Palos Verdes Peninsula Coordinated Monitoring Plan

In Compliance with the Machado Lake Nutrient Total Maximum Daily Load

February 1, 2011

Prepared by the Cities of Rolling Hills Estates, Rolling Hills, Rancho Palos Verdes, and Palos Verdes Estates

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1. Introduction

The Palos Verdes Peninsula Coordinated Monitoring Plan (Plan) was developed in compliance with the Machado Lake Eutrophic, Algae, Ammonia, and Odors (Nutrient) Total Maximum Daily Load (TMDL)[1]. The Nutrient TMDL lists eleven responsible parties tributary to Machado Lake. Among the responsible parties listed are the cities of Rancho Palos Verdes, Palos Verdes Estates, Rolling Hills, and Rolling Hills Estates, which together constitute the Palos Verdes Peninsula (Peninsula Cities). The unique characteristics and isolated geographic setting of the Palos Verdes Peninsula (Peninsula) encouraged a collaborative approach from these Peninsula Cities. This document is the result of that collaboration. Not participating in this plan are the cities of Carson, Lomita, Los Angeles, Redondo Beach, and Torrance, Caltrans, and the unincorporated areas of the County of Los Angeles (County). These agencies have indicated that they will be submitting separate Monitoring and Reporting Plans.

The purpose of this document is to establish a plan to monitor and assess the water quality of discharges exiting the Peninsula. The Plan describes several representative monitoring sites for the Palos Verdes Peninsula drainage system which are situated at the furthest accessible downstream locations of this system before it exits the Peninsula. These sites will be monitored for TMDL compliance as described herein. Results from this monitoring will be beneficial in determining the scope of work needed for the implementation of Best Management Practices (BMPs) to be used in order to achieve compliance with the water quality objectives set forth in the Machado Lake Nutrient TMDL.

1.1. Background

Machado Lake is located in the City of Los Angeles' Ken Malloy Harbor Regional Park. The park is situated to the west of the Harbor (110) Freeway and east of Vermont Avenue. The park is bounded by the Tosco refinery to the south and Pacific Coast Highway to the north. Machado Lake is approximately 40 acres in size and averages approximately 3 feet in depth. It supports a diverse range of wildlife including several threatened and endangered species. The Machado Lake Subwatershed is located within the harbor portion of the larger Dominguez Channel Watershed. Machado Lake receives urban and stormwater runoff from a subwatershed area of approximately 20 square miles consisting of nine incorporated cities, Caltrans highways and roads, and areas of unincorporated County land. Water from Machado Lake overflows a dam located at its southern end before entering the ocean through the Harbor Outflow.

Machado Lake is listed on the 1998, 2002, and 2006 Clean Water Act 303(d) lists of impaired water bodies due to eutrophic conditions, algae and odors. 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. These occurrences affect the recreational, aesthetic, and ecological functioning of Machado Lake. The Water Quality Control Plan for the Los Angeles Region (Basin Plan) identifies seven existing (E) or potential (P) beneficial uses for Machado Lake.

[1] State Water Resources Control Board, Los Angeles Region Resolution No. R08-006, Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the Total Maximum Daily Load for Eutrophic, Algae, Ammonia, and Odors (Nutrient) in Machado Lake

Table 1.1. Potential and Existing Beneficial Uses of Machado Lake as Outlined in the Basin Plan							
Waterbody	MUN (Municipal Water Supply)	REC1 (Water Contact Recreation)	REC2 (Non-Contact Water Recreation)	WARM (Warm Freshwater Habitat)	WILD (Rare, Threatened, or Endangered Species)	RARE (Endangered Species)	WET (Wetland Habitat)
Machado Lake	P	E	E	E	E	E	E

The Clean Water Act section 303(d) requires the prioritization and development of TMDLs to address impairments and outline plans to restore the beneficial uses of listed water bodies. TMDLs require the reduction of pollutant loading by assigning waste load allocations, load allocations, and numeric targets to responsible parties which must be met at set interim and final compliance dates. The TMDL addressing the nutrient impairment of Machado Lake was adopted by the State Water Resources Control Board, Los Angeles Region (Regional Board) on May 1, 2008. It was subsequently approved by the United States Environmental Protection Agency and became effective on March 11, 2009. This TMDL sets forth stringent numerical limits for nitrogen and phosphorus, as well as numerical targets for ammonia, dissolved oxygen and chlorophyll a which will help assess the overall water quality in the lake.

1.2. Geographic Description of Palos Verdes Peninsula

The Peninsula is situated in the southwestern portion of the Machado Lake Subwatershed atop the Palos Verdes Hills which are bounded to the north by Torrance, to the east by City of Los Angeles, and to the south and west by the Pacific Ocean. The Peninsula consists of the four incorporated cities of Rancho Palos Verdes, Palos Verdes Estates, Rolling Hills, and Rolling Hills Estates along with areas of unincorporated County land. The Peninsula Cities are all very similar in topography and land usage. The major land use designation on the Peninsula is residential. There are also significant portions of open space and soft bottom canyons. There is one commercial district and several areas of institutional land. There are also notable areas where horse uses exist. Figure 1.1 depicts the major land uses that characterize the Peninsula. There is a large drainage divide which dissects the Peninsula from the northeast to the southwest with the westerly portion draining into the Santa Monica Bay. The portion of the Peninsula which drains to Machado Lake consists of approximately 5.63 square miles, which is about 25% of the Machado Lake Subwatershed drainage area. This drainage flows in an easterly or northeasterly direction, contributing flow to three of the four major drainage systems entering Machado Lake (i.e. Wilmington Drain, Project 77 and Project 510). Drainage from the Peninsula Cities is conveyed via the natural soft bottom canyon systems in conjunction with structured storm drain systems. These systems are intertwined and cross-connected warranting a Peninsula-wide coordinated approach to end-of-pipe monitoring.

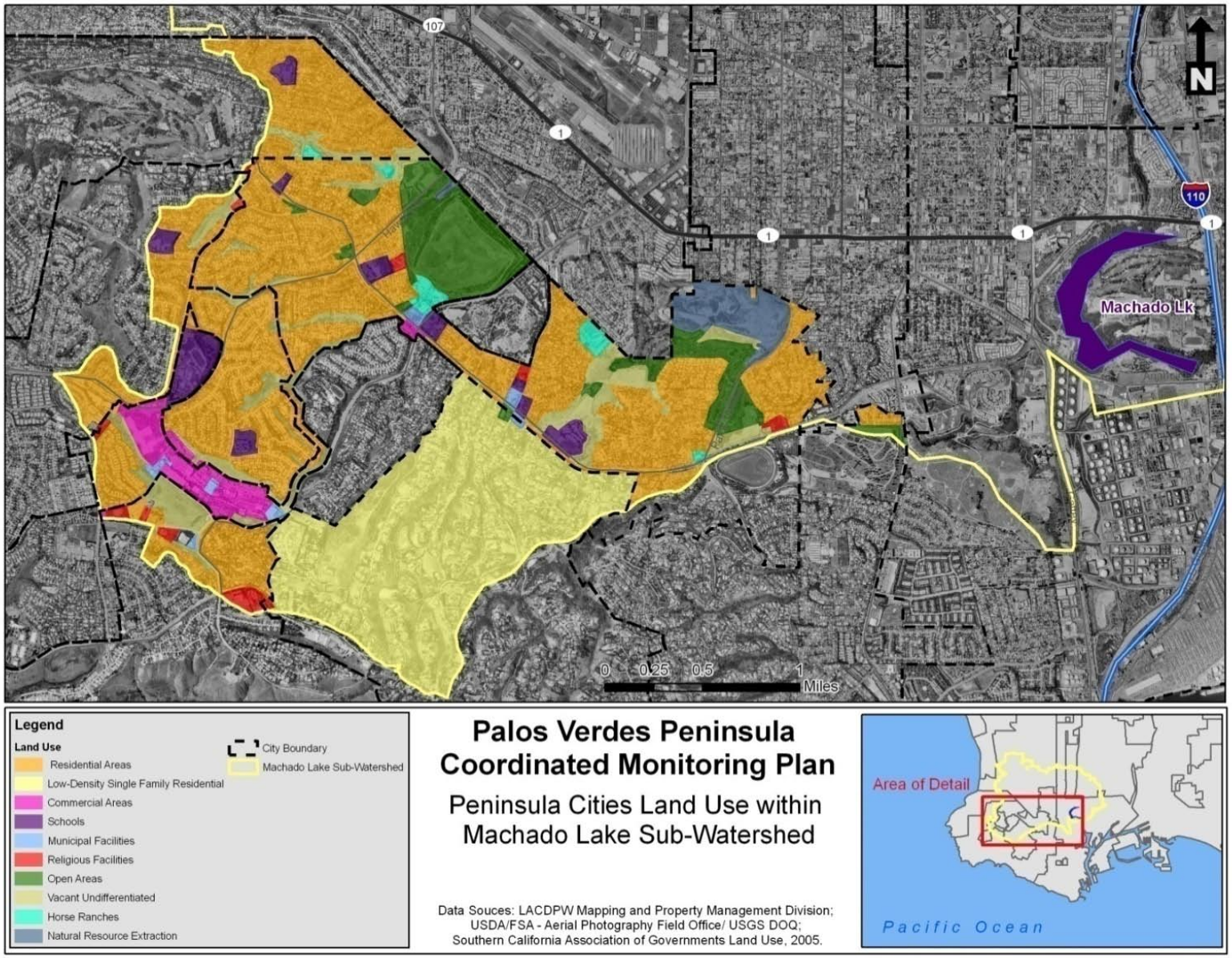


Figure1.1 Major Land Uses Characterizing the Palos Verdes Peninsula

1.3. Waste Load Allocation Compliance

The Nutrient TMDL for Machado Lake outlines three options for compliance. It assigns waste load allocations, or limitations on pollutant discharges contained in storm drain discharges, to responsible parties which drain to Machado Lake. Interim and final waste load allocations [Table 1.2] can be demonstrated through one of the following methodologies:

- Concentration-based waste load allocations with in-lake monitoring
- Concentration-based waste load allocations with monitoring at the end of the responsible party's drainage system (end-of-pipe)
- Mass-based waste load allocations with end-of-pipe monitoring

Table 1.2. Interim and Final Waste Load Allocations as Specified in the Machado Lake Nutrient TMDL

Compliance Date	Total Phosphorus	Total Nitrogen
March 11, 2009	1.25 mg/L	3.5 mg/L
March 11, 2014	1.25 mg/L	2.45 mg/L
September 11, 2018	0.1 mg/L	1 mg/L

The Peninsula Cities met and determined that the best option for compliance was Option 2, concentration based waste load allocations with end-of-pipe monitoring. However, the systems which convey drainage from the Peninsula Cities are intertwined and cross-connected. Drainage from one city generally flows through at least one of the other three cities before exiting the Peninsula. It would be difficult and redundant for each city to monitor its own drainage independent of the other Peninsula Cities. For this reason, it was appropriate for the Peninsula Cities to coordinate efforts in order to comply with the Nutrient TMDL. The Peninsula Cities decided to determine compliance with concentration-based waste load allocations by choosing monitoring sites at the termini of the shared Peninsula drainage system. This Plan satisfies the first deliverable requirement outlined in the compliance schedule for the selected approach [Table 1.3]. Monitoring in accordance with this Plan will continue until the Peninsula Cities have established compliance with final waste load allocations. Once compliance with final waste load allocations is established, the results of this monitoring plan and other available information may be used to revise the amount of monitoring required to demonstrate continued TMDL compliance under a revised monitoring plan or other Regional Board order.

Table 1.3. Compliance Schedule for Option 2: End-of-Pipe Concentration-Based Waste Load Allocations	
Compliance Date	TMDL Requirement
March 11, 2009	Meet 1st interim waste load allocations (shown in Table 2)
March 11, 2010	Submit Monitoring and Reporting Plan (MRP) to the Regional Board for approval
60 days from date of MRP approval	Begin monitoring as outlined in MRP
Annually from date of MRP approval	Submit annual monitoring reports
March 11, 2011	Submit Implementation Plan (IP) to Regional Board for approval
60 days from date of IP approval	Begin implementation as outlined in IP
March 11, 2014	Meet 2nd interim waste load allocations (shown in Table2)
September 11, 2016	TMDL re-opener period
September 11, 2018	Meet final waste load allocations and numeric targets (shown in Table 2)

2. Monitoring Program Design

Drainage on the Peninsula is conveyed via a network of natural soft-bottom canyons augmented by improved storm drain structures in the more developed areas. A drainage divide running northwest to southeast along the crest of the Peninsula separates the Machado Lake watershed from the Santa Monica Bay watershed. Within the Machado Lake watershed the canyons convey stormwater flow in an easterly or northeasterly direction. Stormwater runoff from the four incorporated cities on the Peninsula is closely intertwined and is therefore conducive to the implementation of a coordinated monitoring plan.

2.1. Criteria and Methodology for Monitoring Site Selection

The Peninsula Cities have selected monitoring sites that are representative of the drainage from each of the Cities' land uses on the Peninsula tributary to Machado Lake. These monitoring sites have been selected to ensure that:

- Each city has drainage tributary to at least one sampling location
- Each city has each of its major land use/zoning types represented in the tributary area to at least one location
- Taken together the sampling locations are representative of major Peninsula land uses and development intensity, e.g., commercial, residential with curb-and-gutter, residential with soft bottom canyons, equestrian use, schools/ball fields, open space, parks, etc.
- Monitoring could be conducted in a safe manner considering traffic and stormwater access conditions

In order to establish appropriate and representative monitoring locations, subdrainage areas were delineated based on desktop examination of County GIS-based drainage maps, topographic drainage maps and aerial photographs. Several potential monitoring locations near the foot of each of the major subdrainage areas on the Peninsula were identified based on this desktop analysis. Final monitoring sites were selected based on field reconnaissance to identify representative locations that could be safely accessed for monitoring.

The Machado Lake subdrainage areas and monitoring locations are discussed in the following subsections in order progressing from northwest to southeast across the Peninsula. Taken together, the subdrainage areas and monitoring locations proposed in this plan directly monitor 2,108 acres within the total 3,608 acres of the Peninsula Cities' tributary area to Machado Lake. These subdrainage areas and monitoring locations together will provide direct monitoring of all the significant land uses tributary to Machado Lake in the four incorporated cities on the Peninsula. Currently, of the 1,500 acres not directly monitored, 707 acres is tributary to a local infiltration basin, the Chandler Quarry pit, which does not discharge to Machado Lake unless an unusually large storm such as a 50-year storm occurs, effectively isolating that subdrainage area from Machado Lake. The remaining 800 acres of Machado Lake tributary area which are not directly monitored by one of the proposed monitoring sites will be indirectly monitored by a surrogate monitoring location with similar land use and development intensity. Figure 2.1 Water Quality Monitoring Sites and Associated Sub-Drainage Areas depicts the

subdrainage areas and monitoring sites. These same subdrainage areas are shown overlaid onto the land use map in Figure 2.2 for ease of reference in the subsequent discussions of each monitoring site. This figure shows which land uses are captured within each subdrainage area.

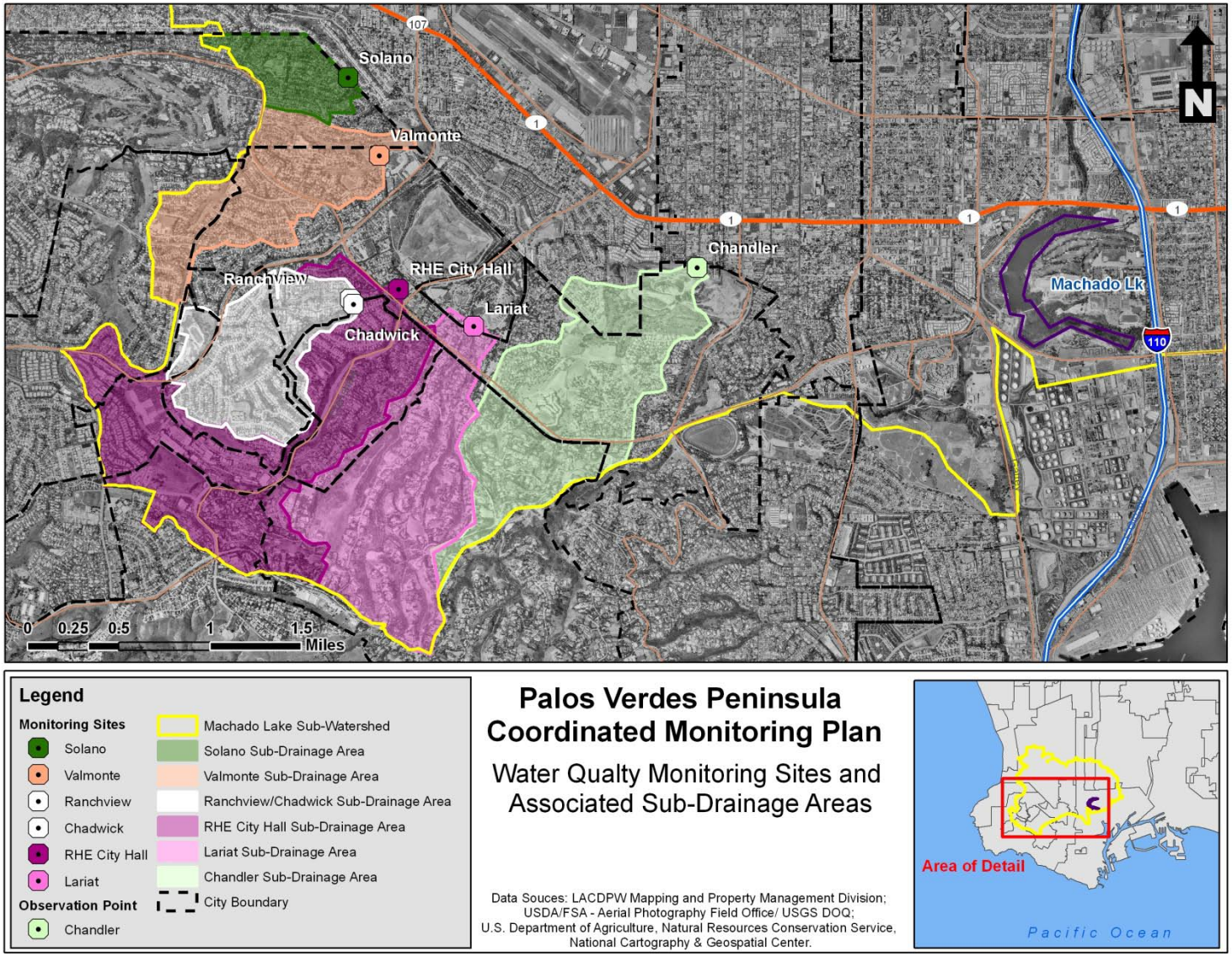


Figure 2.1 Water Quality Monitoring Sites and Associated Sub-Drainage Areas

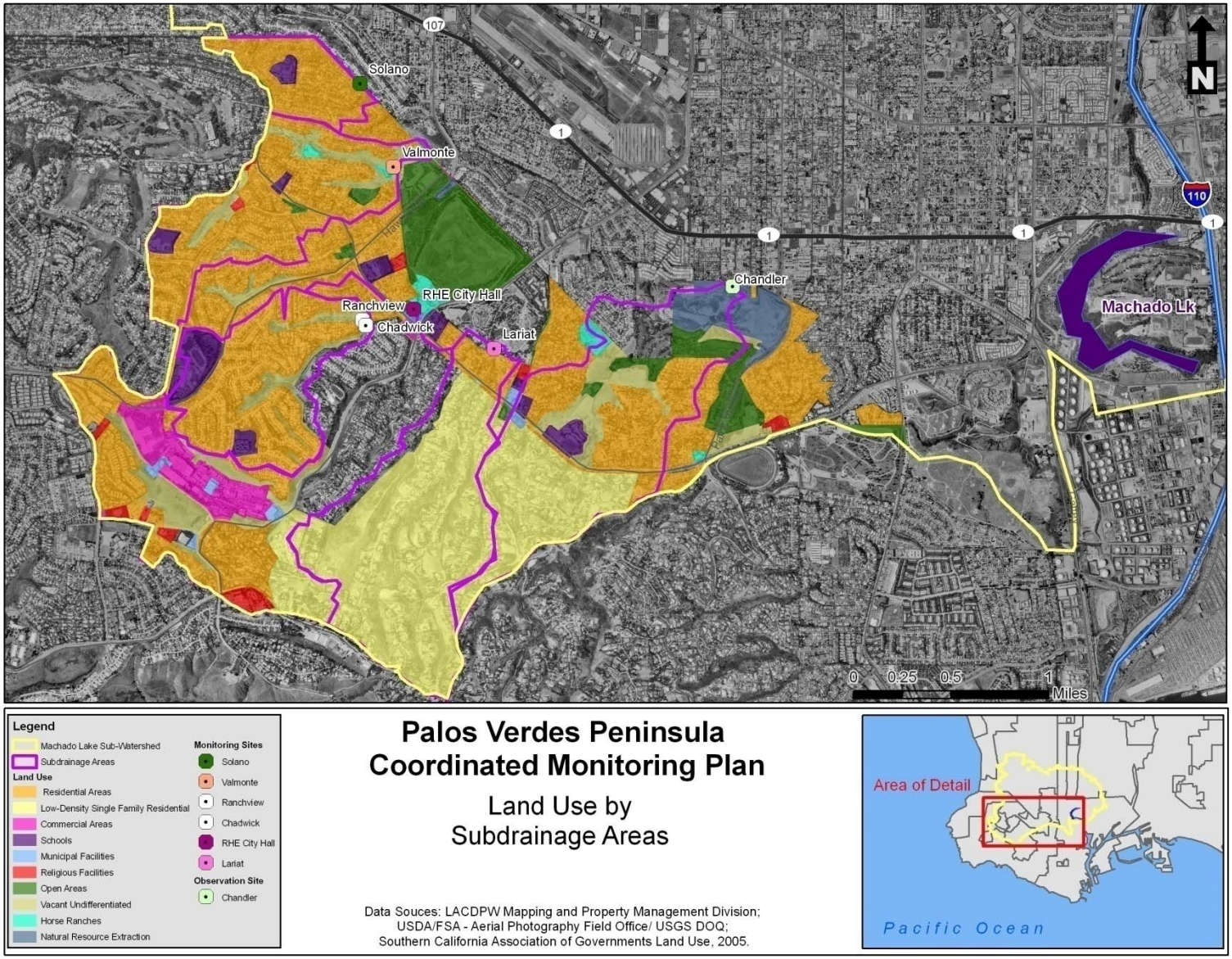


Figure 2.2 Palos Verdes Peninsula Land Use by Subdrainage Areas

2.1.1. Solano Subdrainage Area

A portion of the Peninsula drains to the Walteria Lake storm water detention basin located in Torrance via the City of Torrance Project No. 8102 storm drain. This subdrainage area is approximately 144 acres located entirely within Palos Verdes Estates and situated east of Palos Verdes Drive North, south and west of the City of Palos Verdes Estates' border with the City of Torrance, and north of Via Valmonte [Figure 2.3]. The primary land use in this subdrainage area is residential with curb-and-gutter. There is one elementary school located in the subdrainage area. The curb-and-gutter system (storm drain system) in the subdrainage area collects storm water runoff as well as dry-weather runoff and discharges flow through the subsurface Miscellaneous Transfer Drain (MTD) 1495-2 near Via Verderol into the City of Torrance. Monitoring will occur in this storm drain as the flow here is representative of runoff from the entire subdrainage area. Figure 2.3 shows the manhole atop of the MTD 1495-2 at the Solano monitoring site to where the flow discharges from the Peninsula into the City of Torrance.

Figure 2.3 Solano Monitoring Site

2.1.2. Valmonte/Ferncreek Subdrainage Area

Valmonte Canyon and Ferncreek have a combined drainage area of 415 acres and are both soft-bottom natural drainage courses which converge at the base of Ernie Howlett Park. At the convergence of these canyons [Figure 2.4] the stormwater flow is directed into a subsurface storm drain which runs under Ernie Howlett Park and connects to a Los Angeles County Flood Control District (LACFCD) storm drain MTD 227 below Hawthorne Boulevard at which point the drainage exits the City of Rolling Hills Estates and the Peninsula and enters the City of Torrance.

The Valmonte Canyon Subdrainage Area is the larger of the two and collects stormwater runoff from residential areas of Palos Verdes Estates, Rancho Palos Verdes and Rolling Hills Estates. Ferncreek collects runoff only from Rolling Hills Estates.

The Valmonte/Ferncreek subdrainage area is predominantly residential and includes some residential properties in the lower reaches of the drainage area in the equestrian overlay where horses are kept. A municipal stable also lies within this drainage area. This monitoring site receives runoff from three of the four Peninsula Cities (Rolling Hills Estates, Rancho Palos Verdes and Palos Verdes Estates).

Figure 2.4 Looking West From Ernie Howlett Park at Ferncreek Converging from Left and Valmonte Canyon from Right

The safest, most accessible downstream location for monitoring of this subdrainage area is at the convergence of the two drainage courses (Valmonte Canyon and Ferncreek [Figure 2.5]) where the flow enters a subsurface storm drain under Ernie Howlett Park. A baseline dry weather flow enters the subsurface storm drain under Ernie Howlett Park, either from groundwater seeping from below Ernie Howlett park (see weep holes visible in Figure 2.5) or from Ferncreek or both. A routine dry weather and wet weather monitoring site named “Valmonte” will be established at this location.

Valmonte Canyon does not appear to have discharge during dry weather so in the event that a source tracking monitoring investigation is needed for this subdrainage area, a dry weather monitoring site will be established at the storm drain pipe conveying runoff from Valmonte Canyon to the subsurface storm drain below Ernie Howlett Park to document the presence/absence of dry weather discharge from Valmonte Canyon. [Figure 2.6] This location will thus serve as a Tier 2 source tracking monitoring site in the event that samples collected from flow entering the subsurface storm drain under Ernie Howlett Park at the Valmonte monitoring site trigger a source tracking investigation.

Figure 2.5 Valmonte Monitoring Site; Pipe Conveying Drainage from Valmonte Canyon is in the Foreground and Flow From Ferncreek Enters From the Right

Figure 2.6 Valmonte Canyon Tier 2 Monitoring Site

2.1.3. Ranchview/Chadwick Canyon Subdrainage Areas

Ranchview Canyon and Chadwick Canyon are both soft-bottom natural drainage courses [Figure 2.7] with a combined drainage area of 385 acres. These two canyons converge and enter a subsurface storm drain which then crosses under Palos Verdes Drive North and connects with LACFCD subsurface storm drain RDD 275 behind Rolling Hills Estates City Hall.

The upper reach of Ranchview Canyon collects runoff from residential areas of Rancho Palos Verdes, from the playing fields and classroom buildings of Palos Verdes Peninsula High School, as well as a section of a major arterial roadway, Hawthorne Blvd. The lower reach of Ranchview Canyon collects runoff from residential areas in Rolling Hills Estates within the equestrian overlay, however only a few of those property owners currently keep horses [*based on Community Emergency Response Team (CERT) map].*

Chadwick Canyon collects runoff from residential areas of Rancho Palos Verdes, including an elementary school, as well as residential areas within County unincorporated areas. No equestrian areas lie within the Chadwick Canyon drainage area [*confirmed by CERT map*].

Neither Ranchview Canyon nor Chadwick Canyon subdrainage areas appear to have discharge to RDD 275 during dry weather [Figure 2.7]. These locations will serve as Tier 2 source tracking monitoring sites in the event that samples collected from the RHE City Hall monitoring site trigger a source tracking monitoring investigation. Flow observations made at the storm drain entry structures for each of these canyons will document the presence/absence of dry weather discharge from these two subdrainage areas.

Figure 2.7 Upper Ranchview Canyon

Figure 2.8 Ranchview Canyon Tier 2 Site

Figure 2.9 Chadwick Canyon Tier 2 Site Entering Subsurface Storm Drain

2.1.4. RDD 275 Subdrainage Area—RHE City Hall Monitoring Site

Unlike most of the drainage courses on the Peninsula, the RDD 275 subdrainage area, comprised of 860 acres excluding Ranchview and Chadwick Canyons, consists primarily of hardened conveyances; a combination of curb-and-gutter, subsurface storm drains, and a section of large open channel (trapezoidal ditch). This is the most diverse subdrainage area from a land use perspective as it includes the downtown commercial area of the Peninsula located mainly within Rolling Hills Estates, residential areas in Rancho Palos Verdes and Rolling Hills, a County unincorporated residential area with some equestrian properties and a private K-12 academy, as well as arterial roadways (Silver Spur Road and Crenshaw Blvd.) The City of Palos Verdes Estates is the only one of the Peninsula cities without land area in this subdrainage area. This subdrainage area is to be directly monitored and will also serve as a surrogate monitoring site for areas on the Peninsula not being directly monitored.

Baseline dry weather flow from this subdrainage area is evident where it daylights in a trapezoidal ditch along Crenshaw Boulevard [Figure 2.10]. The safest, most accessible downstream location for monthly monitoring of this subdrainage area is at the manhole behind Rolling Hills Estates City Hall [Figure 2.11] where RDD 275 joins drainage from Ranchview and Chadwick Canyons.

The trapezoidal ditch location adjacent to Crenshaw Blvd. will be utilized as a Tier 2 source tracking monitoring site along with Ranchview and Chadwick Canyons in the event that wet weather samples collected from the “RHE City Hall” monitoring site behind Rolling Hills Estates City Hall trigger a source tracking investigation.

Figure 2.10 Looking South/Upstream RDD 275 along Crenshaw Boulevard

Figure 2.11 RHE City Hall Monitoring Site at Manhole behind Rolling Hills Estates City Hall

2.1.5. Agua Magna/Sepulveda/Blackwater Canyon Subdrainage Area—Lariat Monitoring Site

Three canyon drainage ways within Rolling Hills (Agua Magna, Sepulveda, and Blackwater Canyons) cross under Palos Verdes Drive North, pass for a short distance through Rolling Hills Estates, cross under Lariat Lane and converge into a drainage structure just inside the boundary of the South Coast Botanic Garden which lies within County unincorporated land [Figure 2-12]. The predominant land use within this 650 acre, three canyon subdrainage area is low density residential development with some horse keeping.

Based on preliminary field reconnaissance, it appears that this subdrainage area may not have discharge to Machado Lake during dry weather. A monitoring site, "Lariat", will be established for this subdrainage area at the drainage structure just inside the South Coast Botanic Garden.

Figure 2.12 Lariat Monitoring Site at Drainage Structure Collecting Flow from Agua Magna/Sepulveda/Blackwater Canyons

2.1.6. Project 77 Storm Drain Subwatershed within Palos Verdes Peninsula

As currently developed, only a minor area within the Peninsula currently contributes discharge to Machado Lake via the Project 77 Storm Drain. This is because of a unique geologic/hydrologic condition associated with the former Chandler Quarry, now an inert landfill. The Chandler quarry pit collects flows from the majority of the areas west of Palos Verdes Drive East within the Project 77 Subwatershed, including the Rolling Hills Country Club golf course. The Chandler Quarry/Landfill is currently proposed for redevelopment and, according to the Chandler Ranch/Rolling Hills Country Club Project EIR hydrology study, the tributary area of the Chandler quarry pit is 707 acres and has the capacity to retain and infiltrate up to the 50-year storm without discharging to the Project 77 storm drain[2]. So as currently developed, the tributary area to the Chandler Quarry does not result in discharge to Machado Lake except under very rare, large storms. The City of Rolling Hills Estates intends to place conditions of approval on the Chandler Ranch/Rolling Hills Country Club Project to achieve compliance with the Machado Lake Nutrient TMDL targets. At the time of redevelopment, depending on the final hydrologic analysis of the project, consideration will be given to placing an additional monitoring site at the discharge point from the Chandler Ranch/Rolling Hills Country Club project to Project 77 Storm drain.

There is currently no safely accessible, representative monitoring location for the areas east of Project 77 storm drain not tributary to the Chandler quarry pit because those flows are conveyed via a

[2] The EIR can be found on the City of Rolling Hills Estates website at http://www.ci.rolling-hills-estates.ca.us/index.aspx?page=209&recordid=37

subsurface County storm drain in the right-of-way for Palos Verdes Drive East which manholes cannot be safely accessed for monitoring. Consequently, we are not proposing to monitor this subdrainage area. Those areas within Project 77 storm drain subwatershed on the Peninsula not tributary to the Chandler quarry pit will be assumed to be represented by the surrogate monitoring site, RHE City Hall.

2.2. Monitoring Schedule and Frequency

During the first twelve (12) months of the monitoring program, the four (4) monitoring sites (Solano, Valmonte, RHE City Hall, and Lariat) will be visited by a monitoring crew on a monthly basis during dry weather. Dry weather is defined as a day when there has been no rainfall of 1/10th inch or greater on that day or on the 72 hours preceding. If flow is observed, a Field Conditions Data Sheet will be completed, a sample collected and flow measurements recorded. If no flow or insufficient flow for sampling is present, a No Flow or Low Flow Conditions Data Sheet will be completed. Based on the results of the first year of monitoring, each monitoring site will be classified as either a routine *dry weather/wet weather sampling location*, or as a *wet weather-only sampling location*. Monitoring sites which had sufficient flow for sampling on three (3) or more out of the twelve (12) routine monthly site visits during the first year of the monitoring program will be classified as a *dry weather/wet weather monitoring site*.

Monitoring Sites	Subdrainage Description
Solano	PVP subdrainage to Walteria Lake
Valmonte	Valmonte and Ferncreek subdrainage
RHE City Hall	RDD 275, Ranchview and Chadwick Canyons, also surrogate for areas not directly monitored
Lariat	Agua Magna, Sepulveda and Blackwater Canyons

2.2.1. No/Low Flow Observation Sites

Following the first year of monitoring, sites which are identified as being wet weather-only sampling locations due to no or insufficient flow for sampling on eight or more out of twelve dry weather observations, will be visited on a quarterly basis and a No Flow or Low Flow Conditions Data Sheet will be completed to confirm that the status has not changed. After a year of quarterly confirmation, sites which have no or insufficient flow for sampling on at least three (3) of the four (4) quarterly confirmatory site visits will be removed from the routine dry weather monitoring program and no further monitoring visits will be made for these sites during dry weather. See No/Low Flow Site Classification Decision Process [Figure 2.13 No/Low Flow Site Classification Decision Process].

2.2.2. Dry Weather Sampling

Monitoring sites which have sufficient flow for sampling on three (3) or more out of the twelve (12) routine monthly site visits during the first year of the monitoring program will be classified as *dry weather/wet weather monitoring sites*. These sites will be monitored on a monthly basis for the duration of the monitoring program unless implementation measures result in decreased flows which would trigger reclassification of these sites as No/Low Flow Observation Sites in accordance with the No/Low Flow Site Classification Decision Process.

2.2.3. Wet Weather Sampling and Flow Measurement

In addition to routine dry weather sampling, at least two qualifying wet weather sampling and flow measurement events per year will be conducted at the four (4) monitoring sites (Solano, Valmonte, RHE

City Hall, and Lariat). Wet weather sampling events will be scheduled by monitoring weather forecasts for the 90274 and 90275 zip code areas on weather.com. Qualifying wet weather sampling events are those work days (non-holiday week days) with a forecast of an 80% chance of at least 0.25 inch of rainfall. Wet weather sampling events will begin as early in the day as possible to ensure that samples are transported to the laboratory within required holding times.

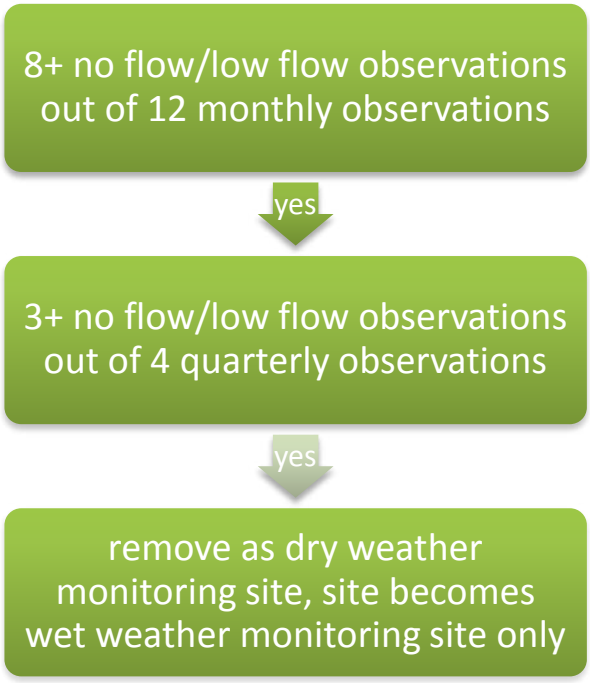


Figure 2.13 No/Low Flow Site Classification Decision Process

2.3. Interim Waste Load Allocation Source Tracking Monitoring Investigation

Based on the first year of baseline dry weather monitoring data collected from the Peninsula monitoring sites as outlined in Section 2.2 above, an evaluation will be made to assess compliance with the monthly average criteria in the Machado Lake Nutrient TMDL shown in Table 2.1. An Interim Waste Load Allocation Source Tracking Monitoring investigation will be conducted for any monitoring sites where monthly averages are exceeding the Year 0 waste load allocation. The Peninsula Cities will meet to establish a flow tracking and sampling scheme to identify branch(s) of drainage system contributing to interim waste load allocation exceedance. The source tracking will be conducted in an iterative, adaptive manner to identify potential sources contributing to the waste load allocation exceedance and will be informed by the results of low flow/no flow observation data.

After two years of combined wet weather and dry weather monitoring data are collected and reviewed, an updated evaluation will be made to assess compliance with the monthly average criteria in the Machado Lake Nutrient TMDL. An Interim Waste Load Allocation Source Tracking Monitoring investigation will be conducted for sites with monthly averages exceeding the Year 0 or Year 5 waste load allocation. The Peninsula Cities will meet to establish a source tracking sampling scheme to identify monitoring sites in the various branch(s) of the drainage system and to determine the particular land uses and defined areas of the drainage system that are contributing to interim waste load allocation exceedance. Findings of source tracking investigations will inform appropriate action under the Palos

Verdes Peninsula Implementation Plan for Machado Lake Nutrient TMDL (to be submitted by March 11, 2011).

Table 2.1. Interim and Final Waste Load Allocations for Storm Drain Discharges				
MS4 Permittees	Years After Effective Date (03/11/2009)	Date of Compliance	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)
Caltrans, General Construction and Industrial Stormwater Permits	0	03/11/2009	1.25	3.5
	5.0	03/11/2014	1.25	2.45
	9.5	09/11/2018	0.10	1.00

A source tracking monitoring scheme would include the monitoring of upstream locations (Tier 2 monitoring sites) tributary to a Tier 1 monitoring site which has exceeded interim waste load allocations. A preliminary list of several Tier 2 monitoring sites already identified for a few of the Tier 1 monitoring sites are provided in Table 2.2. Tier 3 sites will be established by the Peninsula Cities at the time a source tracking investigation is initiated or as needed in an iterative process. A description of the technical design and rationale for source tracking investigations planned for the coming year will be included as an attachment or appendix to the annual monitoring report. Results of any source tracking investigations performed during the reporting year will be included as an appendix to the annual monitoring report.

Table 2.2. Preliminary List of Tier 2 Monitoring Sites	
Tier 1 Monitoring Site	Tier 2 Monitoring Sites
Solano	
Valmonte	Valmonte Canyon storm drain pipe
	Ferncreek stream bed
RHE City Hall *also surrogate monitoring site*	Ranchview Canyon at inlet structure
	Chadwick Canyon at inlet structure
	RDD 275 trapezoidal open channel @ Crenshaw Blvd.
Lariat	Agua Magna Canyon @ PV Drive North
	Sepulveda Canyon @ PV Drive North
	Blackwater Canyon @ PV Drive North

3. Field Monitoring Methods and Procedures

This Chapter provides the methods and procedures to be used in the field when conducting water quality monitoring.

3.1. Water Quality Sampling Parameters

Compliance with the Nutrient TMDL will be shown through concentration-based monitoring. The water quality constituents to be analyzed and the analytical methods are shown in Table 3.1. A State Certified Laboratory will provide the analytical services for this Plan.

Table 3.1. Water Quality Constituents To Be Sampled	
Analyte	Method
Nitrate-Nitrite	EPA method 300.0; 353.2
Total Kjeldahl Nitrogen (TKN)	EPA 351.2
Total Phosphorus	SM 4500-P E; EPA 365.3

3.2. Sampling and Flow Measurement Methods

All samples will be collected using manual grab sampling methods as this is the most relevant technique for the conditions found on the Peninsula. Sampling Teams comprised of two (2) to three (3) members will be responsible for obtaining the water quality samples from each of the identified monitoring sites. Each Sampling Team will carry all necessary equipment to be able to sample in various environmental and physical conditions (i.e. high or low flow, natural or manmade conveyances, etc). A list of necessary equipment is presented in the following section. The Sampling Team will fill out a Field Conditions Data Sheet at each monitoring site for each day of sampling. An example Field Conditions Data Sheet is located in Appendix A.

A protocol for making instantaneous flow measurements will be established by the field team and approved in advance by the Peninsula Cities' representatives for each permanent monitoring location. Flow measurements will entail the use of a velocity meter plus measurement of the depth and width of cross-sectional flow area or the use of an area-velocity flow meter calibrated for the particular conveyance structure at each location. A minimum of three velocity readings will be made immediately following each sample collection.

3.3. Monitoring Site Procedures

The following are the specific procedures that will be followed by the Sampling Teams at each monitoring site regardless of whether it is an open manmade channel, an open natural area, or a subterranean storm drain and regardless of the flow type (high or low). The locations and descriptions of each identified monitoring site are provided in Chapter 2.

3.3.1. Sampling Preparations

Each Sampling Team should be certain that they have all of the necessary equipment to conduct the sampling as shown in Table 3.2.[3]

[3] Adapted from Minnesota Pollution Control Agency, Biological Monitoring Program. 2001. Water Chemistry Assessment Protocol for Depressional Wetland Monitoring Sites.

Table 3.2. Sampling Equipment Inventory		
Equipment	Purpose	Operation Check
Sample Bottles: Poly Ethylene/ High Density Poly Ethylene – 250 mL	Sample bottle	Sufficient quantity for sampling all sites Clean labels attached
Amber glass bottles – 250 mL	Sample bottle	Sufficient quantity for sampling all sites Clean labels attached
Sulfuric Acid (H_2SO_4)	Preservative	Sufficient volume for sampling all sites
Other Equipment	Purpose	Operation Check
Cooler with ice	Short term sample preservation	Properly working cooler and adequate amount of ice
Color wheel	Measure water color in field	Deionized water for reference Instruction manual
Cell phone	Communication	Phone charger/batteries present
Field Sampling Plan	Site location information	Correct maps for each site
Portable Flow Meter	Measurement of volumetric flow rate	Calibration per manufacturer's instructions
Camera	Document sampling	Associated charger, batteries, instruction manual, etc
Data sheets and clipboard	Record field observations	Correct data sheets for each site
Pencils/pens	Recording data	Sharp pencil point/working pen
Fine point permanent marker	Label sample bottles	Working marker
Chain of Custody Forms from Sate Certified Laboratory	Request analyses for samples	Adequate number for sampling all sites
Rain gear	Keep Sampling Team dry	Working rain gear
Safety vests/cones	Ensure Sampling Team safety	Enough for Sampling Team(s)

3.3.2. Arrival at Monitoring Site

Upon arrival at the monitoring site, the Sampling Teams will inspect the location for general safety. It is important to be aware of the surroundings when working in a street or other right-of-way and is imperative to place safety cones so that traffic is aware of the situation.

3.3.3. Field Conditions Sheet

Site conditions are general observations that will be recorded when the Sampling Team first arrives at the monitoring site. The following general observations should be recorded on the Site Conditions Field Sheet:

- Date and time of arrival;
- The weather conditions;
- The air temperature;
- The general flow conditions of the water;
- The appearance and odor of the water; and
- If there is trash or debris at the monitoring site.

3.4. Sampling in Open Channels or Creeks/Streams Procedures

The following are the procedures that will be employed for sampling open manmade channels or creek/stream sites. Water Quality samples will be collected prior to making flow measurements in order to minimize disturbance of deposited sediment prior to sampling to ensure that samples collected are as representative as possible of the discharged storm water.

A designated sampling apparatus must always be used to fill a sample bottle containing preservative. It is important that the sample bottles do not overflow. If a sample bottle overflows, it must be discarded and a new sample must be taken using a new sample bottle. Listed below are the steps to be taken during open channels or creeks/streams sampling:[4]

- An ice chest with sufficient ice to properly store any samples will be utilized;
- Only the sample bottles with the correct site number will be used at each monitoring site;
- The sampling apparatus for each site will be acclimated by rinsing it out with water from the waterbody three (3) times;
- Grab samples will be taken from the section of the manmade channel or creek/stream with the deepest flow (if it is safe to do so);
- The Sample Team will always walk upstream to ensure that they do not disturb the sediments which could taint the sample;
- Samples will be taken by facing the sampling apparatus upstream to reduce the possibility of contamination;
- The Sampling Team will avoid touching the inside of the sampling apparatus to further prevent contamination;
- The water in the sampling apparatus will be transferred to the sample bottle;

[4] Procedures adapted from: US EPA, Office of Water. 1992. *NPDES Storm Water Sampling Guidance Document*. EPA 833-92-001.

- The sample bottles labeled with the appropriate site number will be placed in the cooler standing straight up surrounded and supported by ice;
- The number of each sample from the sample bottle, the time the samples were collected, and the time the samples were put on ice will be recorded on the Chain of Custody Form;
- All Sampling Team members that had custody of any samples will sign the Chain of Custody Form;
- The courier used to transport the samples to the lab will be listed as receiving the samples for transport. However, they will not sign the Chain of Custody Form;
- The Chain of Custody Form will be placed into a large watertight resealable bag and placed inside the cooler with its corresponding samples;
- The cooler will be secured with packing tape and transported to the State Certified Laboratory within the designated method holding times; and
- Upon the laboratory receiving custody of the samples, the State Certified Laboratory's representative will sign the Chain of Custody Form.

3.5. Sampling in Subsurface Storm Drains Procedures

Subsurface storm drain sampling involving manholes can be more involved than open channel sampling and may be inherently more dangerous. These types of areas may be considered confined entry spaces requiring compliance with OSHA regulations. Therefore, any sites that require entry into a manhole will be handled by city crews with the proper equipment and experience. However, most of the sampling sites will not require entry into a manhole.

Water Quality samples will be collected prior to making flow measurements in order to minimize disturbance of deposited sediment prior to sampling to ensure that samples collected are as representative as possible of the discharged storm water. A designated sampling apparatus must always be used to fill a sample bottle containing preservative. It is important that the sample bottles do not overflow. If a sample bottle containing preservative overflows, it must be discarded and a new sample must be taken using a new sample bottle. Listed below are the steps to be taken during subsurface storm drain sampling:[5]

- An ice chest with sufficient ice to properly store any samples will be utilized;
- The required Occupational Safety and Health Administration safety checks and preparations for the removal of a manhole cover and entry into a manhole safely will be completed;
- The designated sampling apparatus labeled with the appropriate site number will be used;
- The sampling apparatus for each site will be acclimated by rinsing it out with water from flow in the drain three (3) times;
- The grab sample will be taken from the horizontal and vertical center of the storm drain (if it is safe to do so);
- The bottom sediments (if there are any) in the drain will not be disturbed so as to avoid contaminating the sample;
- The sampling apparatus will be held so the opening faces upstream (with the Sampling Team member also facing upstream);
- The inside of the sampling apparatus will not be touched in order to prevent contamination;

[5] id.

- The sample water from the sampling apparatus will be transferred into the proper sample bottles without overflowing them;
- The sample bottles labeled with the appropriate site number will be placed in the cooler standing straight up surrounded and supported by ice;
- All Sampling Team members that had custody of any samples will sign the Chain of Custody Form;
- The courier used to transport the samples to the lab will be listed as receiving the samples for transport. However, they will not sign the Chain of Custody Form;
- The Chain of Custody Form will be placed into a large watertight Ziploc bag and placed inside the cooler with its corresponding samples;
- The cooler will be secured with packing tape and transported to the State Certified Laboratory within the designated method holding times; and
- Upon the laboratory receiving custody of the samples, the State Certified Laboratory's representative will sign the Chain of Custody Form.

3.6. No Sample Taken Procedures

There may be circumstances that would cause a particular monitoring site to not be sampled. These circumstances may involve:

- Lack of flow or insufficient flow
- Site inaccessibility.

3.6.1. Low Flow Conditions

Sampling will be attempted even in extreme low flow conditions. If a sample cannot be taken due to insufficient or a lack of flow, a separate data sheet will be completed to explain why no sample was taken.

3.6.2. Site Inaccessibility Due to Storm Event

If a monitoring site becomes inaccessible due to a storm event in which it would be dangerous to approach the manmade channel, stream/creek, storm drain inlet or manhole; the Sampling Team will delay sampling for 24 hours to 48 hours after the storm event. However, if an alternative monitoring site is in close proximity and provides a sample which is representative of the original monitoring site, then sampling will occur on schedule at the alternative monitoring site.

3.6.3. Site Inaccessibility Due to Temporary Physical Obstruction or Condition

If a monitoring site is temporarily or permanently blocked by a physical obstruction, such as downed trees or evidence of a landslide or rockslide, the Sampling Team will attempt to move 25-50 feet (ft) upstream or downstream from the monitoring site and conduct sampling there. If there still is no suitable access, the Sampling Team will determine the possibility of sampling further away (up to 100 ft) from the original monitoring site.

3.6.4. Site Inaccessibility Due to Ownership Change

This condition is unexpected, but if the monitoring site comes under new ownership, such that previously granted access is now denied, permission will be requested from the new owner. If this is denied, a permanent new monitoring site will be selected in close proximity to the original monitoring site provided the proposed new monitoring site is as representative as the previous monitoring site.

3.7. Corrective Action for Field Measurements

The Sampling Team will have the primary responsibility for responding to equipment failures during sampling. Deviations from defined protocols will be documented in the comment section of the Field Conditions Data Sheet. If any equipment fails, Sampling Team personnel will report the problem in the comment section of the Field Conditions Data Sheet and will not record the data values for the water quality constituents in question. Actions will be taken to replace or repair broken equipment prior to the next field use. Data that are known to be collected with faulty equipment will be entered into the project database, but will not be used for determining compliance. It is the combined responsibility of all members of the Sampling Team to determine if the performance requirements of the specific sampling method have been met, and to collect an additional sample if required.

3.8. Sample Management

In order for the samples to be considered valid, each sample must be taken to the State Certified Laboratory for chemical analyses:

- In the proper container as provided by the State Certified Laboratory;
- With a sufficient volume of sample as prescribed by the State Certified Laboratory;
- Having a sufficient amount of preservative as pre-supplied in the appropriate sampling bottles by the State Certified Laboratory; and
- In less time that the method holding time for that type of sample (i.e. water quality constituent type).

3.8.1. Container Type, Container Volume, Sample Preservation, and Holding Time

Each Sampling Team will use a designated filling container that will be rinsed with deionized water (no soap) three times prior to use. The State Certified Laboratory will supply a sufficient number of sampling bottles to the Sampling Teams who will label the sampling bottles with the correct monitoring site information. After collection of the samples, the Sampling Team will write the following information on the label:

- Analyses to be performed on the sample: For this project, the State Certified Laboratory will be notified in advance that each label will state “PVP Nutrient TMDL”. The PVP Nutrient TMDL label will signify to the State Certified Laboratory what parameters to analyze for;
- Date and Time sample collected;
- Sample number: identifies sample location, date, and aliquot (see sample assignment numbers shown in Table 5); and
- Full names of individuals who collected the samples.

Total Phosphorous requires a 250 milliliter (mL) amber glass bottle or a 250 mL Poly Ethylene bottle for sampling under EPA method 635.3 and a 250 mL amber glass bottle for sampling undere SM 4500-P E. Total Kjeldahl Nitrogen (TKN) requires a 250 mL Poly Ethylene bottle for sampling under EPA method

351.2. Nitrate (NO_3) and Nitrite (NO_2) require a 250 mL Poly Ethylene bottle for sampling under EPA method 353.2 and require a 125 mL High Density Poly Ethylene (HDPE) bottle for sampling under EPA method 300.0.

TKN, Total Phosphorus, and Nitrate-Nitrite (under EPA method 353.2) require sulfuric acid (H_2SO_4) as a preservative. Nitrate-Nitrite, under EPA method 300.0, do not require H_2SO_4 as a preservative during sampling. Each sample bottle will be prepared with the correct amount of H_2SO_4. All samples must be kept under 4° Celsius (C) regardless of the constituent and the method.

The amount of time that a representative valid sample can be held from the time the sample is taken until the time the sample is analyzed is the method holding time. The allowed holding time assumes that the sample has been properly preserved and kept on ice (< 4° C) from sampling until custody of the sample is relinquished to the State Certified Laboratory. Table 3.3 lists the analytical method used, the bottle type and volume, the preservative, and the method holding time required for each water quality constituent.

Table 3.3. Water Quality Sampling Method, Bottle Types, Preservatives, and Holding Time.

Analyte	Method	Bottle/Volume	Preservative	Holding Time
Total Phosphorous	EPA 365.3	250 mL Poly Ethylene	<4° C, H_2SO_4	28 days
Total Phosphorous	SM 4500-P E	250 mL Amber glass	<4° C, H_2SO_4	28 days
TKN	EPA 351.2	250 mL Poly Ethylene	<4° C, H_2SO_4	28 days
NO_2 + NO_3-N	EPA 353.2	250 mL Poly Ethylene	<4° C, H_2SO_4	28 days
NO_2 + NO_3-N	EPA 300.0	125 mL HDPE	<4° C	48 hours

3.8.2. Sample Naming Methodology

Because several cities are coordinating together for this Plan, the identification and use of a specific water quality sample naming protocol is very important. Each sample will have the name of the specific monitoring site written first, the date in mmddyyyy format second, and a letter denoting the sample order (for multiple samples at one location on one day) last. Table 3.4 lists the sample naming protocol for each monitoring site.

Table 3.4. Sample Nomenclature

Monitoring Site Name	Location	Sample Numbering
Solano	Palos Verdes Estates	Solano – mmddyyyy – A, B, C, D, E, …
Valmonte	Rolling Hills Estates	Valmonte – mmddyyyy – A, B, C, D, E, …
RHE City Hall	Rolling Hills Estates	RHE City Hall – mmddyyyy – A, B, C, D, E, …
Ranchview	Rolling Hills Estates	Ranchview – mmddyyyy – A, B, C, D, E, …
Chadwick	Rolling Hills Estates	Chadwick – mmddyyyy – A, B, C, D, E, …
Lariat	Rolling Hills Estates	Lariat – mmddyyyy – A, B, C, D, E, …

3.8.3. Chain of Custody Procedures

The State Certified Laboratory will supply the Chain of Custody Forms that will be utilized by each of the Sampling Teams. An example of a Chain of Custody Form can be found in Appendix B. Chain of custody procedures will be used for all samples throughout the collection, transport, and analytical process to ensure the most accurate results. Samples will be considered to be in custody if they are (1) in the custodian's possession or view, (2) retained in a secured 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 principal documents used to identify samples and to document possession will be the Field Conditions Data Sheet and the Chain of Custody Form.

The chain of custody procedures will be initiated during sample collection. A Chain of Custody Form will be provided with each sample or group of samples. Each Sampling Team Member having custody of the samples will sign the Chain of Custody Form and ensure that the samples were not left unattended unless properly secured. Documentation of sample handling and custody will include the following:

- Sample identification;
- Type of sample;
- Sample collection date and time;
- Any special notations on sample characteristics or analysis;
- Analyses to be performed;
- The initials of the Sampling Team member that collected the sample;
- The date the sample was delivered to/sent to the State Certified Laboratory; and
- The shipping company and waybill information if shipped.

Once samples have been collected, each Sampling Team will deliver the samples for chemical analyses with the respective chain of Chain of Custody Form to the State Certified Laboratory or coordinate with a reliable courier for sample drop off to the State Certified Laboratory. The completed Chain of Custody Form will be placed into a plastic envelope and kept inside the sampling cooler. Upon delivery to the State Certified Laboratory, the Chain of Custody Form will be signed by the person receiving the samples and by the person delivering the samples. Chain of custody records will be included in the final reports prepared by the analytical laboratories and will be considered an integral part of the report.

3.9. Health and Safety Concerns

There is the potential for the Sampling Teams to be out in adverse conditions. Therefore, the safety of the Sampling Teams is of the upmost concern. The Sampling Team coordinator will prepare a health and safety plan and will train the Sampling Team on that plan. The following sections detail the methods that will be undertaken to ensure the safety of the Sampling Teams.

3.9.1. Traffic Hazards and Traffic Control

Due to the fact that water quality monitoring often occurs in severe weather, there is potential for the Sampling Teams to be driving in poor conditions. It is important that all traffic rules and regulations as well as all traffic control signs and devices be obeyed in order to ensure Sampling Team safety.

Vehicle traffic is also a major concern in water quality monitoring. Vehicle traffic can present a hazard to Sampling Teams when they are working close to roadways because there is a potential for a Sampling Team member to be hit by oncoming traffic. While working in areas with traffic, the Sampling Team will:

- Park as far off the road as feasible to avoid interfering with traffic flow;
- Utilize the vehicle's flashing yellow warning lights and hazard lights;
- Use safety cones to mark off the work area and wear a reflective safety vest;
- Place a yellow barricade around open manholes to clearly mark the area; and
- Wear bright rain gear during storms to be more visible.

3.9.2. Inclement Weather

Extreme heat, cold, humidity, and rain can adversely affect monitoring instrument response and reliability. Rain and wet conditions also increase slipping and tripping hazards, braking distances of vehicles, and the potential for slippage or handling difficulties of field equipment. Winter storms will bring in colder than normal temperatures to the area. Sampling Teams should be prepared to work long hours in wet and cold conditions and should wear extra layers of clothing under rain gear since there may be a variety of temperature changes.

4. Quality Assurance and Quality Control (QA/QC)

This section discusses the quality assurance and quality control measures that will be implemented for both field and laboratory activities to verify that data quality objectives are being met under this Plan.

4.1. Field Sampling QA/QC Procedures

The following quality assurance and quality control procedures will be implemented as part of the field sampling procedures that have been described in detail in Section 3.

4.1.1. Trip Blank

Sample blanks containing deionized water are provided by the State Certified Laboratory with each batch of sample bottles. The field Sampling Teams should ensure that trip blanks are kept on ice with the sample bottles as a check on proper temperature of preservation. Upon receipt of samples from the courier or field Sampling Team, the laboratory staff will check the temperature of the trip blank to confirm that samples have been properly held on ice at a temperature of 4^{o}C or lower. Trip blanks will be included at a frequency of one per cooler.

4.1.2. Equipment Blank

Although it is preferable to collect water samples directly into the sample bottle in order to minimize cross-contamination, this may not be feasible due to field conditions and/or to avoid flushing preservative from the sample bottles. When intermediate sampling apparatuses are necessary, they must be made of appropriate materials for the project target analytes, and must be decontaminated at the start of sampling and between monitoring sites if the device is to be re-used. Any intermediate apparatuses that are used for collecting samples and dispensing them into sample bottles such as hand-held sampling devices, bailers and/or tubing will be tested with equipment blanks to evaluate the potential for cross-contamination associated with decontamination procedures.

The sampling equipment should be thoroughly pre-cleaned and placed in a sealed bag or wrapped in protective covering prior to transport to the field. Pre-cleaning will utilize either manual or ultrasonic techniques aided by Liquinox® (or other acceptable non-phosphate detergent), followed by a tap water rinse, and a final rinse with deionized water. It is preferable to dedicate a pre-cleaned sampling apparatus for each monitoring site in order to avoid the need for field decontamination, however depending on the type of equipment, this may be cost-prohibitive in which case field decontamination between monitoring sites will be necessary. Field decontamination of intermediate sampling apparatuses between monitoring sites will utilize manual scrubbing and three rinses with deionized water (no detergent).

Effectiveness of pre-cleaning and/or field decontamination procedures will be evaluated by collecting an equipment blank for laboratory analysis. The equipment blank will be collected by pouring laboratory grade deionized water into the sampling device which has been decontaminated using the specified method and then transferring the water to a sample bottle. The equipment samples will be given a fictitious sample I.D., handled in the manner used for surface water/stormwater samples, and submitted to the laboratory as “blind” samples. An equipment blank will be collected at a minimum frequency of once per sampling event for the first three sampling events and then the frequency reduced to one for every 20 samples (5%) or for every change in field personnel, decontamination methodology, or change in intermediate sampling device, whichever is more frequent.

4.1.3. Duplicate Samples

Duplicate samples are two samples collected at the same time and place in sequential order. Analysis of duplicate samples evaluates field sampling precision and sample homogeneity. A duplicate sample is to be collected as soon as possible after the initial surface water sample has been collected and will be subjected to identical handling and analysis. Duplicate samples will be given a fictitious sample I.D. and will be submitted to the laboratory as "blind" samples. Duplicate samples will be collected a minimum of once per sampling day. The location of the duplicate sample collection will be rotated among monitoring sites from one event to the next.

Table 4.1. Field QA/QC Sample Collection Requirements

QA/QC Samples	Initial Frequency (1st three months)	Ongoing Frequency
Trip blanks	1 per cooler	1 per cooler
Field equipment method blanks	1 per decontamination method per event	1 per decontamination method per every 20 samples or at change in field crew, decontamination methodology, or sampling device whichever is more frequent
Field duplicate samples	1 per event, rotating location	1 per event, rotating location

4.1.4. Collection of Sample for Laboratory Spike and Duplicate Analyses

The State Certified Laboratory performs laboratory duplicate and spike analyses on environmental samples to evaluate accuracy, precision and potential matrix interference. Matrix spike and sample duplicate analyses should be performed by the laboratory by using project samples whenever possible. This requires that adequate sample volume is provided, consequently bottles will be filled leaving only a small head space. If an additional sample bottle is needed by the laboratory in order to perform Matrix Spike/Matrix Spike Duplicate analyses, field personnel will specify on the chain-of-custody form the sample to be used for the Matrix Spike/Matrix Spike Duplicate analyses.

4.1.5. Training Sessions and QA/QC Review

Sampling Team personnel will receive training so that they are familiar with the field sampling plan and are aware of analysis holding times. Quality control and training sessions will be held prior to the start of sampling to verify the proper working order of field equipment, refresh monitoring staff in monitoring techniques and familiarize them with the field sampling plan. At least twice per year the Sampling Teams will consult with the QA manager to determine whether the data quality objectives are being met, and decide if any changes in field sampling methods are necessary.

4.2. Laboratory QA/QC

A laboratory certified by the State of California in the analytical methods specified in this Plan will conduct the laboratory analysis of samples. Analytical methods to be used for laboratory analyses are listed in Table Table 4.2 Analytical Methods and Limits. The certified laboratory will maintain custody logs sufficient to track each sample submitted and to analyze or preserve each sample within specified holding times.

Table 4.2 Analytical Methods and Limits				
Parameter	Method	Units	Target Reporting Limit	Method Detection Limit
Total Phosphorus	SM 4500 P-E or EPA 365.3	mg/L	0.05	0.01
Nitrate/Nitrite	EPA 300.0 or EPA 353.2	mg/L	0.1	0.03
Total Kjeldahl Nitrogen (TKN)	EPA 351.2	mg/L	0.1	0.07

Method Detection Limit (MDL)—The MDL is the lowest concentration at which an analyte can be detected in a sample that does not cause matrix interferences (typically determined using spiked reagent water). In this context, "detected" means that a sample that contains the analyte detected at the MDL can be distinguished from a blank with 99% certainty. Detection limits are established by the laboratory during MDL studies using clean, undiluted matrix. If, during analysis, it is determined that a sample needs to be diluted prior to analysis, the detection limit will be modified based on the dilution and the detection limit adjusted by "best professional judgment".

Reporting Limit (RL)[6]—The RL is the lowest concentration at which an analyte can be detected in a sample and its concentration can be reported with a reasonable degree of accuracy and precision. A criterion of ± 20% accuracy and 20% relative standard deviation (RSD) for replicate determinations is often used to define "reasonable". The acceptable ranges depend somewhat on the analytical methodology used. For samples that do not pose a particular matrix problem, the RL is typically about three to five times higher than the MDL. Similar to the MDL, the RL is a laboratory-specific number, which may change with time. When a sample has to be diluted before analysis, either because of matrix problems or to get the instrument response within the linear dynamic range, the RL is raised by a factor corresponding to the dilution factor. This number may change with time.

4.2.1. Laboratory Performance Measurements

The certified laboratory routinely includes performance measurements in the analysis stream as part of its internal QA/QC and certification requirements to assess whether data quality criteria are met. These results are reported along with results of project sample analysis. These types of laboratory performance QA/QC checks are briefly described below.

1. Method Blanks (also called extraction blanks or preparation blanks): These account for contaminants present in the preservative and analytical solutions and equipment used during the preparation and quantification of the parameter.

2. Injection Internal Standards and/or Surrogates: These account for error introduced by the analytical instrument or extraction process.

3. Matrix Spike Samples: These are field samples to which a known amount of contaminant is added and used to measure potential analytical interferences present in the field sample.

[6] California Department of Public Health

4. Replicate Samples: These are replicates of extracted material that measure the instrumental precision.

    a. Laboratory Replicate Samples: These are replicates of the raw material that are extracted and analyzed to measure laboratory precision.

    b. Matrix Spike Replicate Samples: These are used to assess both laboratory precision and accuracy. They are particularly useful when the field samples analyzed do not contain many of the target compounds (measuring non-detects in replicate does allow the data reviewer to measure the precision or the accuracy of the data in an analytical batch).

5. Certified Reference Materials (CRMs): Analysis of CRMs is another way of determining accuracy of the analysis by comparing a certified value of material with similar concentrations as those expected in the samples to be analyzed.

4.2.2. Reporting of Results

Analytical results will be reported to the Quality Assurance Manager (QA Manager) within ten (10) business days (ten-day turnaround time). The certified laboratory will provide analytical data reports to the QA manager in electronic format along with summaries of QA/QC analyses and copies of the chain-of-custody forms. The certified laboratory quality assurance manager will review analytical data reports and ensure that data has been internally validated in accordance with the laboratory's published Standard Operating Procedures (SOPs) for each analytical method and that non-conformances are flagged and that the project QA Manager is promptly notified.

Flagging of data:

- Analytical results below the Method Detection Limit are to be reported as less than ("<") followed by the actual MDL value, and flagged with an "ND" or not detected.
- Results reported by a laboratory at levels between the Reporting Limit and the Method Detection Limit are flagged with a "j" to indicate that the analyte is present but not within the range that can be reliably quantified.
- Other QA qualification codes will be used if QC criteria are not met or qualification is deemed appropriate by the contract laboratory QA manager.

4.3. Quality Assurance Manager

A QA Manager, independent of the field sampling contractor and laboratory, will be designated to verify that quality assurance and quality control procedures are being carried out in accordance with the Plan. The QA Manager will review laboratory data reports and field data sheets as well as chain-of-custody forms for conformance with procedures and data quality objectives specified in this Plan. The QA Manager will also perform periodic observations of field sampling procedures to confirm that the field methodology specified in this Plan is being followed. At least twice per year the QA Manager will consult with the field Sampling Team to discuss whether data quality objectives are being met and whether any modifications to the Plan or field sampling procedures are necessary or advisable. The QA Manager will also consult with the Peninsula Cities at least twice per year following the assessment of conformance with data quality objectives to advise them of any necessary or advisable modifications to the monitoring plan or field sampling procedures. Plan revisions will be submitted to Regional Board staff for review and approval.

5. Data Analysis and Reporting

Monitoring in accordance with this Plan will continue until the Peninsula Cities have established compliance with final waste load allocations. Compliance will be based on three contiguous years of monitoring data wherein monthly average concentrations are at or below the final waste load allocations for Total Nitrogen and Total Phosphorous. Once compliance with final waste load allocations is established, the results of this monitoring plan and other available information may be used to revise the amount of monitoring required to demonstrate continued TMDL compliance under a revised monitoring plan or other Regional Board order. If final waste load allocations are established at one or more Tier 1 monitoring sites, but not at others, then reduced monitoring may be proposed at the compliant locations after three contiguous years of compliant monthly average data are achieved.

5.1. Annual Monitoring Reports

The data collected as described in this Plan shall be compiled and reported to the Regional Board annually beginning one year from the date of approval of the Plan. The report will include the results from the preceding year and will be submitted to the Regional Board within 45 days of the end of each reporting year. Compliance[7] will be based upon the monthly samples, or in the case of multiple samples being collected during one month, the monthly average.

Data transmitted shall include:

- A discussion of the Peninsula Cities' compliance with interim and final waste load allocations and targets set for nutrients in Machado Lake.
- A tabular database in Excel or Access format including: Sample Dates, Sample Locations, Laboratory Results, and Detection Limits.
- Copies of field observation/sampling comment logs in PDF or equivalent format.
- A discussion of any requested changes or modifications to this Plan along with supporting documentation.
- Results of source tracking investigations included in an appendix

A description of the technical design and rationale for source tracking investigations planned for the coming year will be included as an attachment or appendix to the annual monitoring report.

The Annual Report shall be signed by the Executive Officer or authorized designee of the Peninsula City acting as current Chair in accordance with an MOA to be established among the Peninsula Cities, and transmitted electronically to the Regional Board. The certification shall read:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility, of a fine and imprisonment for knowing violations.

Executed on the _____ day of _____, 20_____

[7] Basin Plan Amendment, page 11, Implementation Plan Element

Printed Name: _____ Title: _____

City of _____

5.2. Receiving Waters Limitation Compliance Reports

In the event that any of the monitoring sites described herein are deemed out-of-compliance with interim or final waste load allocations, the annual monitoring reports prepared as part of this Plan may be used by the Peninsula Cities tributary to those monitoring sites to prepare individual Receiving Waters Limitation Compliance Reports (if required by the Regional Board).

Appendix A

Palos Verdes Peninsula
Machado Lake Nutrient TMDL Coordinated Monitoring Plan

Field Data Sheet-Page 1

Date: _____

Site Name: _____

Station ID No.: _____-____ ____20__-___ (Example: Site Name-MMDDYEAR-A)

Time arrived on site: _____ (24-hr clock)

TIME OF SAMPLE COLLECTION

Time (24-hr clock): _____ Date: ___/___/___ Number of containers: ___

FLOW MEASUREMENTS

Depth of water: _____ (in, ft) Width of flow: _____ (in, ft)

Flow rate: _____ (gal/min or linear vel.) Time (24-hr clock):_____

Depth of water: _____ (in, ft) Width of flow: _____ (in, ft)

Flow rate: _____ (gal/min or linear vel.) Time (24-hr clock): _____

Depth of water: _____ (in, ft) Width of flow: _____ (in, ft)

Flow rate: _____ (gal/min or linear vel.) Time (24-hr clock): _____

Field Data Sheet-Page 2

OBSERVATIONS: _____

_____

Water Conditions: (Circle the Appropriate Identifier)
Odor: None, Musty, Sewage, Rotten egg, Sour milk, Fishy, Other: _____

Color: None, Yellow, Brown, Grey, Green, Red, Other: _____

Clarity: Clear, Cloudy, Opaque, Suspended Solids, Other: _____

Floatables: None, Oil sheen, Foam, Animal waste, Green Waste (Leaves), Food, Paper, Plastic, Grease, Hydrophytes, Trash, Other: _____

Settleables: None, Salt, Clay, Oil, Rust, Microbes, Other: _____

Weeds: None, Normal, Excessive, Note: _____

Biology:None, Algae bloom, Larvae, Crawfish, Frogs, Fish, Waterfowl, Hydrophytes, Blue-green algae,

Other _____

Sky: Stormy, Overcast, Partial clouds, Haze, Fog, Clear

Wind: Calm, Light breeze, Strong breeze, Windy, Gusty

Flow Characterization: Storm/Flood, Rapid, Tranquil, Laminar, Standing, Dry

Low Flow/ No Flow Conditions

Station ID No.: _____-____ ____20__-___ (Example: Site Name-MMDDYEAR-A)

Time (24-hr clock): _____

Was there Flow? (Circle answer) YES NO

If there was flow but no sample was taken, why was no sample taken? Explain:

_____

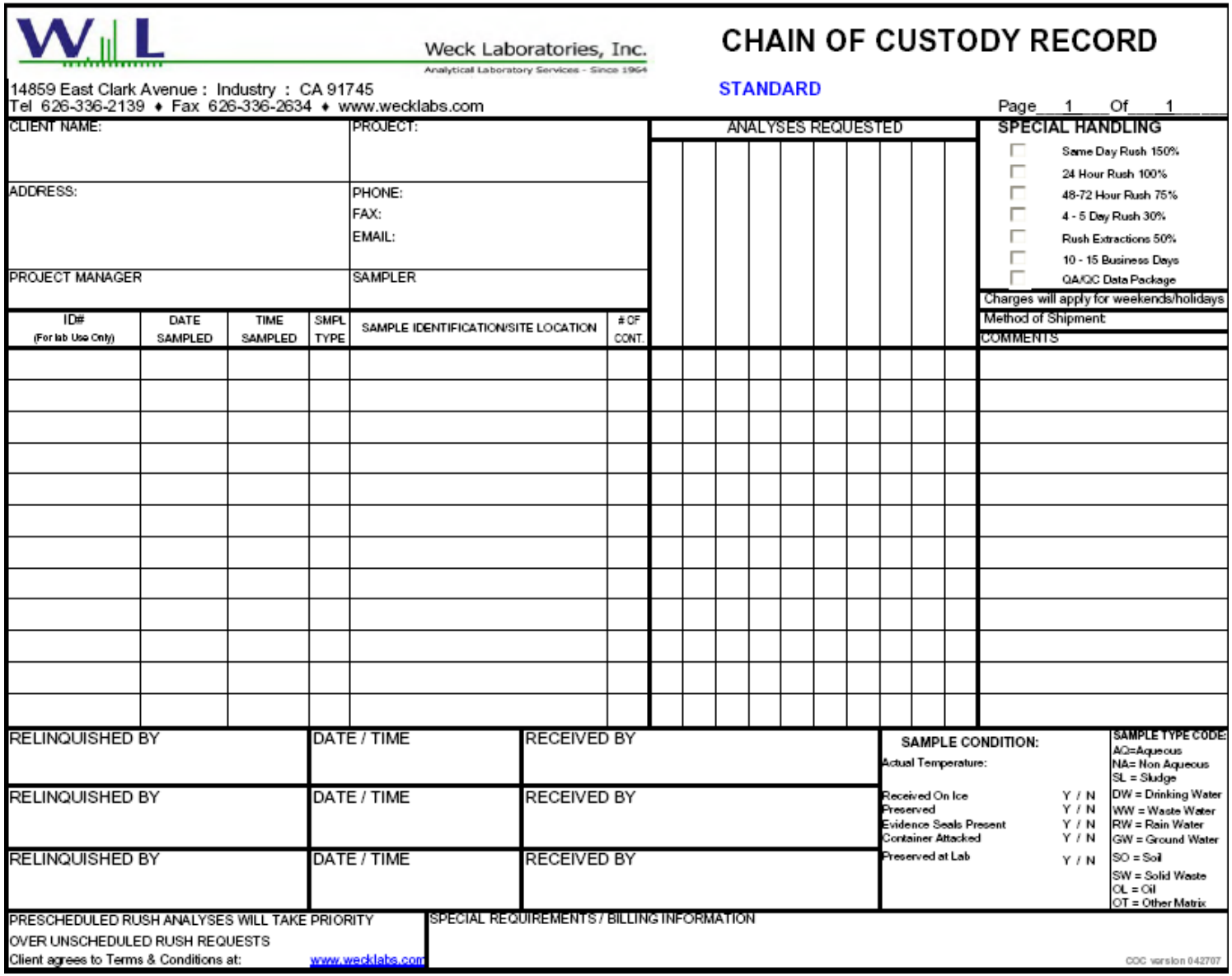
_____

_____

Time left site: _____ (24-hr clock)

Appendix B

Example Chain of Custody Form



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CHAIN OF CUSTODY RECORD

STANDARD

Page 1 Of 1

CLIENT NAME: | PROJECT:

ADDRESS: | PHONE: FAX: EMAIL:

PROJECT MANAGER | SAMPLER

ANALYSES REQUESTED

SPECIAL HANDLING
- Same Day Rush 150%
- 24 Hour Rush 100%
- 48-72 Hour Rush 75%
- 4 - 5 Day Rush 30%
- Rush Extractions 50%
- 10 - 15 Business Days
- QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

COMMENTS

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:
Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY
OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

COC version 042707

Appendix C

Monitoring Site Summary

Site ID: Solano	**Land Uses:** residential, elementary school,
Type: Tier 1 dry and wet weather	**Tributary Area:** 144 acres
Tributary Agencies: Palos Verdes Estates	
Site ID: Valmonte	**Land Uses:** residential, residential with horse keeping, schools, municipal stable, religious, parks, open space
Type: Tier 1 dry and wet weather	**Tributary Area:** 415 acres (Valmonte Canyon and Ferncreek)
Tributary Agencies: Rolling Hills Estates Rancho Palos Verdes Palos Verdes Estates	

Site ID: RHE City Hall	**Land Uses:** Commercial, residential, low-density single family residential, K-12 schools, municipal facilities, religious facilities, arterial roadways
Type: Tier 1 dry and wet weather	**Tributary Area:** 1245 acres (860 acres from RDD 275 and 385 acres from Ranchview and Chadwick Canyons). *Note: this includes 334 acres of County unincorporated which is not counted in PVP incorporated cities area.*
Tributary Agencies: Rolling Hills Estates Rancho Palos Verdes Rolling Hills County unincorporated	
Site ID: Lariat	**Land Uses:** low density residential, residential, some residential horse keeping
Type: Tier 1 dry weather observation and wet weather sampling	**Tributary Area:** 602 acres (Agua Magna, Sepulveda and Blackwater Canyons)
Tributary Agencies: Rolling Hills Rolling Hills Estates	

Site ID: Valmont Cyn	**Land Uses:** residential, residential with horse keeping, schools, municipal stable, religious, parks, open space
Type: Tier 2 subdrainage of Valmonte	**Tributary Area:** TBD
Tributary Agencies: Palos Verdes Estates Rolling Hills Estates	
Site ID: Ferncreek	**Land Uses:** residential, residential with horse keeping, open space
Type: Tier 2 subdrainage of Valmonte	**Tributary Area:** TBD
Tributary Agencies: Rolling Hills Estates	

Site ID: Ranchview	**Land Uses: :** Residential, K-12 schools, arterial roadways
Type: Tier 2 subdrainage of RHE City Hall	**Tributary Area:** TBD
Tributary Agencies: Rancho Palos Verdes Rolling Hills Estates	
Site ID: Chadwick	**Land Uses: :** Residential, K-12 schools, arterial roadways
Type: Tier 2 subdrainage of RHE City Hall	**Tributary Area:** TBD
Tributary Agencies: Rancho Palos Verdes County unincorporated	

Site ID: RDD 275Trap	**Land Uses: :** Commercial, residential, low-density single family residential, municipal facilities, religious facilities, arterial roadways
Type: Tier 2 subdrainage of RHE City Hall	**Tributary Area:** TBD
Tributary Agencies: Rolling Hills Estates Rancho Palos Verdes Rolling Hills County unincorporated	
Site ID: Blackwater	**Land Uses: :** Low-density single family residential
Type: Tier 2 subdrainage of Lariat	**Tributary Area:** TBD
Tributary Agencies: Rolling Hills