DRAFT

MONITORING AND REPORTING PLAN

Machado Lake Nutrient and Toxics
Total Maximum Daily Load (TMDL)
Torrance, California
Redondo Beach, California

Prepared For:

City of Torrance
3031 Torrance Boulevard
Torrance, CA 90503

Prepared By:

Northgate Environmental Management, Inc.
24411 Ridge Route Drive, Suite 130
Laguna Hills, California 92653

September 12, 2012

Project No. 2040.01

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Derrick S. Willis
Principal

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Project Manager

2040.01

northgate environmental management, inc.

September 12, 2012 2040.01

Mr. John Dettle
City of Torrance
3031 Torrance Boulevard
Torrance, California 90503

RE: Monitoring and Reporting Plan
Machado Lake Nutrient and Toxics Total Maximum Daily Load (TMDL)

Dear Mr. Dettle:

Enclosed is acompact disk (CD) containing the Monitoring and Reporting Plan and Health and Safety Plan updated to include stormwater sampling activities as described in the Machado Lake Nutrient Total Maximum Daily Load Special Study Workplan (Nutrient-SSWP), and theMachado Lake Pesticides and polychlorinated bi-phenyls (PCBs)Total Daily Load Special Study Work Plan (Toxics-SSWP).

If you have any questions regarding theseplans, please call me at (949) 230-0643, or Derrick Willis at (949) 375-7004.

Respectfully yours,
Northgate Environmental Management, Inc.

DRAFT
Dana R Brown
SeniorGeologist

cc: Derrick Willis, Northgate

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environmental management, inc.

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1.0 INTRODUCTION

Northgate Environmental Management, Inc. (Northgate) has prepared this Monitoring and Reporting Program (MRP) for the City of Torrance (the City) to comply with provisions of both the Machado Lake Nutrient Total Maximum Daily Load (Nutrient TMDL), and the Machado Lake Pesticides and polychlorinated biphenyls*(*PCBs) Total Maximum Daily Load (Toxics TMDL).

The mass-based waste load allocation (WLA) compliance alternative for the Nutrient TMDL is currently addressed in the ongoing work performed as part of the Special Study Work Plan (SSWP) for the Pre-Best Management Practices Implementation Study Period (Carollo, 2011a).The Toxics TMDL will be addressed in work performed under this MRP.

TheMRP outlines the specific activities to be performed and the procedures to be used for performing the Nutrient and Toxics TMDL sampling. The MRP documents sample collection methods, analytical procedures, data analysis, and data reporting. Appendix A of the MRP contains a site-specific Health and Safety Plan (HASP)that includes confined space entry procedures and protocols for working inside the belowground portions of manholes.

1.1 Background

Machado Lake is located in the City of Los Angeles' Ken Malloy Harbor Regional Park. It is approximately 40 acres in size, and averages approximately 3 feet in depth. Machado Lake is listed on the 1998, 2002, and 2006 Clean Water Act Section 303(d) lists of impaired water bodies due to eutrophic conditions, algae and odors (Nutrients): and chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, Chem A, and PCBs in tissue; and impaired sediment due to chlordane, DDT, and PCBs (Toxics). The listed impairments are caused by the overloading of nutrients, such as nitrogen and phosphorus, resulting in excessive algal growth which leads to increased turbidity, decreased levels of oxygen, and odor problems.

The City is situated in the western portion of the Machado Lake subwatershed, which is bounded to the north by the City, to the east by the City of Los Angeles, and to the south and west, by the Pacific Ocean. The City is located about 15 miles south of Downtown Los Angeles, in southern Los Angeles County, just north of the Palos Verdes Hills. The City was incorporated on May 12, 1921, and is just over 20.5 square miles in area. The City is bounded by Redondo Beach on the west and north, Lawndale and Gardena on the north, Los Angeles on the east, Lomita to the southeast, and Rolling Hills Estates and Palos Verdes Estates on the south. The City is also bounded by approximately 4,000 feet of Santa Monica Bay coastline.

The City's stormwater conveyance systems are interconnected with neighboring city systems. Neighboring cities located at generally higher elevation such as Rolling Hills Estates and Palos Verde Estates discharge stormwater into stormwater conveyance systems located within the City's boundaries. Figure 1 shows a regional site location map of the City.

The Regional Water Quality Control Board – Los Angeles Region (RWQCB) established TMDLs for Machado Lake for algae, ammonia and odors (Nutrients) on May 1, 2008 (RWQCB, 2008), and for Pesticides and PCBs (Toxics) on September 2, 2010 (RWQCB, 2010).

1.1.1 Nutrient TMDL

The City has elected to establish annual mass-based WLAs for Nutrientsequivalent to monthly average concentrations of 0.1 milligrams per liter (mg/l)total phosphorus and 1.0 mg/l total nitrogen based on approved flow conditions.When the concentration-based WLAs are met under the approved flow condition of 8.45cubic hectometers per year, the annual mass of the total phosphorus discharged to Machado Lake will be 845 kilograms (kg) and the annual mass of total nitrogen discharged to the lake will be 8,450 kg. The City mass-based WLAs will be proportional to the City owned area in the sub-watershed. The City area accounts for 35.6 percent of the Machado Lake Watershed. Table 1 lists the interim and final WLAs based on this area.

Table 1: Nutrient TMDL Mass-Based Waste Load Allocations

Responsible Party	Years after TMDL Effective Date	Total Phosphorus (kg)	Total Nitrogen (kg)
City of Torrance	5	3,760	7,370
	9.5 (final WLAs)	301	3,008

NOTES:
mg/l = milligrams per liter

1.1.2 Toxics TMDL

The Toxics TMDL assigned WLAs for municipal separate storm sewer systems (MS4) permitees as concentration-based allocations (equal to the sediment numeric targets) for suspended sediment-associated contaminants as shown in Table 2.

Table 2: Toxics TMDL Concentration Based Waste Load Allocations		
Responsible Party	**Pollutant**	**WLA for Suspended Sediment Associated Contaminants (*u*g/kg dry weight)**
City of Torrance	Total PCBs	59.8
	DDT (all congeners)	4.16
	DDE (all congeners)	3.16
	DDD (all congeners)	4.88
	Total DDT	5.28
	Chlordane	3.24
	Dieldrin	1.9

Notes:
*u*g/kg = micrograms per kilogram
DDT = dichlorodiphenyltrichloroethane
DDE = Dichlorodiphenyldichloroethylene
DDD = Dichlorodiphenyldichloroethane

1.2 Summary of Proposed Activities

Ongoing Nutrient TMDL monitoring will be combined with Toxics TMDL monitoring after approval of the workplan by the RWQCB in the fall of 2012. The following sections describe in detail the proposed activities to accomplish TMDL monitoring.

1.2.1 Nutrient TMDL Monitoring Summary

Northgate willperform monthly visits to nine (9) monitoring sitesduring dry weather conditionsand three (3) additional monitoring visits during wet weather conditions to collect water samples, download flow sensor data, and service the sensors. Northgate will also perform up to seven (7) additional visits to station Tor-S3 when Los Angeles County pumps stormwater from the Walteria Lake into the 54-inch storm drain and collect a water sample (maximum of 10 storm event/pumping event visits per year).Based on the requirements of the Special Study Workplan (Carollo, 2011a), routine dry weather sampling will be conducted at all nine stations until a full year of data is obtained after the February, 2013 dry weather sampling event. At the end of this period the City will review the monitoring results to determine if the sampling frequency and locations should be modified. For the remainder of the Special Study period, flow measurements and water samples (when available) will continue to be collected at all nine monitoring stations. Details of the monitoring locations, frequency of sampling, and sampling parameters are included in Sections 3.0 to 5.0 of the MRP.

1.2.2 Toxics TMDL Monitoring Summary

The Toxics TMDL monitoring will consist of two phases of wet weather sampling designed to collect suspended solids for the analysis of pollutants in bulk sediments. Phase I monitoring will be conducted for a two (2) year period, and Phase II monitoring will commence once Phase I monitoring has been completed. In Phase I monitoring, samples will be collected during three (3) qualifying wet weather events at all stations for the first year, including the first significant storm event of the season. In the second year of Phase I activity samples will still be collected at stations representing discharge from the City during three qualifying wet weather events (Tor-S1, Tor-S2, Tor-S4, and Tor-S5), but the remaining stations will only be sampled during one qualifying wet weather event. During Phase II monitoring the number of sampling events will be decreased to one per year, and the frequency decreased to every other year, and all nine sampling stations will be visited.

At the end of the fourth year of wet weather monitoring, the City will assess the data to determine if the monitoring schedule should be altered. Details of the monitoring locations, frequency of sampling, and sampling parameters are included in Sections 3.0 to 5.0 of the MRP.

1.3 Work Plan Organization

Section 2.0 presents the MRP objectives. Section 3.0 summarizes the field methods and materials to be used in performing the scope of work. Section 4.0 summarizes the sampling locations, and Section 5.0 presents the sampling schedule and frequency. Section 6.0 presents the quality assurance/quality control (QA/QC) procedures to be used in the performance of this work.

2.0 PROJECT OBJECTIVES

The objective of this project is to ensure that the City is in compliance with the requirements of the Machado Lake Nutrient and Toxics TMDLs.The specific objectives of the work to be performed under this MRP are:

- Monitor attainment of WLAs as required by the TMDLs;
- Guide the design of future implementation actions;
- Monitor the effectiveness of implementation actions in improving water quality; and
- Guide pollutant source investigations.

Knowledge gained through the Special Studies (Carollo, 2011a and 2011b) will be used to modify the monitoring approach, number and location of monitoring sites, and sample collection techniques to adequately characterize and document the City's pollutant loads, progress toward pollutant load reductions, and improvement in water and sediment quality.

3.0 SAMPLING PROCEDURES

This section documents the procedural and analytical requirements for sampling events performed to collect water quality data as part of the MRP. All work conducted as part of the project is to be in accordance with provisions of the HASP, attached as Appendix A.

3.1 Sampling Methodology

Sampling will be conducted by a team of at least two workers using a combination of non-dedicated and dedicated sampling equipment. All sampling will be conducted in a manner that minimizes the possibility of sample contamination. Sampling equipment will be decontaminated prior to use. Grab samples will be collected in laboratory-supplied pre-preserved containers. Other types of discrete samples will also be collected and described separately.

After collection, the sample containers will be labeled, sealed in plastic bags, and placed in a cooler with ice for transportationunder proper chain-of-custody protocol to the analytical laboratory. QA/QC samples will be collected and analyzed for each sampling event.Field personnel shall adhere to established sample collection protocols to ensure the collection of representative and uncontaminated samples for laboratory analysis. Deviations from the standard protocol must be recorded on the *Water Sample Data Sheet* at the time of sampling. The following sections describe the specific protocols for stormwater sample collection and handling.

3.1.1 Nutrient TMDL Dry Weather Sampling

3.1.1.1 Sampling Equipment

Sampling equipment shall typically consist of reusable polyethylene dippers or polyethylene buckets suspended on a disposable rope. Non-dedicated sampling equipment shall be decontaminated prior to each use according to the methods listed in *Section 3.3 Decontamination Procedures*. Non-dedicated sampling equipment will be stored and transported in resealableplastic bags to prevent contamination.

3.1.1.2 Sampling Procedures

A checklist is to be used by the field team at each monitoring site to ensure that the team members comply with all appropriate health and safety protocols during the sampling task. A *Water Sample Data Sheet* will also be used to document the sample collection, flow measurement, and water conditions. The checklist for site visits and *Water SampleData Sheets* are attached in Appendix B.

Upon arrival at a monitoring site, the sampling team will inspect the location for general safety and deploy traffic cones to delineate the working zone around the vehicle, and alert drivers of the potential hazard. Prior to water sample collection, specific observations concerning the weather, water conditions, and flow conditions will be recorded on the *Water Sample Data Sheet*. Care must be taken to avoid disturbing the channel sediment or debris on the walls of the manhole access port prior to sample collection.

Grab samples will be collected from approximately mid-channel and at a depth where the flow is greatest (typically 60% of total depth). If the monitoring site lacks sufficient flow no sample will be collected and observations of the flow width and velocity (if measurable) will be recorded on the Water Sample Data Sheet. Pools of water with no visible flow should not be sampled as data collected at those locations may not represent surface flows. Care should be exercised to not capture algae, sediment, or other particulates from the bottom or sides of the channel to avoid bias in the collected sample.

A grab sample of the water will be collected by dipping the sampler into the water and emptying it three times to acclimate, then dipping a sample and pouring directly into the sample container containing preservative acid. The sampler will be held facing upstream during sample collection, and retrieved quickly to avoid mixing of the water. Care must be taken not to touch the sampler, or allow the sampler to touch vegetation, the rim or sides of the manhole, or other objects that would contaminate it as the sample is retrieved.

After filling and capping the sample bottles, the bottles will be labeled and placed in resealable plastic bags. The bags will be placed upright in a cooler and the samples surrounded with bagged ice so that the ice is around, beside, and above the samples. The samples will then be entered on the chain-of-custody record and the sample cooler secured from unauthorized access.

Following sample collection, flow measurements stored in the dedicated flow sensors will be downloaded and the sensor data reset.At some locations, direct flow measurements will be performed with field-portable equipment and the results compared to the flow sensor data. Section 3.2 describes methods and procedures for performing flow measurements in subsurface storm drains and open channels.

3.1.2 Nutrient TMDL Wet Weather Sampling

Nutrient TMDL wet weather sampling isvery similar to dry weather sampling, using the same equipment and sampling handling protocols. The only significant difference between wet and dry weather Nutrient TMDL sampling is the qualification procedure for validating a wet weather event that must be used prior to performing wet weather sampling (see Section 5.1.2 fora description of the procedure used to qualify a wet weather sampling event).

3.1.3 Toxics TMDL Wet Weather Sampling

Toxics TMDL sampling involves both water sample and suspended sediment sample collection during qualifying wet weather events. An attempt will be made to collect flow-weighted composite samples during each storm event, but due to the uncertainty associated with storm event durations that may not always be possible. When that is not possible the sampling period will be concluded when enough sample has been collected to supply water and sediment for the required analyses. In some cases where the storm event and resulting discharge ceases rapidly, the falling limb of the storm hydrograph may not be sampled in its entirety.

Water samples will be collected as grab samples, using the procedures described above for wet and dry weather Nutrient TMDL sampling. Samples will be retrieved as grab samples using a polyethylene dipper, bucket, or disposable Teflon bailer; and then transferred to the sample containers. Sufficient volumes of water will be collected to allow for separation of the suspended solids and analysis of toxics in the bulk sediment. The volume of sample to be retrieved in order to obtain at least 10 grams of sediment may require the use of larger capacity sampling equipment to recover sufficient volumes of sample. General water chemistry parameters including temperature, dissolved oxygen, pH, and electrical conductivity will be determined in the field at the time of water sample collection.

A minimum of six unfiltered water samples in 1-liter amber bottles will be collected during the rising and falling limbs of a storm event, then combined in 6:1 ratioto form a composite sample for subsequent analysis. Suspended solids will be extracted from the composite sample for analysis. Because of the highly variable amount of total suspended solids present in natural waters, efforts will be made in the field to qualify the sample as containing enough suspended solids to provide the necessary sediment for analysis. A total of 10 grams of sediment is required when all grab samples are combined, so each sample bottle must be screened for the presence of sediment, and evaluated to determine the amount of unfiltered water sample that will be collected to produce a total of 10 grams of sediment.

Following collection, each unfiltered sample will be allowed to settle in the cooler for a period of at least fifteen minutes. After that time the amount of sediment collected on the bottom of the container will be evaluated, and additional samples collected (if required) to capture enough suspended solids for analysis.

An attempt will be made to collect grab samples at all locations within the first 1 to 2 hours of stormwater discharge (first flush) wherever practical. As the storm event continues, the sampling team will return to all the sampling stations in rotation, and continue collection of grab samples. When the storm event declines or precipitation ceases, an attempt will be made to collect additional grab samples at all stations representing the falling limb of the hydrograph, but this may not be possible in all cases.

Grab samples will be transported under chain of custody protocol to the analytical laboratory where they will be combined into one aliquot and filtered prior to analysis. Analytical methods and target reporting limits are discussed in Section 3.8.

3.2 Flow Measurement

Continuous flow data will be recorded at all nine stations using dedicated flow sensors. Instantaneous flow measurementsusing an alternate measurement technique will also be obtained wherever possible during wet weather events, and when practical during dry weather events.

Instantaneous flow measurements will consist of aminimum of three velocity measurements will made immediately following sample collection. The flow measurements will be made using a digital water velocity meter(Global Water FP111 or equivalent), or area-velocity meter calibrated for the particular conveyance structure to be monitored (Global Water FC220 or equivalent), or both.Theflow (Q) will be calculated using the average velocity (V) multiplied by the cross-sectional area (A) using the formula A x V = Q.

The cross-sectional area of each structure will be obtained from construction drawings, and verified by measurements collected within the conveyance during the site visit.

3.2.1 Flow Measurement Methods

Flow measurements will be collectedat a fixed location in culverts or pipes. The measurement stationsandchannel profiles will be established during the initial site visit, when detailed measurements of the conveyance geometry will be collected. All subsequent measurements will be performed at the same locations to ensure uniformity and repeatability within the collected data.

3.2.1.1 Flow Measurement in Subsurface Storm Drains

For conduits or pipes, the flow velocity probe will be moved smoothly and uniformly throughout the flow profile. When a steady average reading is obtained, the average velocity for the flow stream and depth of water will be recorded on the Water Sample Data Sheet (see Appendix B). Three readings will be collected at each station, and the results of the readings averaged to obtain the calculated flow for the station.

3.2.1.2 Flow Measurement in Open Channels

To determine flow velocity in a stream, the flow velocity probe will be held at fixed measurement stations along a traverse of the channel and the velocity will be measured at 2/3 channel depth. Flow velocity and water depth will be recorded for each station along the traverse on the Discharge Measurement Note (see Appendix B), and the flow value for each segment of the profile will be measured to determine total flow through the channel profile. The value of flow within the channel will be obtained by calculating the average velocity for each subsection of the channel, then combining the results to obtain the total flow within the channel.

3.2.1.3 Flow Measurement – Sheet Flow Conditions

If the depth of flow does not allow measurement with the flow velocity probe (<0.1 foot), a “float” will be used to measure the velocity of flowing water. The width, depth, velocity, cross section and flow rate will be estimated based on the channel geometry, water depth, and amount of time it took a float to travel a marked distance three times. The estimated flow rate (Q) can then be calculated as follows:

$$Q = f \times \text{(cross section)} \times \text{(average surface velocity)}$$

Where:

Q = the flow rate in feet per second

f = dimensionless number

Cross section is the measured value in feet, and average velocity is the measured value in feet per second.

The coefficient f is used to account for friction effects on the channel bottom. The float travels on the water surface, but the average velocity (not the surface velocity) determines the flow rate so f converts the surface velocity to the average velocity. Typical f values range from 0.60 to 0.90 based on the roughness of the surface, in this project a value of 0.75 will be used.

3.3 Decontamination Procedures

Non-dedicated sampling equipment will be decontaminated immediately prior to and after each use. Decontamination will be performed using a three-stage process with phosphate-free detergent wash, tap water rinse, and final deionized/distilled water rinse.

Decontamination will be performed in a designated area, using a plastic sheet as a liner to protect the ground against spilled solutions. The decontaminationprocedure isas follows:

1) Wash with non-phosphate detergent (e.g. Alconox ®) usingbristles brush if necessary;
2) Rinse with tap water; and
3) Rinse with de-ionized/distilled water.

Following decontamination, if the item is not to used immediately; it will be wrapped in plastic or stored on plastic sheeting to prevent contamination. Used decontamination solutions will be containerized for appropriate disposal off-site in a municipal sanitary sewer.

3.4 Sample Containers and Preservation

The following sections detail sample containers and preservation methods for water and sediment samples collected as part of Nutrient and Toxics TMDL monitoring.

3.4.1 Nutrient TMDL Sample Containers and Preservation

The analytical laboratory will provide sample containers for all water samples collected by the field team. Samples collected for nitrate-nitrite will use one 500 milliliter (ml) polyethylene bottle. Samples collected for total phosphorus and total Kjeldahl nitrogen will each use one 500 ml polyethylene bottle, containing a small amount of concentrated H_2SO_4 (Sulfuric Acid), used as a sample preservative. Table 3 provides a summary of the sample container and preservative use used for each analytical method.

The sample containers must be stored properly to prevent accidental release of the acid during transport and handling. The field team will keep the sample bottles stored inside plastic bags that are kept within a bulk bottle cooler to ensure they are clean and do not become contaminated during transport. Sample bottles will only be handled by gloved hands, and the lids will be secured at all times except when filling the bottle.

At each sampling location the field team will place the required number of sample containers into a resealable plastic bag prior to collection of a water sample, then close and seal the bulk bottle container. Sample containers shall be filled but not overflow. If a container is overflowed during filling, the container will be sealed, marked, and placed aside as an unused sample. In that case an additional container will be filled and used as the primary sample.

It should be noted that unused samples contain preservative acids and must be disposed of properly. Unused samples will be transported to the analytical laboratory for proper disposal and will not be listed on the chain-of-custody.

Table 3: Analytical Methods, Bottle Types, Preservatives and Holding Times				
Analyte	**Method**	**Bottle/Volume**	**Preservative**	**Holding Time**
Total Phosphorous	EPA 365.3	500 ml Polyethylene	<$4^{O}C$, H_2SO_4	28 days
TKN	EPA 351.2	500 ml Polyethylene	<$4^{O}C$, H_2SO_4	28 days
Nitrate/Nitrite	EPA 300.0	500 ml Polyethylene	<$4^{O}C$	48 hours
Total Organic Carbon	EPA 415.3	40 ml VOA	<$4^{O}C$	28 days
Total Suspended Solids	EPA 160.2	500 ml Polyethylene	<$4^{O}C$	7 days
Organochlorine Pesticides[1]	EPA 8081A	1 liter amber	<$4^{O}C$	7 days
Total PCBs[2]	EPA 8082	1 liter amber	<$4^{O}C$	7 days

NOTES:

1. Organochlorine Pesticides to be analyzed include chlordane-alpha, chlordane gamma, 2,4'-DDD, 2,4'-DDE, 2.4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin.
2. PCBs in water and sediment are measured as sum of seven Aroclors identified in the CTR (1016, 1221, 1232, 1242, 1248, 1254, and 1260). Congeners will also be analyzed to provide a better estimate of PCB concentrations and loads for PCBs.

VOA – volatile organic analysis

3.4.2 Toxics TMDL Sample Containers and Preservation

The analytical laboratory will provide sample containers for all water and sediment samples collected by the field team. Water samples collected for TOC will use three 40 ml VOA vials. Water samples for TSS analysis will use one 500 ml polyethylene bottle. Water samples collected for sediment analysis of OCPs and PCBs will be collected in 1-liter glass amber bottles. Table 3 provides a summary of the sample container and preservative use used for each analytical method.

3.5 Sample Handling, Packaging, and Shipping

The handling and transportation of samples must be accomplished in a manner that protects the integrity of the samples and complies with the provisions of the MRP. As few people as possible will handle the samples.The field team will have custody of the samples during the monitoring event, and chain-of-custody (COC) forms will accompany all samples during shipment or delivery to the analytical laboratory.

The field team shall package samples carefully to avoid breakage or contamination, maintain samples at the proper temperature (4°C), and ship samples daily to the analytical laboratory under chain-of-custody protocol. The following sample packaging requirements shall be followed:

1) Sample bottle lids must not be mixed, all sample lids must stay with the original containers;
2) Sample bottles will be placed in a resealable plastic bag to minimize leakage in case a bottle breaks during shipment;
3) The samples will be cooled by placing ice in sealed plastic bags and placing the sealed ice-filled bags around, between, and above the sample containers;
4) Any remaining space in the sample shipping container shall be filled with clean, inert packing material such as bubble-wrap;
5) The chain-of-custody document must be sealed in a resealable plastic bag and placed in the shipping container. The resealable plastic bag will be taped to the inside lid of the sample cooler, and sealed with shipping tape;
6) Clear strapping tape will be wrapped around the cooler in at least two locations, sealing the container to prevent the contents from spilling; and
7) Custody seals will be affixed over the shipping tape in at least two locations (normally the front and right side of the cooler); in a manner that accessto the container can only be gained by breaking a seal. A layer of clear strapping tape will be placed over the seals to ensure that they are not broken accidentally during shipping. Custody seals shall be constructed with security slots designed to break if the seals are disturbed.

3.6 Sample Naming Convention

Each sample will be labeled with a unique name that contains the sample station, the date of collection, and a suffix indicating the order of sample collection. Each sample will have the name of the monitoring site written first, followed by the date in mmddyyyy format, and a number denoting the sample order (X). For example, the first sample collected at station Tor-S2 on November 24, 2012 would be labeled **Tor-S2-11242012-1**. Table 4 lists the sample naming protocol for each sampling station.

Table 4: Sample Naming Convention		
SamplingStation	**Station Location**	**Sample Name**
Tor-S1	40' north and 80' east of intersection of Plaza Del Amo and Western Ave.	Tor-S1-mmddyyyy-X
Tor-S2	50' west of intersection of 246th Place and Pennsylvania Ave.	Tor-S2-mmddyyyy-X
Tor-S3	Effluent of Walteria Lake, approx. 100' east of intersection of Madison St. and Skypark Drive.	Tor-S3-mmddyyyy-X
Tor-S4	210' north and 85' east of intersection of 236th St. and Western Ave.	Tor-S4-mmddyyyy-X
Tor-S5	25' west of intersection of Bani Avenue and 250th Street.	Tor-S5-mmddyyyy-X
Tor-S6	600' east of intersection of Estates Lane and Crenshaw Boulevard.	Tor-S6-mmddyyyy-X
Tor-S7	160' south and 280' east of intersection of Rolling Hills Road and Hawthorne Boulevard.	Tor-S7-mmddyyyy-X
Tor-S8	500' northwest of intersection Paseo de las Tortugas and Mesa Street.	Tor-S8-mmddyyyy-X
Tor-S9	830' east and 120' south of intersection of Paseo de las Tortugas and Vista Montana.	Tor-S9-mmddyyyy-X

3.7 Chain-of-Custody Procedures

The field team shall follow proper chain-of-custody protocol with collected samples at all times. Samples will be considered to be in custody if they are (1) in the custodian's possession or view, (2) retained in a secure place (under lock) with restricted access, or (3) placed in a container and secured with an official seal such that the sample could not be reached without breaking the seal.

The field team shall complete chain-of-custody recordsfor all collected samples on triplicate forms supplied by theanalytical laboratory. The chain-of-custody will be utilized by the field team for all samples throughout the collection, transport, and analytical process to ensure compliance with the SSWP. Each field team member handling the samples will sign the chain-of-custody.

3.8 Analytical Methods and Limits

Stormwater samples will be collected and analyzed for multiple constituents to support development of methods for reducing contaminant loading in City stormwater and to evaluate the effectiveness of BMPs as they are implemented. The following sections describe the constituents for which samples will be analyzed, the analytical methods, method detection limits and reporting limits for each constituent.

3.8.1 Nutrient TMDL Monitoring

Nutrient TMDL samples will be analyzed for ammonia-ammonium, nitrate-nitrite, total Kjeldahl nitrogen (TKN), total phosphorus, phosphate, and total suspended solids.Table 5 specifies the analytical methods, reporting units, target reporting limits, and method detection limits for use in Nutrient TMDL monitoring.

Table 5: Nutrient TMDL Monitoring Analytical Methods and Limits

Parameter	Method Number	Reporting Units	Target Reporting Limits	Method Detection Limits
Ammonia-Ammonium (NH_3^+)	SM 4500D	mg/l	0.6	0.12
Nitrate (NO_3)	EPA 300.0	mg/l	0.1	0.03
Nitrite (NO_2)	EPA 300.0	mg/l	0.1	0.03
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	mg/l	0.1	0.07
Total Phosphorus (TP)	EPA 365.3	mg/l	0.05	0.01
Phosphate(PO_4)	EPA 365.3	mg/l	0.16	0.13
Total Suspended Solids (TSS)	EPA 160.2	mg/l	1.0	0.5

NOTES:
mg/l = milligrams per liter

3.8.2 Toxics TMDL Monitoring

Toxics TMDL samples will be analyzed for TSS, organochlorine Pesticides, PCBs, and total organic carbon (TOC). Table 6 specifies the analytical methods, reporting units, target reporting limits, and method detection limits for use in Toxics TMDL monitoring.

Table 6: Toxics TMDL Monitoring Analytical Methods and Limits

Sample Medium	Parameter	Method Number	Method Detection Limit	Target Reporting Limit

Water	Total Suspended Solids	EPA 160.2	0.5 mg/L	1.0 mg/L
Sediment	Total Organic Carbon (TOC)	EPA 415.1	0.05% dry weight	0.05%-66% dry weight
	Organochlorine Pesticides[1]	EPA 8081	0.1-1 ng/dry g	0.5-5 ng/dry g
	Total PCBs[2]	EPA 8082	10 ng/dry g	20 ng/dry g

NOTES:
Mg/l = milligrams per liter
ng/dry g = nano grams dry weight per gram

1. Organochlorine Pesticides to be analyzed include chlordane-alpha, chlordane gamma, 2,4'-DDD, 2,4'-DDE, 2.4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin.
2. PCBs in water and sediment are measured as sum of seven Aroclors identified in the CTR (1016, 1221, 1232, 1242, 1248, 1254, and 1260). Congeners will also be analyzed to provide a better estimate of PCB concentrations and loads for PCBs.Method Detection Limit/Reporting Limit for individual congeners are 1 ng/dry g and 5 ng/dry g.

3.8.3 Field Measurements

Sample collection for Toxics TMDL monitoring will also be analyzed for the following field parameters: temperature, dissolved oxygen, turbidity, and conductivity. Table 7 specifies the field methods, range of expected values, reporting units, and target reporting limits for use in conducting field measurements.

Table 7: Field Measurements

Parameter	Range	Project RL
Velocity/Flow[1]	-0.5 to +20 ft^3/s	
pH	0 – 14 pH units	NA
Temperature	-5 – 50 ^{O}C	NA
Dissolved oxygen	0 – 50 mg/L	0.5 mg/L
Turbidity	0 – 3000 NTU	0.2 NTU
Conductivity	0 – 10000 µmhos/cm	2.5 µmhos/cm

NOTES:
RL - Reporting Limit
Ft^3/s = cubic feet per second
NA- Not applicable
^{O}C = degrees Celsius
NTU = nephelometric turbidity units
µmhos/cm = micro ohms per centimeter

1. For velocity/flow, range refers to velocities measured by a handheld flow meter. The lower limit for measuring flow is dependent upon the size of the specific pipe or channel.

3.9 No Sample Taken Procedures

If a sample is not able to be collected due to lack of flow or site accessibility issues, the field team shall fill out a *Water Sample Data Sheet* to explain why no sample was taken. Sampling will not be attempted in low-flow conditions to avoid sample bias or contamination. If a sample is not able to be collected,this information shall be reported immediately to the Project Manager who will direct the sampling team to the appropriate course of action as specified in the SSWP.

4.0 MONITORING SITES

Nine(9) water quality sampling stations (Tor-S1 through Tor-S9) will be visited by the monitoring crew on a monthly basis and during qualifying wet weather events (see Figure 1). One sampling station (Tor-S3) will also be visited by the crew whenLos Angeles County pumps stormwater out of Walteria Lake into the 54-inch storm drain. Six (6) of the monitoring sites are owned by the County of Los Angeles (Tor-S1through Tor-S6),stations Tor-S7, Tor-S8, and Tor-S9 are owned by the City of Torrance. Table 8 provides a summary of the monitoring sites, and Figures 2 through 10are detailed maps of the monitoring site locations.

Table 8: Monitoring Site Summary

Site Name	Site Ownership	Drainage System	System Description	Site Location	GPS Coordinates
Tor-S1	LA Co FCD	RDD 339	36" RCP	40' north and 80' east of intersection of Plaza Del Amo and Western Ave.	33° 49.3572' N, 118° 18.5208' E
Tor-S2	LA Co FCD	Project 2	33" RCP	50' west of intersection of 246th Place and Pennsylvania Ave.	33° 48.093' N, 118° 19.5252' E
Tor-S3	LA Co FCD	Project 245	54"	Effluent of Walteria Lake, approx. 100' east of intersection of Madison St. and Skypark Drive.	33° 48.6312' N, 118° 20.8674' E
Tor-S4	LA Co FCD	Project 8101	9'-2"W x 11' H RCB	210' north and 85' east of intersection of 236th St. and Western Ave.	33° 48.7056' N, 118° 18.5196' E
Tor-S5	LA Co FCD	Project 540	54”	39' east of intersection of Pennsylvania Avenue and 250th Street.	33° 47.8956' N, 118° 19.6872' E
Tor-S6	LA Co FCD	PD 1032	36" RCP	600' east of intersection of Estates Lane and Crenshaw Boulevard.	33° 47.1822' N, 118° 20.43' E
Tor-S7	City of Torrance	N/A	10' x 10' RCB	160' south and 280' east of intersection of Rolling Hills Road and Hawthorne Boulevard.	33° 47.6826' N, 118° 20.9232' E
Tor-S8	City of Torrance	N/A	24" RCP	500' northwest of intersection Paseo de las Tortugas and Mesa Street.	33° 48.0522' N, 118° 21.4254' E

Tor-S9	City of Torrance	N/A	42" RCP	830' east and 120' south of intersection of Paseo de las Tortugas and Vista Montana.	33° 48.2742' N, 118° 21.7776' E

The following sections provide a detailed description of each monitoring station.

4.1 Station Tor-S1 (RDD 339)

Sampling location Tor-S1 is within LACoFC Storm Drain RDD 399. The storm sewer conveying stormwater to this site is a 36-inch reinforced concrete pipe. It is accessed through a manhole located 40 feet north and 80 feet east of the intersection of Plaza Del Amo and Western Avenue (Thomas Guide page 763, grid J7).The total upstream drainage area served by the conveyance is approximately 63 acres. The drainage area is mainly residential and commercial land use that represents 36 percent and 33 percent, respectively, of the drainage area.This site is one of the four sites that will provide information on the amount of pollutants leaving the City limits.

The site is easily accessible and safe for conducting sampling during both dry and wet weather conditions provided traffic control procedures are followed as described in theWork Area Traffic Control Handbook (BNI Publications, Inc., 2010) or “WATCH Manual”. An Encroachment Permit from the City of Los Angeles is required to block part of the street to conduct sampling.

Figure 1 Sampling Station Tor-S1

4.2 Station Tor-S2 (Project 2)

Tor-S2 is within LACoFC Storm Drain Project 2.Stormwater is conveyed to this site through an 8’ x 7’ reinforced concrete box (RCB). It is accessed through a manhole located approximately

50 feet west of the intersection of 246th Place and Pennsylvania Avenue (page 793-grid G3). The total upstream drainage area is about 2,605 acres. The drainage area is a mixed land use, about 32 percent residential, 10 percent commercial and 11 percent industrial. The Torrance Airport accounts for 12 percent of the drainage area.This site is one of the four sites that will provide information to quantify the amount of pollutants leaving the City limits.Tor-S2 is easily accessible and safe for conducting sampling during both dry and wet weather conditionsprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Lomita is required to block part of the street to conduct sampling.

Figure 2 Sampling Station Tor-S2

4.3 Station Tor-S3 (Project 245)

Sampling station Tor-S3 iswithin LACoFC Storm Drain Project 245. Itis accessed through a manhole locatedin a parking lot approximately 150 feet east of the intersection of Madison Street and Skypark Drive (page 793, grid D2). The station is located upstream of station Tor-S2, and will assist the City in characterizing discharges from Walteria Lake. The total upstream drainage area is approximately 2,285 acres. Land use is mixed with 37 percent residential, 10 percent commercial and 9 percent industrial. A 54-inch pipe conveys stormwater to this site. The site is easily accessible and safe for all weather samplingprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the parking lot during sampling.

Figure 3 Sampling Station Tor-S3

4.4 Station Tor-S4 (Project 8101)

Sampling station Tor-S4 is within LACoFC Storm Drain Project 8101). It is accessed through a manhole located approximately 210 feet north and 85 feet east of the intersection of 236th Street and Western Avenue (page 793, grid J2). The total drainage area upstream of this sampling location is approximately 1,014 acres. Residential land use represents nearly 60 percent of the drainage area. Commercial and industrial land uses represent only 9 percent of the drainage area. The storm drain serving this site is a 9'-2" x 11' RCB. The site is safe for all weather sampling and it is easily accessibleprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Los Angeles is required to block part of the street to conduct sampling.

Figure 4 Sampling Station Tor-S4

4.5 Station Tor-S5 (Project 540)

Sampling station Tor-S5 iswithin LACoFC Storm Drain Project 540. Itis accessed through a manhole located about 39feet east of the intersection of Pennsylvania Avenue and 250th Street (page 793, grid G4). The site is downstream of two conveyance pipes that intersect from the south and west. This sampling site serves an upstream drainage area of approximately 661 acres. This site is mainly residential and airport land use,which represent 43 and 24 percent of the drainage area, respectively. The storm drain discharging stormwater to this site is a 54" conduit. This site is easily accessible and safe for sampling activitiesprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Lomita is required to block part of the street during sampling.

Figure 5 Sampling Station Tor-S5

4.6 Station Tor-S6 (PD 1032)

Sampling Station Tor-S6 is within LACoFC Storm Drain PD 1032. It is accessed through a manhole located approximately 600 feet east of the intersection of Estates Lane and Crenshaw Boulevard (page 793, grid E5). This site will monitor flow entering the City's storm drain from Rolling Hills Estate. The sampling site is safe and easily accessibleprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 6Sampling Station Tor-S6

4.7 Station Tor-S7

Sampling station Tor-S7 is accessed through a manhole located about 160 feet south and 280 feet east of the intersection of Rolling Hills Road and Hawthorne Blvd (page 793, grid D4). It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditionsprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 7Sampling Station Tor-S7

4.8 Station Tor-S8

Sampling station Tor-S8 is accessed through a manhole located about 500 feet northwest of the intersection of Paseo De Las Tortugas and Mesa Street(page 793, grid C4). It will monitor dry weather flow originating from Rolling Hills Estates. The site is easily accessible and safe for sampling at all weather conditionsprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 8Sampling Station Tor-S8

4.9 Station Tor-S9

Sampling station Tor-S9 is accessed through a manhole located about 830 feet east and 120 feet south of the intersection of Paseo de Las Tortugas and Vista Montana (page 793, grid B3). This site will monitor dry weather flow originating from Palos Verdes Estates. The site is accessible and safe for sampling activitiesprovided traffic control procedures are followed as described in the WATCH Manual. An Encroachment Permit from the City of Torrance is required to block part of the street during sampling.

Figure 9Sampling Station Tor-S9

5.0 MONITORING SCHEDULE AND FREQUENCY

The City has completed seven months of Nutrient monitoring under the Machado Lake Nutrient TMDL Special Study Workplan (Carollo, 2011a). Monitoring under that program will continue until March, 2013 when the study will be completed.At that time the monitoring program will be re-evaluated to assess compliance with the WLA criteria in the Nutrient TMDL shown in Table 1 and adjust the sampling methodology as appropriate. .

A summary of the schedule for Nutrient TMDL monitoringfor the remaining Special Study period is included in Table 9. The table also shows the proposed schedule for monitoring following completion of the Special Study, but after each year the City will review the monitoring results to assess potential changes to the monitoring program.

Table 9: Monitoring Schedule and Frequency

SamplingStation	Constituents	Phase I				Phase II					
		2012		2013		2014		2015		2016(1)	
		Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
Tor-S1	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S2	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S3	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--
Tor-S4	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S5	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	3	--	1	--	--	--	1	--
Tor-S6	Nutrient	3	12	3	9	1	4	1	4	--	--

Table 9: Monitoring Schedule and Frequency											
SamplingStation	**Constituents**	**Phase I**				**Phase II**					
		2012		**2013**		**2014**		**2015**		**2016(1)**	
		Wet	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**
	Toxics	3	--	1	--	1	--	--	--	1	--
Tor-S7	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--
Tor-S8	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--
Tor-S9	Nutrient	3	12	3	9	1	4	1	4	--	--
	Toxics	3	--	1	--	1	--	--	--	1	--

Notes:

(1) At the end of 2015 the City will review the monitoring results to determine whether additional monitoring is required in 2016.

-- No monitoring required

Toxics TMDL monitoring will be implemented in the fall of 2012 following approval by the LARWQCB of the MRP. Toxics monitoring will be performed in two phases. Phase 1 monitoring will be conducted for a two-year periodand phase 2 monitoring that commences once Phase I monitoring has been completed.

Phase I Toxics TMDL sampling will be conducted during three wet weather events, including the first significant storm of the season, for two years (see Table 9). Phase I sampling will begin within 60 days of approval of the MRP and QAPP by the RWQCB. Phase 2 toxics TMDL samples will be collected during one wet weather event every other year as shown in Table 9

The following sections summarize the schedule for Nutrient and Toxics TMDL monitoring.

5.1 Nutrient TMDLMonitoring

Nutrient TMDL monitoring consists of three major elements:

- Monthly sampling during dry weather conditions at all nine sampling locations;

- Wet weather sampling at station Tor-S3 during four discrete storm events; and
- Up to six pumping event samples from station Tor-S3 when theLos Angeles County Department of Public Works (LACDPW)discharges water from Walteria Lake.

The following sections describe the schedule for Nutrient TMDL monitoring for each type of sampling event.

5.1.1 Dry Weather Sampling

Dry weather sampling will be conducted monthly at the nine (9) primary monitoring stations. The sampling will occur on a Thursday during the first full week of the month to facilitate traffic control at station Tor-S2 (parking at the station Tor-S2 is restricted on Thursday mornings). Dry weather conditions must be preceded by at least 24 hours of no greater than trace precipitation, or have an intensity of less than 0.1 inches of rain in a 24-hour period.

5.1.2 Wet WeatherSampling

Three wet weather sampling events are scheduled for the fall and winter of 2012 to complete the Special Study #3. Following acceptance by the RWQCB of the City's BMP Evaluation and Selection Study Report, the MRP will be modified to accomplish sampling specific to the needs for assessment of future compliance with the Nutrient TMDL. At that time the wet weather sampling schedule and locations will be revised, and the number of samples collected and events scheduled is predicted to increase (see Table 8).

For the 2012 fall and winter season, only station Tor-S3 will be sampled during qualifying wet weather events.Qualifying events occur during a storm with at least 0.1 inch of precipitation (defined as a "measurable" event). Wet weather sampling will not occur at a frequency greater than once every 72 hours, and sampling will not occur unless there has been at least 72 hours of continuous dry weather immediately preceding the "measurable" event. Weather forecasts for the 90503 zip code will be evaluated before deciding whether or not to sample a particular storm event.

5.1.3 Pumping Event Sampling

Whenever LACDPW pumps stormwater from Walteria Lake into the 54-inch storm drain, the City will conduct sampling at station Tor-S3. The pumping schedule will be obtained from LACDPW, and a decision regarding which events to sample will be made by the City. A maximum of seven (7)pumping events will be sampled yearly.

5.2 Toxics TMDL Monitoring

The frequency for Toxics TMDL sampling will follow the requirements of the Machado Lake Pesticides and PCBs Total Maximum Daily Load Special Study Workplan (Carollo, 2011b), and requirements set forth in the R10-008 (RWQCB, 2010). Phase I sampling will begin within 60 days of approval of the MRP and QAPP by the RWQCB. Phase I Toxics TMDL sampling will be conducted during three wet weather events, including the first significant storm of the season, for two years (see Table 8). Phase 2 toxics TMDL samples will be collected during one wet weather event every other year as shown in Table 8.

6.0 QA/QC

This section describes the QA/QC measures that will be implemented for field and laboratory activities outlined in this plan.

6.1 Field Sampling QA/QC Procedures

QA/QC samples will be collected to ensure that the project QA objectives outlined in the Special Studies Workplan are met. QA/QC samples will include field duplicates (FD), matrix spike/matrix spike duplicates (MS/MSD), equipment blanks (EB), and temperature blanks (TB). Table 10 lists the QA/QC sample types, initial frequency of collection, and ongoing frequency of collection.

Table 10: QA/QC Sampling Summary

QA/QC Sample Type	Initial Sampling Frequency	Ongoing Sampling Frequency	Naming Convention
FD	1 per event, rotating location	1 per event, rotating location	Tor-S30-mmddyyy-A
MS/MSD	1 every other sampling event, rotating location	1 every other sampling event, rotating location	Primary sample ID plus suffix -MS or -MSD
EB	1 per decontamination method per event	1 per decontamination method per every 20 samples or at field staff change, decontamination method change, or sampling device change whichever is more frequent	Tor-S31-mmddyyy-A
TB	1 per cooler	1 per cooler	Temperature Blank

The following sections describe the purpose, collection method, sample naming conventions, and frequency of collection for QA/QC samples.

6.1.1 Field Duplicates

Collection of FD samples will be at the same time and place, and in sequential order from the primary sample. It shall be collected as soon as possible after the primary sample, and will be subjected to identical handling and analysis. The FD is a blind duplicate, and shall be identified with a fictitious sample ID (i.e. "Tor-S30-mmddyyy-A"), and assigned a time one hour prior to the first sample collection event of the day. A minimum of one (1) FD shall be collected each sampling day, and the location of the FD shall be rotated among the monitoring sites from one event to the next.

6.1.2 Matrix Spike/Matrix Spike Duplicates

Collection of MS/MSD samples is performed to allow the analytical laboratory to perform duplicate and spike analysis on the primary samples to evaluate accuracy, precision, and potential matrix interferences. MS/MSD samples consist of triple volume (3X) samplescollected at the same time and place, and in sequential order from the primary sample. The MS/MSD shall be collected as soon as possible after the primary sample, and will be subjected to identical handling and analysis.

One set of sample bottles will be labeled with the standard primary sample ID. A second set of sample bottles will be labeled with the primary sample ID, followed by the suffix -MS. The third set of sample bottles will be labeled with the primary sample ID, followed by the suffix -MSD. All three sets of samples will be listed on the chain-of-custody document. The CMP does not specify a frequency for MS/MSD sample collection, but one (1) every other sampling event is proposed for the frequency of collection.

6.1.3 Equipment Blanks

Non-dedicated sampling equipment will be tested with equipment blanks (EBs) to evaluate the potential for cross-contamination associated with decontamination procedures. Prior to collecting an EB, decontaminate the sampling equipment using the procedure in *Section 4.5 Decontamination Procedures*. The EB will be collected by pouring laboratory grade reagent water into the sampling device, and then transferring it to the sample bottles. The EB is a blind sample, and shall be identified with a fictitious sample ID (i.e. "Tor-S31-mmddyyy-A). The EB shall be collected at the frequency of one (1) per sampling event for the first two (2) events; at a reduced frequency of one (1) per fifty (50) samples (2 percent) thereafter or one (1) per every change in field personnel, decontamination methodology, or change in sampling device - whichever is more frequent.

6.1.4 Temperature Blanks

Sample bottles containing tap water for use as temperature blanks (TBs) shall be provided by the analytical laboratory with each batch of sample bottles. The TBs are used to check for proper temperature of sample preservation by the receiving laboratory. The sampling team will include one TB per sample cooler, and label the bottle "Temperature Blank". The TB will not be listed on the chain-of-custody.

6.2 Laboratory QA/QC Procedures

Samples will be submitted under chain-of-custody protocol to the analytical laboratory. The analytical laboratory will have its own internal QC program, and will follow the QC requirements for each analytical method. The laboratory shall maintain logs sufficient to track each sample submitted, and will analyze or preserve each sample within the specified holding times.

All analytical data generated by the laboratory will undergo a QC review prior to release of the reported data. Each step of this review process involves evaluation of data quality based on both the results of the QC data and the professional judgment of those performing the review. This application of technical knowledge and experience to the data evaluation is essential so that data of high quality are generated consistently.

6.2.1 Method Blank

A method blank will be analyzed with every batch of 20 or fewer samples to measure laboratory contamination. The method blank will consist of analyte-free (laboratory reagent-grade) water and will be carried through the entire preparation and analysis procedure. Acceptance criteria for method blanks must conform to reference method requirements when specified. Generally, corrective action, including data flagging, is required when method blank concentrations are greater than the reporting detection limit, and the samples must be reprocessed if sample target compound/analyte concentrations are not greater than 10 times the method blank concentrations.

6.2.2 Spikes

A laboratory control sample (LCS) will be analyzed with every batch containing 20 samples or less to measure accuracy. The LCS will consist of a method blank spiked with a known amount of analyte, and it will be carried through the entire preparation and analysis procedure. The standards source will be separate from that used to prepare calibration standards. All analytes will be used for spiking the LCS. The recoveries will be plotted on control charts, and control limits will be calculated based upon historical data. If control limits are exceeded, the analysis will be stopped and the problem corrected. Samples associated with the out-of-control LCS will be reanalyzed in another batch.

One MS will be analyzed for one out of every 20 samples to measure matrix effects on accuracy. MS samples will consist of additional alilquots of sample spiked with a known amount of analyte. All analytes will be spiked. If a valid spike recovery is outside acceptable limits, but the LCS in control, matrix interference may be indicated.

One MSD will be analyzed for one out of every 20 samples to measure precision. For any batch of samples that does not contain a FD or MSD, two LCS samples (LCS and LCS duplicate) will be separately prepared and analyzed. If the relative percent difference does not meet the required acceptance limits, the problem will be investigated and corrected. Any affected samples will be reanalyzed in a separate batch.

6.2.3 Laboratory Sample Custody

The analytical laboratory will maintain custody procedures that conform to those required by the Contract Laboratory Program (CLP), as outlined in the CLP User's Guide (USEPA, 1991 and USEPA, 2002). The procedures include designation of a sample custodian who will accept the samples and document sample condition; complete the chain-of-custody, any required sample tags, and the laboratory request sheets. The custodian will follow laboratory sample tracking and documentation procedures, and ensure secure sample storage in the appropriate environment to maintain preservation.

The laboratory will maintain records documenting all phases of sample handling, from receipt to final report of analysis. Accountable documents include sample receipt forms, laboratory operation logbooks, chain-of-custody records, bench work sheets, and other documents related to sample preparation and analysis. The laboratory shall utilize a document numbering and identification system for all documents/logs.

7.0 REFERENCES

BNI Publications, Inc., 2010. *Work Area Traffic Control Handbook "WATCH Manual"*.

The State of California, California Regional Water Quality Control Board, Los Angeles Region (RWQCB), 2008.*Resolution No. R08-006, Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate a Total Daily Maximum Load for Eutrophic, Algae, Ammonia, and Odors (Nutrients) for Machado Lake:*Dated May 1, 2008.

RWQCB, 2010.*Resolution No. R10-008, Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate a Total Daily Maximum Load for Pesticides and PCBs for Machado Lake:* Dated September 2, 2010.

Carollo Engineers, 2011a.*Machado Lake Nutrient Total Maximum Daily Load Special Study Workplan:* Dated May 18, 2011.

Carollo Engineers, 2011b.*Machado Lake Pesticides and PCBs Total Maximum Daily Load Special Study Workplan:* Dated August 31, 2011.

U.S. Environmental Protection Agency (USEPA), 1991.*User's Guide to the Contract Laboratory Program. Office of Emergency and Remedial Response. EPA/540/P-921/002. January, 1991.*

U.S. Environmental Protection Agency (USEPA), 2002.*USEPA Contract Laboratory Program National Functional Guidelines for Data Review-Inorganics. EPA-540-R-01-008. July, 2002.*

FIGURES

APPENDIX A

Site-Specific Health and Safety Plan

APPENDIX B

Field Forms