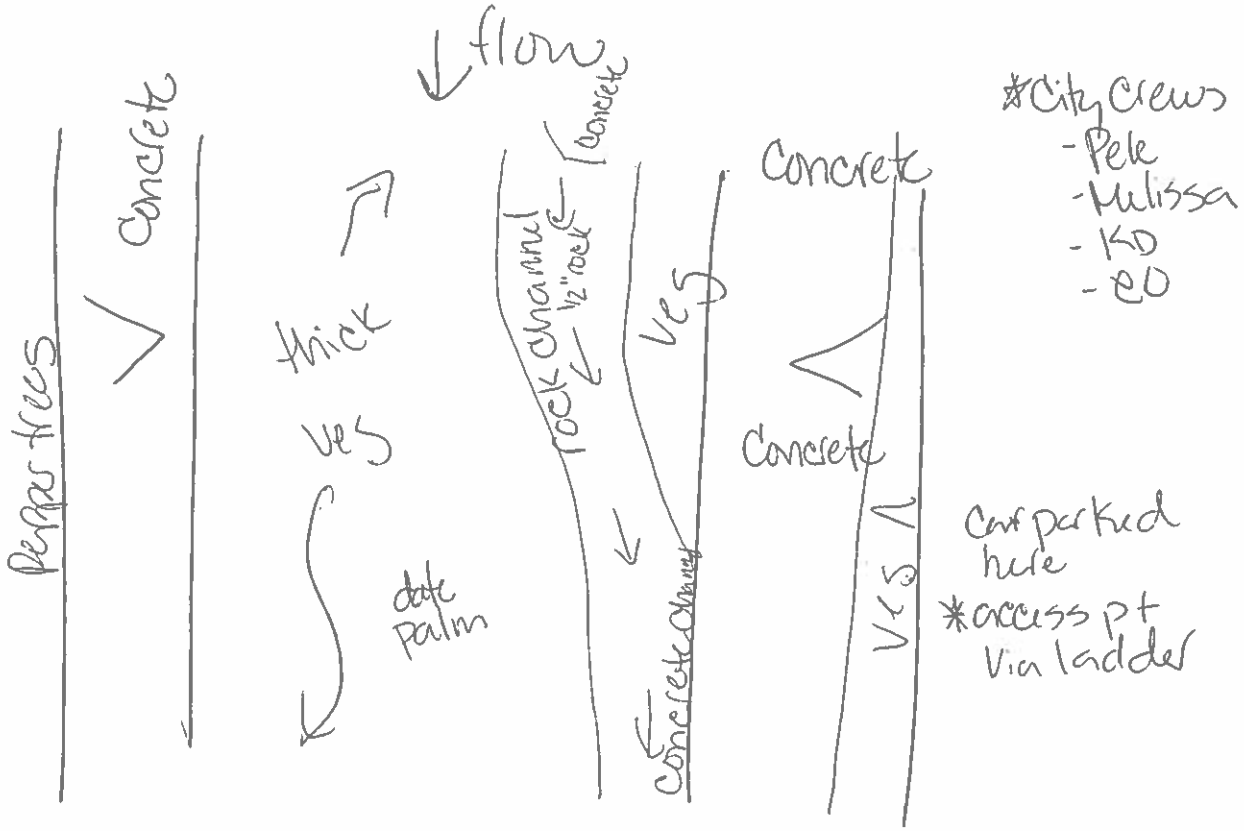
Left and Right Bank are determined when looking downstream
LWB = left wetted bank - where surface water terminates at the left bank
RWB = right wetted bank - where surface water terminates at the right bank
X Measurement = difference in horizontal distance from LWB
Y Depth of Water = difference in vertical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

Location 3

Water samples taken 12:39pm by CO@

Access limited due to very thick veg
drove to south side of channel & accessed via ladder
Thick veg - all upstream flow passes thru thick veg
Water appears clear & fast moving
small fish (tadpole?) observed?





Cross Section Measurement Field Form

Client:

Project Name: Lower Alvarado Location #3

Field Crew: Kelly Doyle, Chelsea Chanesian

Date/Time: 12/11/14 1:00pm

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
1ft	0.3	1.01		on concrete, two small rocks upstream on either side, ~6" bank to the north, sediment & veg roots pulled back away
2ft	0.3	0.62		on concrete
		0.62		
3ft	0.3	~~0.51~~		on concrete
4ft				< 0.2'

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg, if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

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

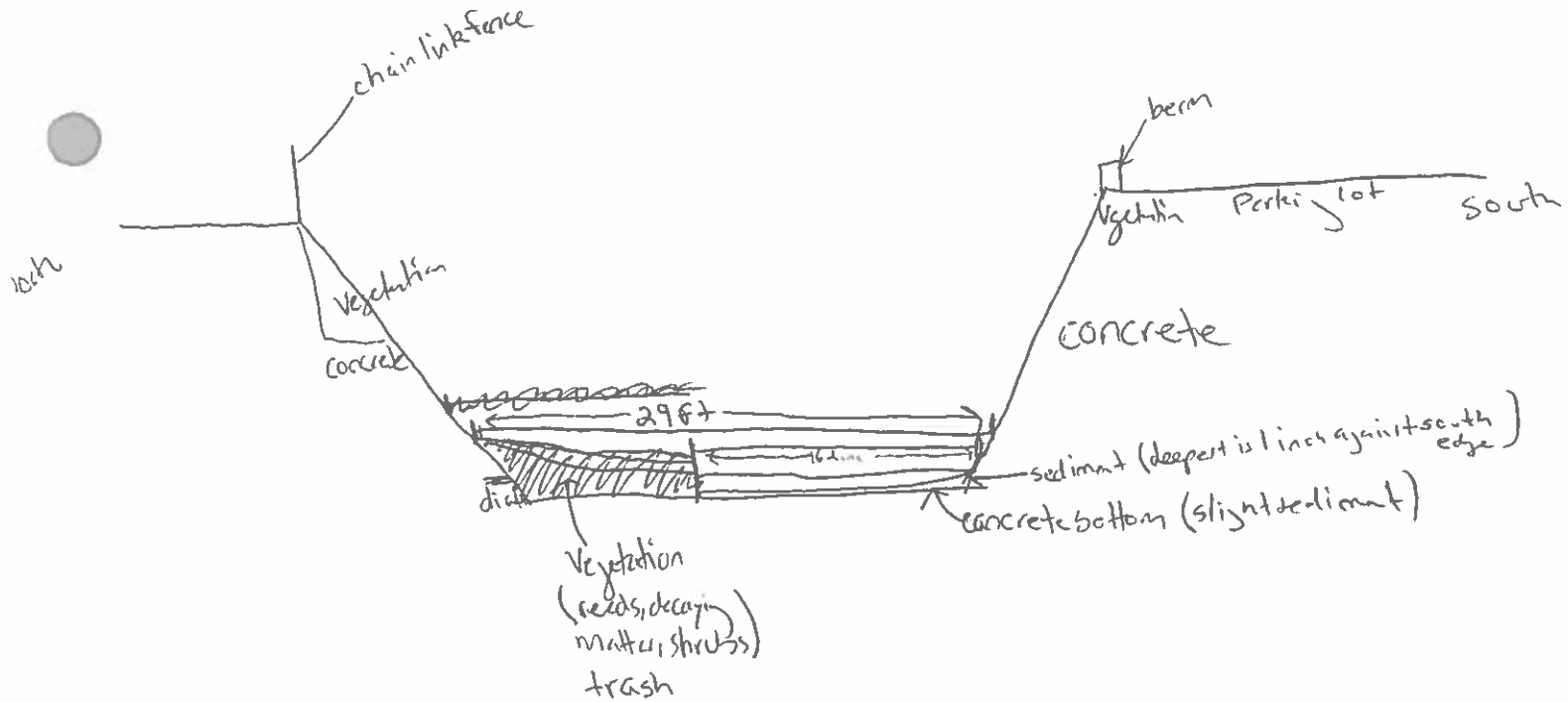
Y Depth of Water = difference in vertical distance from channel bottom to surface of water

Velocity - measured with YSI 556 (with flow cell) Flow Meter

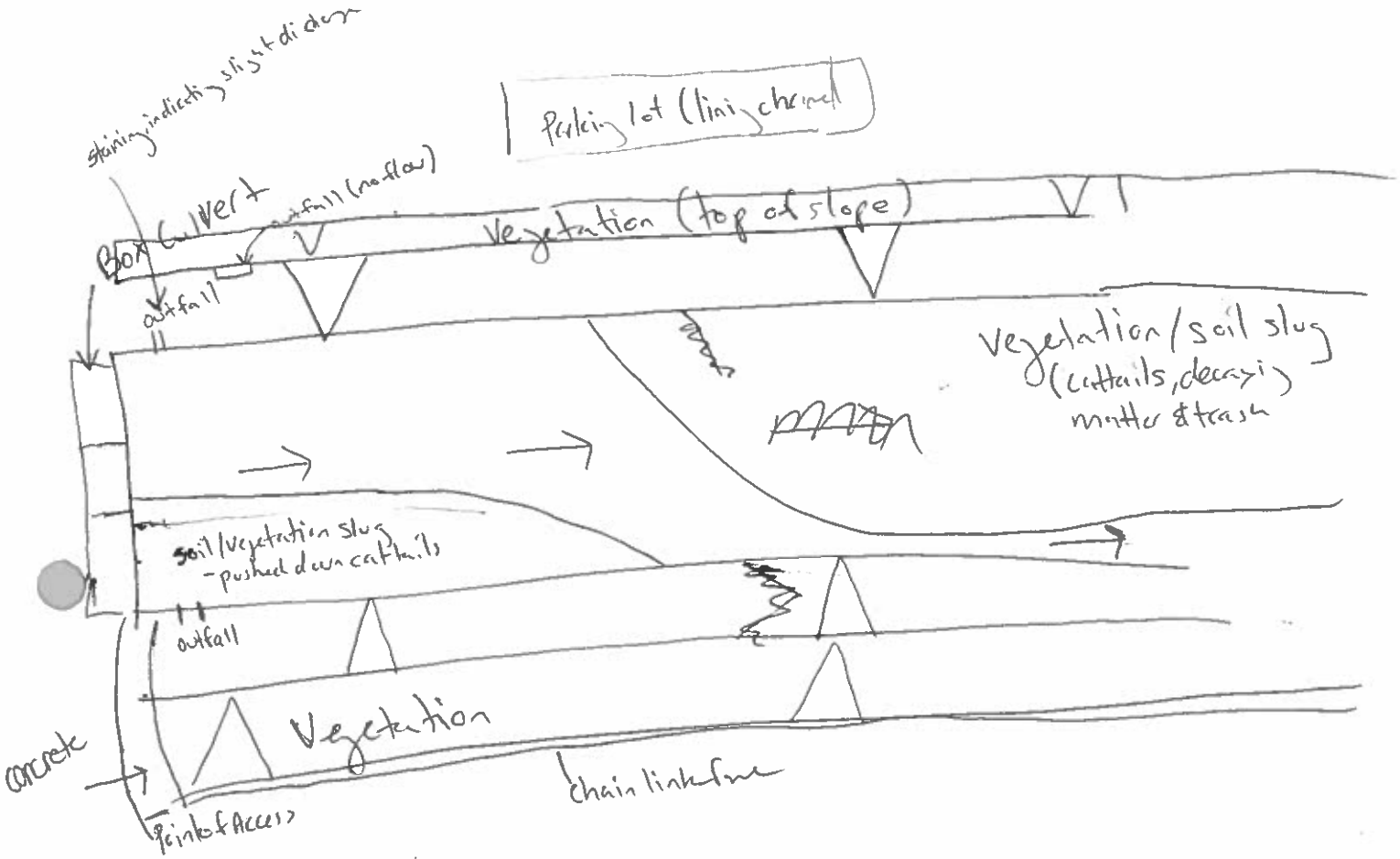
12/11/14

Location 4

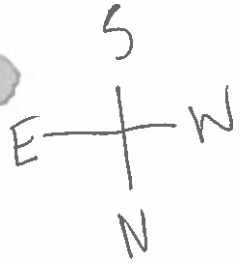
- Location selected due to access issues. We chose a location where there is a concrete swale approx 20ft downstream of culvert. Vegetation along north half of sampling location. Downstream (approx 20ft) vegetation lines southern half of channel moving towards north side. Downstream H_2O lines 1-2 ft of channel on north side with the remaining area being mostly vegetation. All vegetation in channel can be described as a mix of cattails, large leafed shrubs and decaying vegetation matter.



Location 4 Aerial



*Concrete lined, thin film of sediment on bottom



Cross Section Measurement Field Form

Client:

Project Name: Lower Alvarado Location #4

Field Crew: Kelly Doyle, Chelsea Ohanesian

Date/Time: 12/11/19 11:19

Location Description:

Associated Sample ID:

Cross Section Measurements

X Measurement From Left Bank (ft)	Y Depth of Water (ft)	Velocity (ft/sec)	Standard Deviation	Notes
1ft	0.9	-0.06		11:19 - fine sand on bottom of concrete vegetation matter very close upstream, bubbles on surface, slight oily sheen on H2O along north bank by cattails, flat
2ft	0.9	-0.05		11:21 " "
3ft	0.9	-0.08		11:22 " "
4ft	0.9	-0.06		11:25 " "
5ft	0.9	-0.03		11:27 " "
6ft	0.9	-0.02		11:29 " "
7ft	0.85	0.01		11:31 " "
8ft	0.80	0.03		11:33 " "
9ft	0.80	0.01		11:35 " "
10ft	0.80	0.03		11:36 " rock upstream approx 1ft away from sensor
11ft	0.80	0.01		11:39
12ft	0.75	0.03		11:40 on small amount of sand lining concrete
13ft	0.65	0.0		11:42 on sand, approach south bank

NOTE: Cross section surveys of the storm water facility segment shall be performed at a minimum of every 50 linear feet (eg. if segment is 1,000 feet, minimum of 21 cross sections shall be surveyed). For smaller wetted channels (less than 10 feet across), depth and distance from bank shall be measured at approximately 1-foot interval. For larger wetted channels (greater than 10 feet acorss), depth and distance from bank shall be measured at approximately 2-foot intervals.

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

→ 14ft <.2 = too shallow

FLOW MEASUREMENTS CALCULATION SHEETS

Total Flow Calculations

Location ID:	Lower Alvarado East area	Upstream (Location 4)
Date:	12/11/2014	
Time:	~11:15-11:45 AM	

Average Channel Velocity(ft/s)=	0.020
Total Q (cfs)=	0.10

X Measurement from Left Bank (ft)	Water Depth (ft)	Velocity (ft/sec)	SD	Effective Segment Area	Q (cfs)	Time sample was taken	Notes
1	0.9	-0.06		0.00	0.00	11:19:00 AM	fine sand on bottom of concrete vegetation matter very close upstream, bubbles on surface, slightly oily sheen on water along north bank by cattails, flat
2	0.9	-0.05		0.00	0.00	11:21:00 AM	Same as above
3	0.9	-0.08		0.00	0.00	11:22:00 AM	Same as above
4	0.9	-0.06		0.00	0.00	11:25:00 AM	Same as above
5	0.9	-0.03		0.00	0.00	11:27:00 AM	Same as above
6	0.9	-0.02		0.00	0.00	11:29:00 AM	Same as above
7	0.85	0.01		0.88	0.01	11:31:00 AM	Same as above
8	0.8	0.03		0.83	0.02	11:33:00 AM	Same as above
9	0.8	0.01		0.80	0.01	11:35:00 AM	Same as above
10	0.8	0.03		0.80	0.02	11:36:00 AM	rock upstream approximately 1 ft away from
11	0.8	0.01		0.80	0.01	11:39:00 AM	
12	0.75	0.03		0.78	0.02	11:40:00 AM	on small amount of sand lining concrete
13	0.65	0		0.00	0.00	11:42:00 AM	on sand, approaching south bank
14	<.2	-		0.00	0.00		too shallow to take a reading

Total Flow Calculations

Location ID:	Lower Alvarado East Area	Downstream (Location 3)
Date:	12/11/2014	
Time:	~1:00-1:30 PM	

Average Channel Velocity(ft/s)=	0.698
Total Q (cfs)=	0.52

X Measurement from Left Bank (ft)	Water Depth (ft)	Velocity (ft/sec)	SD	Effective Segment Area	Q (cfs)	Time sample was taken	Notes
1	0.3	1.01		0.15	0.15	1:00:00 PM	on concrete, two small rocks upstream on either side ~6" away, bank to the north is sediment and vegitation roots pulled back
2	0.3	0.62		0.3	0.19	-	on concrete
3	0.3	0.62		0.3	0.19	-	on concrete
4	<.2	-		0	0.00	-	too shallow to measure

Total Flow Calculations

Location ID:	Lower Alvarado West Area	Upstream (Location 2)
Date:	12/11/2014	
Time:	~10:10-10:30 AM	

Average Channel Velocity(ft/s)=	0.249
Total Q (cfs)=	0.57

X Measurement from Left Bank (ft)	Water Depth (ft)	Velocity (ft/sec)	Effective Segment Area	Q (cfs)	Time sample was taken	Notes
4	0.23	-0.14	0	0.00	10:11:00 AM	on cement, small plant debris around sensor, on bottom of concrete
5	0.3	-0.13	0	0.00	10:14:00 AM	on cement, water clear
6	0.4	0.07	0.35	0.02	10:16:00 AM	on cement, water clear
7	0.45	0.17	0.425	0.07	10:18:00 AM	on cement, water clear
8	0.5	0.24	0.475	0.11	10:21:00 AM	on cement, water clear
9	0.55	0.3	0.525	0.16	10:23:00 AM	on cement, water clear
10	0.5	0.39	0.525	0.20	10:25:00 AM	
11	<.2	-	0	0.00	10:28:00 AM	too shallow to measure

Total Flow Calculations

Location ID:	Lower Alvarado West Area	Downstream (Location 1)
Date:	12/11/2014	
Time:	~8:30-9:00 AM	

Average Channel Velocity(ft/s)=	0.091
Total Q (cfs)=	0.46

X Measurement from Left Bank (ft)	Water Depth (ft)	Velocity (ft/sec)	Effective Segment Area	Q (cfs)	Time sample was taken	Notes
1	0.8	0.06	0.4	0.02	8:38:00 AM	on small rock approximately 1" in size, close to dirt bank, no algae, clear water, no leaf litter
2	0.95	0.09	0.875	0.08	8:43:00 AM	on medium sized rock approximately 5" rock, small amount of leaf litter, no algae, clear water, no fish
3	0.9	0.15	0.925	0.14	8:45:00 AM	adjacent to large rock, on top of rock, rocks surrounding meter, water clear
4	0.6	0.1	0.75	0.08	8:47:00 AM	on top of very large rock, large boulder to south
5	1.15	0.11	0.875	0.10	8:49:00 AM	on rock, cattails immediately upstream (approximately 4 ft. away) appear to be in fastest and deepest part of channel, cattails 2 feet north
6	1.3	0.04	1.225	0.05	8:52:00 AM	on rock, tips of cattail approximately 1 ft. away to the north
7	1.3	-0.1	0	0.00	8:54:00 AM	on rock, cattail edges now touching velocity rod
8	1.2	-0.11	0	0.00	-	flow blocked by cattails upstream
9	1.1	-0.11	0	0.00	8:57:00 AM	on rock, midst of ends of cattail surrounds velocity rod, flow blocked by vegetation
10	1	-0.1	0	0.00	8:58:00 AM	on rock, midst of ends of cattail surrounds velocity rod, flow blocked by vegetation
11	1.3	-0.1	0	0.00	9:00:00 AM	on edge of vegetation, flow blocked by vegetation

ATTACHMENT 5 – CHANNEL WETLAND ASSESSMENT

WETLAND LAND ASSESSMENT SCORING FIELD NOTES (EXISTING CONDITION)

Lower Alvarado

IBA Data 11/5/14

WATER QUALITY VALUE

Vegetation – Vegetative cover of water surface, vertical density, & species diversity		
0	• No visible vegetation in wet areas	WEST / EAST
1	• Young growth of new inhabitants • Woody and terrestrial species present • Minimal wetland species (submerged and/or emergent macrophytes) • Low surface area coverage and density	DW NNV
2	• Mature population near carrying capacity • >50% coverage of wet areas • Both submerged and emergent wetland species	SWS 1.75/1.73
3	• Young life-stage and population • >75% coverage of wet areas • Both submerged and emergent wetland species • Wetland species that reproduce through tubers and/or rhizomes (e.g., *Spartina, Typha, Scirpus, Phragmites*)	FWM
Hydrosoil – Sample surficial sediments for ratio of sand to fines (Measure conductivity, redox, and/or pH)		
0	• Concrete or other impermeable substrate • No sand and/or fines, organic carbon, detritus, and/or nutrient source	
1	• Sand and cobble substrate Gravel • No visible deposition of fines, organic carbon, and/or detritus • pH<6 or >8 8.81 • Redox: +100 mV	EAST 2/1
2	• Less than 50% sand Silty Sandy • Some visible deposition of fines, organic carbon, and/or detritus • Neutral pH (6.0 to 8.5) 7.94 • Redox: -100 to +100 mV	WEST
3	• Less than 25% sand • Visible deposition of fines and other solids • Neutral pH (6.0 to 8.5) • 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) • Fast flowing and channeling, no deposition of fines • Redox: > +100 mV	
2	• Shallow (0.5 to 1-ft) 0.74 / 0.57 • Moderate and variable flow depending on volume inputs • Observable HRT, some deposition of fines – 10.36hr • Redox: -100 to +100 mV	2 / 2
3	• Moderate water depth (1 to 2-ft) • Slow flow with a significant HRT (> 1 h), deposition of fines 1.25hr/– • Redox: < -100 mV	
Total score from all three categories 0-2 = poor, 3-4 = fair, 5-7 = good, 8-9 = best *		5.75 / 4.73

(averaged / weighted for vegetation scores per community

WETLAND LAND RECOVERY ASSESSMENT FIELD NOTES (MAINTAINED STORM WATER FACILITY)

LOWER ALVARADO

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 • Recovery: > 5 years • Shift to a less desirable species diversity than current species	~~AWW~~ ~~AWV~~
2	• Mature habitat with mix of terrestrial and wetland species • Recovery: 1-5 years • Return to current standing crop and diversity	SWS DW/WNV
3	• Primarily emergent and submerged wetland species • Recovery: approximately 1 year • Return to species density and diversity	FWM
Hydrosoil – What is the sedimentation rate and timeline to return to current depth?		
0	• High flow area, narrow and/or shallow channel • No deposition of organic carbon, nutrients and/or detritus	
1	• Flow is significant (input dependent) • Primarily sand deposition in the short-term • Fines and/or organic carbon will deposit over a > 5 year period	EAST
2	• Heterogenous mix of sand, organic carbon, and fines in < 1 year	WEST
3	• Heterogenous mix of sand, organic carbon, and fines in 1-5 years	
Hydroperiod – What is timeline for reaching optimal depth of 1 to 2-ft of overlying water?		
0	• Flow remains fast • No evidence of deposition or re-establishment of vegetation • No HRT	
1	• Some decrease of flow resulting in some deposition of sand and other coarse grain materials • Some revegetation • No HRT	
2	• Wide area of the channel • Some deposition of fines and evidence of revegetation • Overlying water depth is less than 1-ft • HRT < 1-h	2
3	• Wide area of the channel • Deposition of fines and organics • Overlying water depth is greater than 1-ft • HRT > 1-h	
Total score from all three categories 0-2 = poor, 3-4 = fair, 5-7 = good, 8-9 = best		5.45 / 4.71

ATTACHMENT 6 –IMPACT-BENEFITS MODEL

TABLE 8E – SEDIMENT POLLUTANT MODELING FOR THE EAST AREA (BENEFIT LOAD REMOVAL IN SEDIMENT)

Table 8E - Sediment Pollutant Loading Model for the East Area

SAMPLE NAME	MATRIX	SAMPLE DATE	ANALYTE	SURROGATE	RESULT*	REPORTING LIMIT	UNITS	LOAD REMOVAL (mg)	LOAD REMOVAL (lbs)
326447	Soil	12/22/2014	% Solid		60.4	1	%	NA	NA
326447	Soil	12/22/2014	Manganese		242	0.5	mg/kg	53836787.1	118
326447	Soil	12/22/2014	Total Kjeldahl Nitrogen		810	100	mg/kg	180197511	396.4
326447	Soil	12/22/2014	Nitrate as N		ND	1	mg/kg	-	-
326447	Soil	12/22/2014	Nitrite as N		0.86	0.5	mg/kg	191320.814	0.4
326447	Soil	12/22/2014	Total Nitrogen		810.9	0.5	mg/kg	180388832	397
326447	Soil	12/22/2014	Phosphorus, Total as P		91	25	mg/kg	20244411.7	45
326447	Soil	12/22/2014	Arsenic		2.64	0.1	mg/kg	587310.405	1
326447	Soil	12/22/2014	Cadmium		ND	0.1	mg/kg	-	-
326447	Soil	12/22/2014	Chromium		3.18	0.1	mg/kg	707442.079	2
326447	Soil	12/22/2014	Copper		11.3	0.1	mg/kg	2513866.51	6
326447	Soil	12/22/2014	Nickel		3.5	0.1	mg/kg	778631.219	2
326447	Soil	12/22/2014	Lead		6.84	0.1	mg/kg	1521667.87	3
326447	Soil	12/22/2014	Antimony		ND	0.5	mg/kg	-	-
326447	Soil	12/22/2014	Selenium		0.231	0.1	mg/kg	51389.6605	0
326447	Soil	12/22/2014	Zinc		95.9	1	mg/kg	21334495.4	47
326447	Soil	12/22/2014	Malathion	Tributylphosphate	ND	0.5	ug/kg	-	-
326447	Soil	12/22/2014	Chlorpyrifos	Tributylphosphate	ND	0.5	ug/kg	-	-
326447	Soil	12/22/2014	Diazinon	Tributylphosphate	ND	0.5	ug/kg	-	-

*Total Nitrogen was calculated following the testing laboratory's specified method of adding the concentrations of Total Kjeldahl Nitrogen, Nitrate as N, and Nitrite as N.

Total Removal Volume Estimate at IMP stage

Total Removal Volume	336	yd3
Number Sample Collected	1	unitless
Removal Fraction	1	
Removal Volume	336.0	ft^3/yd
yd3 to ft3	27	
Removal Volume	9,072	ft^3
ρ_{solid} =	165.4	lbs/ft3
ρ_{water}=	62.4	lbs/ft3
Fraction Solid=	0.604	unitless
$\rho_{dry\ insitu}$ =	60.41264333	lbs/ft3
$\%_{Finer}$=	0.753	unitless
CF_{cobble}=	0.893008362	unitless
Sediment Mass	489,425	lbs/mg
lbs to kg	0.4545455	kg/lbs
mg to lbs	0.0000022	lbs/mg

Support Material for Table 8E

Equations:

$$\rho_{dry\ insitu} = \frac{(\%_{solid}) * \rho_{water} * \rho_{solid}}{\rho_{solid} - (\%_{Solid}) * \rho_{solid} + (\%_{solid}) * \rho_{water}}$$

$$CF_{cobble} = \frac{\frac{\%\ Finer}{\rho_{dry\ insitu}}}{\frac{\%\ Finer}{\rho_{dry\ insitu}} + \frac{(1-\%Finer)}{\rho_{solid}}}$$

Sediment Mass = Removal Volume $*\rho_{dry\ insitu} * CF_{cobble}$

Load Removal = Sediment Mass * Measured Concentration

Where: ρ_{solid} = 165.4 lbs/ft^3 ρ_{water} = 62.4 lbs/ft^3 and $\%_{Finer}$ = fraction passing through 1.5 inch sieve based on grain size analysis

Reach #

Sample ID	Reach	Type	% Solid	$\rho_{dry\ insitu}$ (lbs/ft^3)	CF_{cobble}	Removal Volume [1] (cyd)	Sediment Mass (lbs)
1	4	Concrete	60.4	60.4	0.89	336.00	548,063.50
-	-	-	-	-	-	-	-

Notes:

1) Removal value is specified in maintenance plan and typically determined during IMP process

The approximate sediment removal should come from the IMP process, place notes for backup related to sediment removal numbers here.

TABLE 8W – SEDIMENT POLLUTANT LOADING MODEL FOR THE WEST AREA (BENEFIT LOAD REMOVAL IN SEDIMENT)

Table 8W - Sediment Pollutant Loading Model for the West Area

SAMPLE NAME	MATRIX	SAMPLE DATE	ANALYTE	SURROGATE	RESULT*	REPORTING LIMIT	UNITS	LOAD REMOVAL (mg)	LOAD REMOVAL (lbs)
326446	Soil	12/22/2014	% Solid		59.4	1	%	NA	NA
326446	Soil	12/22/2014	Manganese		389	0.5	mg/kg	86778674.6	191
326446	Soil	12/22/2014	Total Kjeldahl Nitrogen		620	100	mg/kg	138310484	304
326446	Soil	12/22/2014	Nitrate as N		ND	1	mg/kg	-	-
326446	Soil	12/22/2014	Nitrite as N		0.96	0.5	mg/kg	214158.169	0
326446	Soil	12/22/2014	Total Nitrogen		620.96	0.5	mg/kg	138524642	305
326446	Soil	12/22/2014	Phosphorus, Total as P		110	25	mg/kg	24538956.8	54
326446	Soil	12/22/2014	Arsenic		2.69	0.1	mg/kg	600089.035	1
326446	Soil	12/22/2014	Cadmium		0.121	0.1	mg/kg	26992.8525	0
326446	Soil	12/22/2014	Chromium		4.23	0.1	mg/kg	943634.431	2
326446	Soil	12/22/2014	Copper		11.6	0.1	mg/kg	2587744.54	6
326446	Soil	12/22/2014	Nickel		3.05	0.1	mg/kg	680398.349	1
326446	Soil	12/22/2014	Lead		11.3	0.1	mg/kg	2520820.11	6
326446	Soil	12/22/2014	Antimony		ND	0.5	mg/kg	-	-
326446	Soil	12/22/2014	Selenium		0.396	0.1	mg/kg	88340.2446	0
326446	Soil	12/22/2014	Zinc		93.5	1	mg/kg	20858113.3	46
326446	Soil	12/22/2014	Malathion	Tributylphosphate	ND	0.5	ug/kg	-	-
326446	Soil	12/22/2014	Chlorpyrifos	Tributylphosphate	ND	0.5	ug/kg	-	-
326446	Soil	12/22/2014	Diazinon	Tributylphosphate	ND	0.5	ug/kg	-	-

*Total Nitrogen was calculated following the testing laboratory's specified method of adding the concentrations of Total Kjeldahl Nitrogen, Nitrate as N, and Nitrite as N.

Total Removal Volume Estimate at IMP stage

Total Removal Volume	309	yd3
Number Sample Collected	1	unitless
Removal Fraction	1	
Removal Volume	309.0	ft^3/yd
yd3 to ft3	27	
Removal Volume	8,343	ft^3
ρ_{solid} =	165.4	lbs/ft3
ρ_{water}=	62.4	lbs/ft3
Fraction Solid=	0.594	unitless
$\rho_{dry\ insitu}$ =	58.82525322	lbs/ft3
$\%_{Finer}$=	1	unitless
CF_{cobble}=	1	unitless
Sediment Mass	490,779	lbs/mg
lbs to kg	0.4545455	kg/lbs
mg to lbs	0.0000022	lbs/mg

Support Material for Table 8W

Equations:

$$\rho_{dry\ insitu} = \frac{(\%_{solid}) * \rho_{water} * \rho_{solid}}{\rho_{solid} - (\%_{Solid}) * \rho_{solid} + (\%_{solid}) * \rho_{water}}$$

$$CF_{cobble} = \frac{\frac{\%\ Finer}{\rho_{dry\ insitu}}}{\frac{\%\ Finer}{\rho_{dry\ insitu}} + \frac{(1-\%Finer)}{\rho_{solid}}}$$

Sediment Mass = Removal Volume * $\rho_{dry\ insitu}$ * CF_{cobble}

Load Removal = Sediment Mass * Measured Concentration

Where: ρ_{solid} = 165.4 lbs/ft^3 ρ_{water}= 62.4 lbs/ft^3 and $\%_{Finer}$= fraction passing through 1.5 inch sieve based on grain size analysis

Reach #

Sample ID	Reach	Type	% Solid	$\rho_{dry\ insitu}$ (lbs/ft^3)	CF_{cobble}	Removal Volume [1] (cyd)	Sediment Mass (lbs)
1	2	Earthen	59.4	58.8	1.00	309.00	490,779.09
-	-	-	-	-	-	-	-

Notes:

1) Removal value is specified in maintenance plan and typically determined during IMP process

The approximate sediment removal should come from the IMP process, place notes for backup related to sediment removal numbers here.

TABLE 9E – COMPARISON OF POLLUTANT CONCENTRATION TO HUMAN HEALTH SCREENING LEVEL FOR EAST AREA

Table 9E - Comparison of Pollutant Concentrations to Human Health Screening Levels for the East Area

Analyte	Concentration (mg/kg)									Human Health	
	Reach										
	4	-	-	-	-	-	-	-	-	CHHSL/RSL (mg/kg)	
	Sample ID										
	1	-	-	-	-	-	-	-	-	Residential	Commercial/Industrial
General Physical											
% Solids	**60.4**	-	-	-	-	-	-	-	-	NA	NA
Inorganic Non-Metals											
Total Kjeldahl Nitrogen	810.0	-	-	-	-	-	-	-	-	NA	NA
Nitrate as N	ND	-	-	-	-	-	-	-	-	130,000	1,900,000
Nitrite as N	0.9	-	-	-	-	-	-	-	-	7,800	120,000
Total Nitrogen	810.9	-	-	-	-	-	-	-	-	NA	NA
Phosphorus, Total as P	91.0	-	-	-	-	-	-	-	-	1.6	23
Metals											
Manganese	242.0	-	-	-	-	-	-	-	-	1,800	26,000
Arsenic	2.6	-	-	-	-	-	-	-	-	0.07	0.24
Cadmium	ND	-	-	-	-	-	-	-	-	1.7	7.5
Chromium *	3.2	-	-	-	-	-	-	-	-	100,000	100,000
Copper	11.3	-	-	-	-	-	-	-	-	3,000	38,000
Nickel	3.5	-	-	-	-	-	-	-	-	1,600	16,000
Lead	6.8	-	-	-	-	-	-	-	-	80	320
Antimony	ND	-	-	-	-	-	-	-	-	30	380
Selenium	0.2	-	-	-	-	-	-	-	-	380	4,800
Zinc	95.9	-	-	-	-	-	-	-	-	23,000	100,000
Organics											
Malathion	ND	-	-	-	-	-	-	-	-	1,200	16,000
Chlorpyrifos	ND	-	-	-	-	-	-	-	-	62	820
Diazinon	ND	-	-	-	-	-	-	-	-	43	580

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 9W – COMPARISON OF POLLUTANT CONCENTRATIONS TO HUMAN HEALTH SCREENING LEVEL FOR THE WEST AREA

Table 9W - Comparison of Pollutant Concentrations to Human Health Screening Levels for the West Area

Analyte	Concentration (mg/kg)									Human Health	
	Reach										
	2	-	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	CHHSL/RSL (mg/kg)	
	Sample ID										
	1	-	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	Residential	Commercial/Industrial
General Physical											
% Solids	59.4	-	-	-	-	-	-	-	-	NA	NA
Inorganic Non-Metals											
Total Kjeldahl Nitrogen	620.0	-	-	-	-	-	-	-	-	NA	NA
Nitrate as N	ND	-	-	-	-	-	-	-	-	130,000	1,900,000
Nitrite as N	1.0	-	-	-	-	-	-	-	-	7,800	120,000
Total Nitrogen	621.0	-	-	-	-	-	-	-	-	NA	NA
Phosphorus, Total as P	110.0	-	-	-	-	-	-	-	-	1.6	23
Metals											
Manganese	389.0	-	-	-	-	-	-	-	-	1,800	26,000
Arsenic	2.7	-	-	-	-	-	-	-	-	0.07	0.24
Cadmium	0.1	-	-	-	-	-	-	-	-	1.7	7.5
Chromium *	4.2	-	-	-	-	-	-	-	-	100,000	100,000
Copper	11.6	-	-	-	-	-	-	-	-	3,000	38,000
Nickel	3.1	-	-	-	-	-	-	-	-	1,600	16,000
Lead	11.3	-	-	-	-	-	-	-	-	80	320
Antimony	ND	-	-	-	-	-	-	-	-	30	380
Selenium	0.4	-	-	-	-	-	-	-	-	380	4,800
Zinc	93.5	-	-	-	-	-	-	-	-	23,000	100,000
Organics											
Malathion	ND	-	-	-	-	-	-	-	-	1,200	16,000
Chlorpyrifos	ND	-	-	-	-	-	-	-	-	62	820
Diazinon	ND	-	-	-	-	-	-	-	-	43	580

Notes:

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

RSL- Regional Screening Level USEPA Region 9, Updated as of November 2014

* Human Health Standards Listed for Chromium (III)

mg/kg - milligrams per kilogram

NA- No Human Level available

TABLE 10E - POTENTIAL WATER QUALITY IMPACTS MODEL FOR THE EAST AREA

Table 10E -Water Quality Impacts Model for the East Area - 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
Lower Alvarado Location 4	Water	12/11/2014	Total Dissolved Solids		1860	20	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lower Alvarado Location 4	Water	12/11/2014	Total Suspended Solids				mg/l	0.78	0.44694	0	0	0	0	0.193	0.307	0.422	0.0	0.0	0.0	0.0
Lower Alvarado Location 4	Water	12/11/2014	Arsenic		ND	0.01	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Cadmium		ND	0.01	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Chromium		ND	0.05	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Copper		ND	0.05	mg/l	0.4	0.2292	-	-	-	-	0.099	0.158	0.216	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Manganese		0.111	0.03	mg/l	0.63	0.36099	148001.7001	0.32560374	0.32560374	0.976811221	0.156	0.248	0.341	0.1	0.2	0.3	0.7
Lower Alvarado Location 4	Water	12/11/2014	Nickel		ND	0.05	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Lead		ND	0.05	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Antimony		ND	0.1	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Selenium		ND	0.01	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Zinc		0.07	0.05	mg/l	0.54	0.30942	80000.91899	0.176002022	0.176002022	0.528006065	0.133	0.213	0.292	0.1	0.1	0.2	0.4
Lower Alvarado Location 4	Water	12/11/2014	Total Kjeldahl Nitrogen		1.3	0.5	mg/l	0.15	0.08595	412703.1535	0.907946938	0.907946938	2.723840813	0.037	0.059	0.081	0.4	0.6	0.9	1.9
Lower Alvarado Location 4	Water	12/11/2014	Nitrite as N		ND	0.05	mg/l	0.67	0.38391	-	-	-	-	0.165	0.264	0.362	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Nitrate as N		0.4	0.05	mg/l	0.67	0.38391	567202.2828	1.247845022	1.247845022	3.743535066	0.165	0.264	0.362	0.5	0.9	1.2	2.6
Lower Alvarado Location 4	Water	12/11/2014	Total Nitrogen		1.7	0.05	mg/l	0.4	0.2292	1439169.971	3.166173937	3.166173937	9.49852181	0.099	0.158	0.216	1.4	2.2	3.0	6.5
Lower Alvarado Location 4	Water	12/11/2014	Phosphorus, Total as P		0.11	0.05	mg/l	0.51	0.29223	118731.5226	0.26120935	0.26120935	0.783628049	0.126	0.201	0.276	0.1	0.2	0.2	0.5
Lower Alvarado Location 4	Water	12/11/2014	Malathion	Triphenyl phosph	ND	0.05	mg/l	0.5	0.2865	-	-	-	-	0.124	0.197	0.271	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Chlorpyrifos	Triphenyl phosph	ND	0.05	mg/l	0.5	0.2865	-	-	-	-	0.124	0.197	0.271	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Diazinon	Triphenyl phosph	ND	0.05	mg/l	0.5	0.2865	-	-	-	-	0.124	0.197	0.271	-	-	-	-
Lower Alvarado Location 4	Water	12/11/2014	Total Hardness		765	100	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

		Units
Dry Weather Instantaneous Flow (avg. of U/S and D/S)	0.29	ft3/sec
Daily Flow	25056	ft3/day
Days of dry weather flow per year	320	days
Annual Treatment Flow	8.0E+06	ft3/year
Total length	500	ft
Average channel velocity	0.358923077	ft/sec
HRT	0.386960042	hr
Retention Time Correction Factor	0.016123335	
Existing Vegetation Score	1.7	
Existing Hydrosoil Score	1.0	
Existing Hydroperiod Score	2.0	
Overall Existing Score	4.7	
Existing Efficiency Coefficient	0.57	
L to ft3 conversion	0.035	ft3/L
Overall Recovery Score	4.4	
Maintenance Period	3	years

nyear	Yearly Rec Score	Yearly Eff Coef
1	1.5	0.247
2	2.9	0.394
3	4.4	0.541

Table 10E -Water Quality Impacts Model for the East Area - 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 sustem 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) maintaned nyear = 1	NTS Removal (lbs) maintaned nyear = 2	NTS Removal (lbs) maintaned nyear = 3	NTS Removal (lbs) maintaned TOTAL
Lower Alvarado Location 3	Water	12/11/2014	Total Dissolved Solids		1790	20	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lower Alvarado Location 3	Water	12/11/2014	Total Suspended Solids		-	-	mg/l	0.78	0.44694	-	-	-	-	0.193	0.307	0.422	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Arsenic		ND	0.01	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Cadmium		ND	0.01	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Chromium		ND	0.05	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Copper		ND	0.05	mg/l	0.4	0.2292	-	-	-	-	0.099	0.158	0.216	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Manganese		0.039	0.03	mg/l	0.63	0.36099	52000.59734	0.114401314	0.114401314	0.343203942	0.156	0.248	0.341	0.0	0.1	0.1	0.2
Lower Alvarado Location 3	Water	12/11/2014	Nickel		ND	0.05	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Lead		ND	0.05	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Antimony		ND	0.1	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Selenium		ND	0.01	mg/l	0.63	0.36099	-	-	-	-	0.156	0.248	0.341	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Zinc		ND	0.05	mg/l	0.54	0.30942	-	-	-	-	0.133	0.213	0.292	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Total Kjeldahl Nitrogen		1.1	0.5	mg/l	0.15	0.08595	349210.3607	0.768262793	0.768262793	2.30478838	0.037	0.059	0.081	0.3	0.5	0.7	1.6
Lower Alvarado Location 3	Water	12/11/2014	Nitrite as N		ND	0.05	mg/l	0.67	0.38391	-	-	-	-	0.165	0.264	0.362	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Nitrate as N		0.27	0.05	mg/l	0.67	0.38391	382861.5409	0.84229539	0.84229539	2.52688617	0.165	0.264	0.362	0.4	0.6	0.8	1.7
Lower Alvarado Location 3	Water	12/11/2014	Total Nitrogen		1.4	0.05	mg/l	0.4	0.2292	1185198.8	2.60743736	2.60743736	7.822312079	0.099	0.158	0.216	1.1	1.8	2.5	5.4
Lower Alvarado Location 3	Water	12/11/2014	Phosphorus, Total as P		0.06	0.05	mg/l	0.51	0.29223	64762.6487	0.142477827	0.142477827	0.427433481	0.126	0.201	0.276	0.1	0.1	0.1	0.3
Lower Alvarado Location 3	Water	12/11/2014	Malathion	Triphenyl phospha	ND	0.05	ug/l	0.5	0.2865	-	-	-	-	0.124	0.197	0.271	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Chlorpyrifos	Triphenyl phospha	ND	0.05	ug/l	0.5	0.2865	-	-	-	-	0.124	0.197	0.271	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Diazinon	Triphenyl phospha	ND	0.05	ug/l	0.5	0.2865	-	-	-	-	0.124	0.197	0.271	-	-	-	-
Lower Alvarado Location 3	Water	12/11/2014	Total Hardness		731	100	mg $CaCO_3$/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

		Units
Dry Weather Instantaneous Flow (upstream)	0.29	ft3/sec
Daily Flow	25056	ft3/day
Days of dry weather flow per year	320	days
Annual Treatment Flow	8.0E+06	ft3/year
Total length	500	ft
Average upstream velocity	0.358923077	ft/sec
HRT	0.386960042	seconds
HRT- (based on velocity and length)	0.016123335	hr
Existing Vegetation Score	1.7	
Existing Hydrosoil Score	1.0	
Existing Hydroperiod Score	2.0	
Overall Existing Score	4.7	
Existing Efficiency Coefficient	0.57	
L to ft3 conversion	0.035	ft3/L
If Retention Time < 24 hrs: RT correction factor	0.016123335	
If Retention Time > 24 hrs: RT correction factor	1	
Overall Recovery Score	4.4	
Maintenance Period	3	years

nyear	Yearly Rec Score	Yearly Eff Coef
1	1.5	0.247
2	2.9	0.394
3	4.4	0.541

TABLE 10W – POTENTIAL WATER QUALITY IMPACTS MODEL FOR THE WEST AREA

Table 10W -Water Quality Impacts Model for the West Area - 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
Lower Alvarado Location 2	Water	12/11/2014	Total Dissolved Solids		1880	20.0	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lower Alvarado Location 2	Water	12/11/2014	Total Suspended Solids		-	-	mg/l	0.78	0.5265	-	-	-	-	0.220	0.361	0.503	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Arsenic		ND	0.01	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Cadmium		ND	0.01	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Chromium		ND	0.05	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Copper		ND	0.05	mg/l	0.4	0.27	-	-	-	-	0.113	0.185	0.258	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Manganese		0.302	0.03	mg/l	0.63	0.42525	2947799.396	6.485158671	6.485158671	19.45547601	0.177	0.292	0.406	2.7	4.5	6.2	13.4
Lower Alvarado Location 2	Water	12/11/2014	Nickel		ND	0.05	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Lead		ND	0.05	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Antimony		ND	0.1	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Selenium		ND	0.01	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Zinc		ND	0.05	mg/l	0.54	0.3645	-	-	-	-	0.152	0.250	0.348	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Total Kjeldahl Nitrogen		1.3	0.5	mg/l	0.15	0.10125	3021238.737	6.646725222	6.646725222	19.94017567	0.042	0.070	0.097	2.8	4.6	6.4	13.7
Lower Alvarado Location 2	Water	12/11/2014	Nitrite as N		ND	0.05	mg/l	0.67	0.45225	-	-	-	-	0.189	0.310	0.432	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Nitrate as N		0.29	0.05	mg/l	0.67	0.45225	3010393.265	6.622865183	6.622865183	19.86859555	0.189	0.310	0.432	2.8	4.5	6.3	13.6
Lower Alvarado Location 2	Water	12/11/2014	Total Nitrogen		1.6	0.05	mg/l	0.4	0.27	9915860.472	21.81489304	21.81489304	65.44467911	0.113	0.185	0.258	9.1	15.0	20.8	44.9
Lower Alvarado Location 2	Water	12/11/2014	Dissolved Oxygen		11.2	0.1														
Lower Alvarado Location 2	Water	12/11/2014	Phosphorus, Total as P		0.1	0.05	mg/l	0.51	0.34425	790170.1313	1.738374289	1.738374289	5.215122867	0.144	0.236	0.329	0.7	1.2	1.7	3.6
Lower Alvarado Location 2	Water	12/11/2014	Malathion	Triphenyl phosph	ND	0.05	ug/l	0.5	0.3375	-	-	-	-	0.141	0.232	0.323	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Chlorpyrifos	Triphenyl phosph	ND	0.05	ug/l	0.5	0.3375	-	-	-	-	0.141	0.232	0.323	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Diazinon	Triphenyl phosph	ND	0.05	ug/l	0.5	0.3375	-	-	-	-	0.141	0.232	0.323	-	-	-	-
Lower Alvarado Location 2	Water	12/11/2014	Total Hardness		821	100	mg $CaCO_3$/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

	Units
Dry Weather Instantaneous Flow (upstream)	0.57 ft3/sec
Daily Flow	49248 ft3/day
Days of dry weather flow per year	320 days
Annual Treatment Flow	1.6E+07 ft3/year
Total length	750 ft
Average channel velocity	0.170283039 ft/sec
HRT	1.223453224 hr
Retention Time Correction Factor	0.050977218
Existing Vegetation Score	1.8
Existing Hydrosoil Score	2.0
Existing Hydroperiod Score	2.0
Overall Existing Score	5.8
Existing Efficiency Coefficient	0.68
L to ft3 conversion	0.035 ft3/L
Overall Recovery Score	5.5
Maintenance Period	3 years

nyear	Yearly Rec Score	Yearly Eff Coef
1	1.8	0.281666667
2	3.6	0.463333333
3	5.5	0.645

Table 10W -Water Quality Impacts Model for the West Area - 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 sustem 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) maintaned nyear = 1	NTS Removal (lbs) maintaned nyear = 2	NTS Removal (lbs) maintaned nyear = 3	NTS Removal (lbs) maintaned TOTAL
Lower Alvarado Location 1	Water	12/11/2014	Total Dissolved Solids		1800	20	mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lower Alvarado Location 1	Water	12/11/2014	Total Suspended Solids		-	-	mg/l	0.78	0.5265	-	-	-	-	0.220	0.361	0.503	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Arsenic		ND	0.01	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Cadmium		ND	0.01	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Chromium		ND	0.05	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Copper		ND	0.05	mg/l	0.4	0.27	-	-	-	-	0.113	0.185	0.258	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Manganese		0.144	0.03	mg/l	0.63	0.42525	1405573.222	3.092261088	3.092261088	9.276783264	0.177	0.292	0.406	1.3	2.1	3.0	6.4
Lower Alvarado Location 1	Water	12/11/2014	Nickel		ND	0.05	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Lead		ND	0.05	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Antimony		ND	0.1	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Selenium		ND	0.01	mg/l	0.63	0.42525	-	-	-	-	0.177	0.292	0.406	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Zinc		ND	0.05	mg/l	0.54	0.3645	-	-	-	-	0.152	0.250	0.348	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Total Kjeldahl Nitrogen		0.9	0.5	mg/l	0.15	0.10125	2091626.818	4.601579	4.601579	13.804737	0.042	0.070	0.097	1.9	3.2	4.4	9.5
Lower Alvarado Location 1	Water	12/11/2014	Nitrite as N		ND	0.05	mg/l	0.67	0.45225	-	-	-	-	0.189	0.310	0.432	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Nitrate as N		0.32	0.05	mg/l	0.67	0.45225	3321813.258	7.307989168	7.307989168	21.9239675	0.189	0.310	0.432	3.0	5.0	7.0	15.0
Lower Alvarado Location 1	Water	12/11/2014	Total Nitrogen		1.2	0.05	mg/l	0.4	0.27	7436895.354	16.36116978	16.36116978	49.08350933	0.113	0.185	0.258	6.8	11.2	15.6	33.7
Lower Alvarado Location 1	Water	12/11/2014	Phosphorus, Total as P		0.08	0.05	mg/l	0.51	0.34425	632136.1051	1.390699431	1.390699431	4.172098293	0.144	0.236	0.329	0.6	1.0	1.3	2.9
Lower Alvarado Location 1	Water	12/11/2014	Malathion	Triphenyl phospha	ND	0.05	ug/l	0.5	0.3375	-	-	-	-	0.141	0.232	0.323	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Chlorpyrifos	Triphenyl phospha	ND	0.05	ug/l	0.5	0.3375	-	-	-	-	0.141	0.232	0.323	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Diazinon	Triphenyl phospha	ND	0.05	ug/l	0.5	0.3375	-	-	-	-	0.141	0.232	0.323	-	-	-	-
Lower Alvarado Location 1	Water	12/11/2014	Total Hardness		809	100	mg $CaCO_3$/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lower Alvarado Location 1	Water	12/11/2014	Dissolved Oxygen		10.4	0.1														

		Units
Dry Weather Instantaneous Flow (upstream)	0.57	ft3/sec
Daily Flow	49248	ft3/day
Days of dry weather flow per year	320	days
Annual Treatment Flow	1.6E+07	ft3/year
Total length	750	ft
Average upstream velocity	0.170283039	ft/sec
HRT	1.223453224	hr
Retention Time Correction Factor	0.050977218	hr
Existing Vegetation Score	1.8	
Existing Hydrosoil Score	2.0	
Existing Hydroperiod Score	2.0	
Overall Existing Score	5.8	
Existing Efficiency Coefficient	0.68	
L to ft3 conversion	0.035	ft3/L
If Retention Time < 24 hrs: RT correction factor	0.050977218	
If Retention Time > 24 hrs: RT correction factor	1	
Overall Recovery Score	5.5	
Maintenance Period	3	years

nyear	Yearly Rec Score	Yearly Eff Coef
1	1.8	0.281666667
2	3.6	0.463333333
3	5.5	0.645

TABLE 11E- COMPARISON OF POLLUTANT CONCENTRATIONS TO WATER QUALITY BENCHMARKS FOR THE EAST AREA

Table 11E - Comparison of Pollutant Concentrations to Water Quality Benchmarks for the East Area

ANALYTE	Sample Date	CONCENTRATION		Water Quality Benchmark	Benchmark Source	Units
		Upstream	Downstream			
		SAMPLE ID-UPSTREAM	SAMPLE ID-DOWNSTREAM			
Wet Chemistry						
Total Dissolved Solids	12/11/2014	1860	1790	1500	Basin Plan Table 3-2	mg/L
Total Suspended Solids	12/11/2014	0	-	50	NA	mg/L
Total Hardness	12/11/2014	765	731	NA	NA	mg/L
Phosphorus, Total as P	12/11/2014	0.11	0.06	0.1	Basin Plan page 3-8	mg/L
Totak Kjeldahl Nitrogen	12/11/2014	1.3	1.1	NA	NA	mg/L
Nitrite as N	12/11/2014	ND	ND	1	Basin Plan page 3-25	mg/L
Nitrate as N	12/11/2014	0.4	0.27	10* (Sum of Nitrite and Nitrate as N cannot be >10)	Basin Plan page 3-25	mg/L
Total Nitrogen	12/11/2014	1.7	1.4	1	Basin Plan page 3-8	mg/L
Total Metals						
Arsenic	12/11/2014	ND	ND	0.05	Basin Plan page 3-25 ①	mg/L
Antimony	12/11/2014	ND	ND	0.006	Basin Plan page 3-25 ①	mg/L
Cadmium	12/11/2014	ND	ND	0.005	Basin Plan page 3-25 ①	mg/L
Chromium*	12/11/2014	ND	ND	0.05	Basin Plan page 3-25 ①	mg/L
Copper	12/11/2014	ND	ND	49.6/27.3	40 CFR 131.38	mg/L
Lead	12/11/2014	ND	ND	230.9/9.0	40 CFR 131.38	mg/L
Manganese	12/11/2014	0.111	0.039	1	Basin Plan table 3-2	mg/L
Nickel	12/11/2014	ND	ND	0.1	Basin Plan page 3-25 ①	mg/L
Selenium	12/11/2014	ND	ND	5	40 CFR 131.38	mg/L
Zinc	12/11/2014	0.07	ND	379.3/382.4	40 CFR 131.38	mg/L
Organics						
Malathion	12/11/2014	ND	ND	0.43/0.1	40 CFR 131.38	mg/L
Chlorpyrifos	12/11/2014	ND	ND	0.02/0.014	40 CFR 131.38	mg/L
Diazinon	12/11/2014	ND	ND	0.08/0.05	40 CFR 131.38	mg/L
Bacteriological						
Enterococcus	12/11/2014	1600	500	151	Basin Plan	CFU/100 mL
Fecal Coliform	12/11/2014	240	170	200	Basin Plan	MPN/100 mL
Total Colform	12/11/2014	1600	1600	NA	NA	MPN/100 mL

Notes:

mg/L- milligrams 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
CA-MCL - California Maximum Contaminant Levels
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 11W – COMPARISON OF POLLUTANT CONCENTRATIONS TO WATER QUALITY BENCHMARKS FOR WEST AREA

Table 11W - Comparison of Pollutant Concentrations to Water Quality Benchmarks for the West Area

ANALYTE	Sample Date	CONCENTRATION		Water Quality Benchmark	Benchmark Source	Units
		Upstream	Downstream			
		SAMPLE ID-UPSTREAM	SAMPLE ID-DOWNSTREAM			
Wet Chemistry						
Total Dissolved Solids	12/11/2014	1880	1800	1500	Basin Plan Table 3-2	mg/L
Total Suspended Solids	12/11/2014	-	-	50	NA	mg/L
Total Hardness	12/11/2014	821	809	NA	NA	mg/L
Phosphorus, Total as P	12/11/2014	0.1	0.08	0.1	Basin Plan page 3-8	mg/L
Total Kjeldahl Nitrogen	12/11/2014	1.3	0.9	NA	NA	mg/L
Nitrite as N	12/11/2014	ND	ND	1	Basin Plan page 3-25	mg/L
Nitrate as N	12/11/2014	0.29	0.32	10* (Sum of Nitrite and Nitrate as N cannot be >10)	Basin Plan page 3-25	mg/L
Total Nitrogen	12/11/2014	1.6	1.2	1	Basin Plan page 3-8	mg/L
Dissolved Oxygen	12/11/2014	11.2	10.4	NA	NA	mg/L
Total Metals						
Arsenic	12/11/2014	ND	ND	0.05	Basin Plan page 3-25 ①	mg/L
Antimony	12/11/2014	ND	ND	0.006	Basin Plan page 3-25 ①	mg/L
Cadmium	12/11/2014	ND	ND	0.005	Basin Plan page 3-25 ①	mg/L
Chromium	12/11/2014	ND	ND	0.05	Basin Plan page 3-25 ①	mg/L
Copper	12/11/2014	ND	ND	49.6/27.3	40 CFR 131.38	mg/L
Lead	12/11/2014	ND	ND	230.9/9.0	40 CFR 131.38	mg/L
Manganese	12/11/2014	0.302	0.144	1	Basin Plan table 3-2	mg/L
Nickel	12/11/2014	ND	ND	0.1	Basin Plan page 3-25 ①	mg/L
Selenium	12/11/2014	ND	ND	5	40 CFR 131.38	mg/L
Zinc	12/11/2014	ND	ND	379.3/382.4	40 CFR 131.38	mg/L
Organics						
Malathion	12/11/2014	ND	ND	0.43/0.1	40 CFR 131.38	mg/L
Chlorpyrifos	12/11/2014	ND	ND	0.02/0.014	40 CFR 131.38	mg/L
Diazinon	12/11/2014	ND	ND	0.08/0.05	40 CFR 131.38	mg/L
Bacteriological						
Enterococcus	12/11/2014	1600	1600	151	Basin Plan	CFU/100 mL
Fecal Coliform	12/11/2014	240	1600	200	Basin Plan Page 3-6	MPN/100 mL
Total Colform	12/11/2014	1600	1600	NA	NA	MPN/100 mL

Notes:

mg/L- milligrams 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

CA-MCL - California Maximum Contaminant Levels

CMC- Criteria Maximum Concentration

CCC - Continuous Criteria Concentration

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

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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 12E – COMPARISON OF IMPACTS TO BENEFITS FOR THE EAST AREA

Table 12E - Comparison of Impacts to Benefits for the East Area

	Pollutant Removal Benefit					Pollutant Removal Impact	
Analyte	**Estimated Sediment Pollutant Load Removal (lbs)[1]**	**Estimated Annual Existing Pollutant Load Removal Capacity (lbs)**	**Maintenance Period (yrs)**	**Estimated Existing Pollutant Load Removal Capacity per Maintenance Period (Existing Pollutant Removal)(lbs)[2]**	**Estimated Maintained Pollutant Load Removal Capacity per Maintenance Period (Maintained Pollutant Removal) (lbs)[3]**	**Maintained - Existing Pollutant Load Removal capacities (lbs)[4]**	**Pollutant Removal Benefit - Pollutant Removal Impact (lbs)**
Arsenic	1	-	3	-	-	-	1.3
Cadmium	ND	-	3	-	-	-	0.0
Chromium	2	-	3	-	-	-	1.6
Copper	6	-	3	-	-	-	5.5
Manganese	118	0.3	3	1.0	0.7	-0.3	118.1
Nickel	2	-	3	-	-	-	1.7
Lead	3	-	3	-	-	-	3.3
Antimony	ND	-	3	-	-	-	0.0
Selenium	0	-	3	-	-	-	0.1
Zinc	47	0.2	3	0.5	0.4	-0.2	46.8
Total Kjeldahl Nitrogen	396.43	0.9	3	2.7	1.9	-0.85	395.6
Nitrite as N	0	-	3	-	-	-	0.0
Nitrate as N	ND	1.2	3	3.7	2.6	-1.2	-0.7
Total Nitrogen	397	3.2	3	9.5	6.5	-3.0	393.9
Phosphorus, Total as P	45	0.3	3	0.8	0.5	-0.2	44.3
Malathion	ND	-	3	-	-	-	0.0
Chlorpyrifos	ND	-	3	-	-	-	0.0
Diazinon	ND	-	3	-	-	-	0.0

Notes:

ND - Not Detected in soil above Laboratory Reporting Limit

1 - The maintained channel will result in pollutant load reductions directly through the removal of sediment pollutants. This column represents the pollutants removed by the dredging effort

2 - In their current condition, each channel possesses characteristics that are similar to a natural treatment system during low flow conditions. This column represents the pollutants removed by the existing channel over a 3 year period.

3 - Once maintenance has occurred, the channel will lose some of its characteristics that are similar to a natural treatment system. This column represents the pollutants removed by the channel post-maintenance, over a 3 year period.

4 - This column represents the loss in pollutant load removal in the channel, over a 3 year period, due to channel maintenance.

TABLE 12W – COMPARISON OF IMPACTS TO BENEFITS FOR THE WEST AREA

Table 12W - Comparison of Impacts to Benefits for the West Area

	Pollutant Removal Benefit					Pollutant Removal Impact	
Analyte	Estimated Sediment Pollutant Load Removal (lbs)[1]	Estimated Annual Existing Pollutant Load Removal Capacity (lbs)	Maintenance Period (yrs)	Estimated Existing Pollutant Load Removal Capacity per Maintenance Period (Existing Pollutant Removal)(lbs)[2]	Estimated Maintained Pollutant Load Removal Capacity per Maintenance Period (Maintained Pollutant Removal) (lbs)[3]	Maintained - Existing Load Removal (lbs) [4]	Pollutant Removal Benefit - Pollutant Removal Impact (lbs)
Arsenic	1	-	3	-	-	-	1
Cadmium	0	-	3	-	-	-	0
Chromium	2	-	3	-	-	-	2
Copper	6	-	3	-	-	-	6
Manganese	191	6.5	3	19.5	13.4	-6	185
Nickel	1	-	3	-	-	-	1
Lead	6	-	3	-	-	-	6
Antimony	ND	-	3	-	-	-	0
Selenium	0	-	3	-	-	-	0
Zinc	46	-	3	-	-	-	46
Total Kjeldahl Nitrogen	304	6.6	3	19.9	13.7	-6	298
Nitrite as N	0	-	3	-	-	-	0
Nitrate as N	ND	6.6	3	19.9	13.6	-6	-6
Total Nitrogen	305	21.8	3	65.4	44.9	-21	284
Phosphorus, Total as P	54	1.7	3	5.2	3.6	-2	52
Malathion	ND	-	3	-	-	-	0
Chlorpyrifos	ND	-	3	-	-	-	0
Diazinon	ND	-	3	-	-	-	0

Notes:

ND - Not Detected in soil above Laboratory Reporting Limit

1 - The maintained channel will result in pollutant load reductions directly through the removal of sediment pollutants. This column represents the pollutants removed by the dredging effort

2 - In their current condition, each channel possesses characteristics that are similar to a natural treatment system during low flow conditions. This column represents the pollutants removed by the existing channel over a 3 year period.

3 - Once maintenance has occurred, the channel will lose some of its characteristics that are similar to a natural treatment system. This column represents the pollutants removed by the channel post-maintenance, over a 3 year period.

4 - This column represents the loss in pollutant load removal in the channel, over a 3 year period, due to channel maintenance.

ATTACHMENT 7 - POTENTIAL MITIGATION EFFORTS MODEL

APPLICABLE PEIR MITIGATION MEASURES

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		●	●		●		●
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.