APPENDIX M

Mariposa Lakes Water Quality Modeling

PACIFIC ADVANCED CIVIL ENGINEERING, INC.

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August 8, 2006

City of Stockton
c/o Mr. David Wade
Wade & Associates
7777 Campus Common Drive, Suite 200
Sacramento, Ca 95825
(703) 236-7488

Re: Comments for Mariposa Lakes On-Site Water Quality Modeling Report, prepared by PACE April 7, 2006 #8013E

Dear Mr. Wade,

Pacific Advanced Civil Engineering, Inc. (PACE) is pleased to provide the following responses to the City of Stockton Community Development Department review comments for the above-referenced project. The responses from PACE are as follows:

a. *Comment: Chapter 2.1 Pollutants of Concern/water Quality and Pollutants of Concern: Second paragraph – How is the algae bloom controlled in the lakes in case of high concentrations of TP, TN, and BOD. Are these factors taken into account in the water quality monitoring?*

   PACE Response: Algal blooms will occur occasionally in any urban lake. The water quality systems proposed for Mariposa Lakes is designed to continually treat the water in the lakes with the goal of reducing the frequency and severity of algal blooms. However, blooms will occur. These are dealt with by the lake management company. Treatments include physical removal of excess algae, treatment with algalcides by licensed applicators, and simply letting the bloom subside, depending on the severity of the bloom.

b. *Comment: Chapter 4.2 Water Quality Modeling/Model Input: Second paragraph – the units of Q in the rational method are cfs, as opposed to inches.*

   PACE Response: Calculations for runoff are based on the TR-55 SCS runoff curve number method and the text has been updated to reflect this comment.

c. *Comment: Correct reference to Little Johns Creek, as opposed to Littlejohns Creek.*

PACE Response: The text has been updated to reflect this comment.

d. *Comment: The proposed use of a network of man-made lakes and wet ponds as stormwater treatment controls are consistent, in concept, with the requirements of the City's and County's Stormwater Quality Control criteria Plan (SWQCP).*

PACE Response: The text has been updated to reflect this comment.

e. *Comment: The submitted report, while providing useful information about the performance of the system, does not constitute a Project Stormwater Quality Plan as required under the SWQCCP. To comply with the requirements of the SWQCCP the project proponent must submit a Project Stormwater Quality Control Plan that conforms to the content and format specified in Appendix D-1 of the SWQCCP. In particular, the Project Stormwater Quality Control Plan should document compliance with design criteria for Wet Pond treatment controls (T-4) specified in the SWQCCP, including:*
   - *Stormwater Quality Design Volume (SQDV) for wet ponds for each pond and its tributary area. The SQDV is determined using Figure 5-1 based on the percent imperviousness of the tributary area and a 12-hour drawdown period for wet ponds.*
   - *Outlet control works designed to release the SQDV over a 12-hours drawdown period.*

PACE Response: This report is intended to document the water quality performance of the lakes for purposes of evaluating the environmental impacts of the project. The Project Stormwater Quality Control Plan is a more detailed report that will be produced at a later date.

If you have any questions regarding the above responses, please do not hesitate to contact us at (714) 481-7300.

Sincerely,
PACIFIC ADVANCED CIVIL ENGINEERING, INC.

Ron Rovansek, P.E.
Project Manager

BMP/as

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cc: Lynn Sutton, CGKL Kamilos Development, Inc.
Charlie Simpson, InSite Environmental, Inc.

Water Quality Report

Mariposa Lakes
Stockton, California

August 8, 2006

Prepared For:

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Prepared By:

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1 Introduction

1.1 Executive Summary

Mariposa Lakes is a 3800-acre project located near the City of Stockton in San Joaquin County, California, just east of Highway 99 (Exhibit 1). The project site is bounded by Mariposa Road on the west and south, US Route 4 on the north, and Kaiser Road on the east. Three creeks run east to west through the project site: Duck Creek, Branch Creek, and North Little Johns Creek. These creeks will receive any stormwater runoff from the site after the runoff is treated within wet detention basins and lakes that serve as the permanent treatment Best Management Practices (BMPs) for the site.

Mariposa Lakes will be designed to provide stormwater runoff treatment as good as or better than the treatment possible with conventional stormwater BMPs. Manmade lakes will be the primary drainage and water quality treatment facility for the residential areas and wet pond detention basins will provide treatment for the industrial areas. Within the residential areas, stormwater runoff will be collected by standard buried storm drains and conveyed to the lakes. The lakes will function as wet pond stormwater treatment BMPs with enhancements that will provide better stormwater treatment than a standard wet pond. Dry weather flows will be captured by the lakes and will offset the need for makeup water, eliminating dry weather flows and the discharge of pollutants associated with dry weather flows. Industrial areas will drain toward wet pond detention basin BMPs. These basins will capture all runoff and slowly release it after adequate detention time, providing water quality treatment by settling of particulates, conversion of nutrients and pollutants, and other physical, chemical, and biological processes.

The proposed use of a network of manmade lakes and wet ponds as stormwater treatment controls is consistent, in concept, with the requirements of the City's and County's Stormwater Quality Control Criteria Plan (SWQCCP). The City of Stockton's SWQCP describes the stormwater control measures that are necessary for the proposed Mariposa Lakes development and calls for a Project Stormwater Quality Control Plan (PSWQCP) for the project. The PSWQCP will describe all permanent stormwater BMPs proposed for the project, including the lakes and detention basins that will serve as the treatment control BMPs for the project. The PSWQCP will be reviewed and approved by the City prior to final City approvals of the project. The project will also have a Stormwater Pollution Prevention Plan (SWPPP) that will describe stormwater pollution prevention measures to be employed during the construction phase of the project. Both the PSWQCP and SWPPP will conform to applicable City, County, and State regulations.

This report presents a model that estimates the stormwater runoff and non-point source pollutant loads from the proposed project and compares them to the corresponding values from both existing conditions and from alternative development schemes. Based on the average annual rainfall for the site, the model predicts the total volume of runoff that will be produced in a year of average rainfall. Similarly, the average concentration (mg/l) and total annual load (lbs) of several pollutants typical of urban runoff are estimated.

Changes in runoff volume and nonpoint source pollutants discharged from the Mariposa Lakes site are predicted using a simple runoff/pollutant load model of existing conditions and the proposed development plans. The annual volume of runoff is calculated based on the average annual rainfall and a single factor, the runoff curve number, which represents the percentage of rainfall that will become runoff for each type of land use. The rainfall depth multiplied by the runoff curve number yields a runoff depth. Runoff depth multiplied by land area yields the annual volume of runoff. The pollutant concentration in the runoff is represented by the average concentration measured in runoff from similar land uses. The annual pollutant load is then calculated by multiplying the annual volume of runoff times the concentration of each pollutant. This calculation is performed for both existing and proposed conditions and the results compared to determine the expected change in runoff volume, pollutant concentration, and pollutant load. The efficiency of BMPs is represented by average pollutant removal efficiency measured in existing BMPs outside the project site. To calculate the concentration and load of a pollutant in an area that will be served by a BMP, the concentration of the pollutant from the proposed conditions is multiplied by the removal efficiency of the proposed BMP for the pollutant in question. This post-BMP pollutant concentration is then multiplied by the expected annual runoff volume to yield the annual pollutant load that will be discharged from the area. By calculating the runoff volume, pollutant load, and pollutant concentration from each subarea within the specific plan area, a complete summation of the runoff and non-point source pollutant concentrations and loads from the project is obtained for existing conditions, proposed conditions before BMP treatment, and proposed conditions with BMP treatment. These values can then be compared to evaluate the impacts of the project on runoff and pollutant discharges.

The calculations prepared for this study are not used to design infrastructure, assess flooding potential, or to evaluate changes in runoff discharge rates from the project site. These calculations do not include any calculation of changes in runoff rate (typically expressed as cubic feet of water per second (CFS) flowing downstream), and should not be confused with the calculations prepared to evaluate or design pipes, culverts, or natural channels. The runoff curve numbers used in this report are intended to represent annual average conditions, and therefore may not be the same as curve numbers or rational method coefficients used to predict flows from design storms (e.g. 100-year flood).

The model indicates that the proposed Mariposa Lakes project will produce smaller loads and lower concentrations of pollutants than alternative developments or existing agricultural land use. In other words, the project will release water of higher quality than that the existing agricultural land use currently releases. At the same time, the project will release approximately 10% more runoff on an annual basis than the existing land use, because the conversion from agricultural land to mixed urban land uses will increase the extent of impervious surfaces on the site and therefore increase the volume of runoff produced.

The hydrologic modeling here does not evaluate water levels or flow rates in receiving waters, nor indicate that the project will exacerbate any existing flooding problems that may exist downstream of the project site. The models presented here are based on average annual runoff and do not simulate peak discharge rates (measured as volume per time, cubic feet per second, for example), nor do they simulate the flood control functions of the lakes. Storm flow discharges are studied in a separate report.

1.2 Overview of Site Hydrology

The Mariposa Lakes project will result in change to the hydrology of the project site. In the existing condition, the project site is agricultural land used mostly for farmland and nut and fruit orchards. Each creek has a large offsite drainage area that contributes flow to the site. This report does not evaluate possible future changes to offiste drainage areas nor calculate the concentrations or loads of pollutants carried by offsite flows. The project does not propose to treat offsite flows. Instead, offsite flows will be conveyed by the creeks through the project site as they are under existing conditions.

Post-development, Mariposa Lakes will consist of the same three watersheds, Duck Creek, Branch Creek, and North Little Johns Creek, but the onsite acreage draining to each creek will be altered by development. In the proposed condition, the project site will include a mix of industrial land, residential land, commercial land, and open space (Exhibit 2). There will be a total of 11 lakes of approximately 175 acres combined (Exhibit 3) that will drain into the three creeks. The Duck Creek watershed will include the industrial areas, all but one detention basin, a recharge basin, four lakes, and surrounding residential areas. The Branch Creek watershed will include five of the remaining lakes and surrounding residential areas. The remaining lakes and all portions of the project site south of North Little Johns Creek will drain into North Little Johns Creek.

2 Pollutants of Concern

2.1 Water Quality and Pollutants of Concern

Urban development, such as the proposed Mariposa Lakes project, leads to changes in the volume of runoff and the types and quantities of pollutants carried by the stormwater. Urban areas typically discharge more runoff and pollutants than undisturbed natural areas. However, agricultural lands generally discharge more runoff and non-point source pollutants than natural areas. Thus, the net change in runoff and non-point source pollutants that will result from this development is unclear and must be determined through careful modeling, such as the efforts described in this report.

The pollutants of concern are the non-point source pollutants that are typically associated with urban runoff, and include nutrients (total nitrogen (TN) and total phosphorus (TP)), total suspended solids (TSS), biological oxygen demand (BOD), bacteria (total coliform), total petroleum hydrocarbons (TPH), and oil and grease. Although nutrients are necessary for proper growth and development of aquatic vegetation, excessive amounts lead to over-stimulated growth of algae, altered pH and temperature, and death of aquatic life. Suspended solids and biological oxygen demand are monitored as an indicator of waste contaminants and organic matter in the water. Fecal coliform measured in water is not directly harmful to beneficial uses. However, it is used as an indicator for other pathogenic organisms that may be present.

3 Site Hydrology

3.1 Existing Hydrology and Drainage Facilities

The Mariposa Lakes project site is currently used for agriculture and its hydrology and drainage facilities are typical of agricultural areas. Runoff from the site is collected in typical agricultural ditches which discharge to the existing channels, Duck Creek, Branch Creek, and North Little Johns Creek. Surface slopes at the project site are moderate. In general, the runoff from the site is typical of orchard agricultural land use.

3.2 Proposed Hydrology and Drainage Facilities

Residential areas of the proposed project will be designed to drain through a system of centrally-located lakes. All surface runoff will be collected in standard urban drainage facilities. Runoff will then be delivered to specially-designed BMPs located within the edges of the lakes that will pre-treat all runoff before the runoff enters the lakes. Once in the lakes, water will be continually treated by a system of underwater bio-filters, constructed wetlands, and aeration. This system is designed to maintain the highest possible level of water quality in the lakes for the sake of both the environment and the aesthetics of the lakes. The system that will be designed for the Mariposa Lakes is based on systems that have successfully operated in similar manmade residential lakes for many years, maintaining excellent water quality despite inflows of nuisance flow, urban runoff, and other nutrient-laden waters.

The Mariposa Lakes will be built with enough reserve storage capacity to eliminate all dry-weather discharges. Therefore, dry weather flows will never leave the site, but instead, will be captured and retained within the lakes. In rainfall events, excess water will be temporarily detained then discharged downstream through lake outlet facilities. Prior to discharge the water will receive a high level of water quality treatment and will carry significantly reduced loads of pollutants as compared to typical urban runoff. During typical small rain events, as runoff enters the lakes, lake water will be discharges and much of the runoff will be retained in the lake. The lake water is typically much cleaner than stormwater runoff, thus the discharge from the lake system is much cleaner than the runoff from a typical stormwater treatment BMP or from an urban area without BMPS. The Mariposa Lakes will be designed to significantly improve the quality of runoff from the site. Surface flows from the Mariposa Lakes site will discharge to Duck Creek, Branch Creek, and North Little Johns Creek that cross the project site.

Industrial portions of the site will drain to wet pond detention basins, which will detain runoff and provide removal of pollutants from the runoff. Runoff will then be discharged to the creeks. These wet ponds will be designed to provide high quality treatment of runoff and meet current design standards.

4 Water Quality Modeling

A water quality model of Mariposa Lakes has been prepared to estimate the discharges of pollutants from the project site and quantify the changes in runoff volume and non-point source pollutant loadings that will result from development of Mariposa Lakes.

4.1 Model Overview

The model presented in this report simulates the runoff from the project site in four steps. The first step simulates runoff water quality based on runoff volumes for the watershed and typical concentrations of water quality constituents associated with proposed land uses. The second step simulates the effect of mixing site runoff with lake water. The third step simulates the removal of constituents by in-lake processes. The fourth step presents the volume and quality of runoff that is discharged from the site.

This process is applied to three project site conditions: Existing Conditions, Alternative Proposed Design, and Proposed PACE Design. The existing conditions model simulates runoff from the existing agricultural land use, and does not include any BMPs to treat runoff. The alternative proposed design model includes the proposed land uses but none of the BMP treatments, which are wet pond detention basins in the industrial region as well as lakes in the residential region. The proposed PACE design model includes the proposed land uses as well as the BMP treatments. The existing conditions model provides a baseline that is useful as a comparison to the proposed project. The alternative proposed design model quantifies the volume of runoff and loads of pollutants that will be generated within the proposed project site. This volume and load of pollutants would be discharged from a project site without BMPs, thus the alternative proposed design results are useful in gauging the effectiveness of proposed stormwater quality BMPs in mitigating the impacts of development. In addition to presenting the effects of proposed land uses, the proposed PACE design model also presents the impacts of lakes as treatment facilities on the effects of developing on the site. This allows for an analysis of how the proposed project will influence runoff volume and non-point source pollutant loading from the site.

The project site was separated into four regions for modeling purposes. It was first divided based on proposed watershed design, resulting in the Duck Creek watershed, Branch Creek watershed, and North Little Johns Creek watershed. Duck Creek watershed was further separated based on the location of lakes. The industrial areas contain no lakes but have detention basins. This affects the BMP treatment that the runoff will receive. Therefore, all industrial land and surrounding areas that will drain into detention basins are grouped into one subarea of Duck Creek watershed. The remaining areas of Duck watershed, which are predominantly residential, will drain into lakes only and are grouped into another subarea of Duck Creek watershed. Based on these factors, water quality was modeled for four subareas (Exhibit 4): North Little Johns Creek, Branch Creek, Duck Creek A (industrial/basin region), and Duck Creek B (residential/lake region). However, final discharged values will be presented for Duck Creek watershed as a whole, Branch Creek, and North Little Johns Creek.

4.2 Model Input

Several types of input data are used in the model including estimates of runoff volume, measured typical runoff pollutant concentrations, lake water quality measured in a manmade lake similar to the proposed Mariposa Lakes, lake design values, and typical BMP treatment efficiencies.

Rainfall predictions are based on publicly available rainfall measurements for the area, as presented in Exhibit 5. Runoff estimates are based on project acreage, soil types, and existing and proposed land uses. The SCS runoff curve number method is used to predict runoff depth, which is converted into runoff volume based on watershed area. This method is among the most widely used and accepted standard methods in hydrology. The SCS method equation is

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

where Q is runoff in inches, P is rainfall in inches, I_a is initial abstraction in inches, and S is potential maximum retention after runoff begins in inches. Initial abstraction represents all losses before runoff begins and is approximated by

$$I_a = 0.2S$$

Potential maximum retention after runoff begins, S, is correlated to soil and cover conditions through the dimensionless curve number, CN, by

$$S = \frac{1000}{CN} - 10$$

Curve numbers are selected based on land use and soil type as listed in TR-55 (Appendix B). The project site consists predominantly of soil type D with minimal amount of soil type C. The curve number selected for Mariposa Lakes in its existing condition assumes fair conditions for orchard wood-grass combination cover type. In selecting curve numbers for the proposed land uses, fair condition is assumed in all cases. Institutions, which include religious facilities, library, and fire houses, are categorized as commercial-business land use while schools are classified as a combination of commercial and open space land use. High, medium, and low density residential curve numbers assumed values for 1/8, 1/4, and ½ acre lot sizes respectively. Village estates assumed 1 acre lot sizes and existing residential area assumed ¼ acre lot sizes, similar to medium density residential area. When more than one land use exists for the watershed, an area-weighted runoff coefficient is necessary. The equation for weighted runoff coefficient is

$$CN_{weighted} = \frac{\sum (CN_i * Area_i)}{\sum Area_i}$$

Weighted curve numbers and results for runoff depth for the four subareas based on the SCS method are shown in Table 4.2.1.

Table 4.2.1 Runoff Depth					
Watershed	Average Annual Precipitation (in)	Pre-development		Post-development	
		Runoff Coefficient	Runoff Depth (in)	Runoff Coefficient	Runoff Depth (in)
Duck A	13	82	10.7	91.5	11.9
Duck B	13	82	10.7	87.5	11.4
Branch	13	82	10.7	87.5	11.4
NLJ	13	82	10.7	87.4	11.4

Runoff pollutant concentrations are represented as Event Mean Concentration (EMC) data and are area-weighted by acreage and land use. Quantitative stormwater monitoring data is not available for Central California, therefore, data collected by the Los Angeles County and Ventura County NPDES Stormwater Monitoring Programs have been used in the model included in this report. LA County data was selected because LA County has extensively monitored its stormwater and made available the resulting data (Table 4.2.2, Appendix C). The project site as it exists today is modeled as agricultural land use, while the proposed site is modeled for the various proposed land uses. Los Angeles County does not provide data for agricultural land use. Therefore, data from Ventura County Stormwater Monitoring Program for agricultural land use is applied in the model for the existing condition (see Table 4.2.2, Appendix D).

Table 4.2.2 Pollutant Concentration in Runoff reported by Land Use							
Watershed	Runoff TP (mg/l)	Runoff TN [3] (mg/l)	Runoff TSS (mg/l)	Runoff BOD (mg/l)	Runoff Total Coliform (MPN/100ml)	Runoff Oil/Grease (mg/l)	Runoff TPH (mg/l)
Duck A [1]	0.33	3.4	159	19	4.4E+05	1.6	1.6
Duck B [1]	0.28	3.2	83	17	1.1E+06	1.4	1.4
Branch [1]	0.27	3.2	87	17	1.0E+06	1.4	1.4
NLJ [1]	0.27	3.2	97	17	9.3E+05	1.3	1.3
Agricultural [2]	132	27	428	5.3	2.2E+06	1.0	0.20

1 - Area-weighted runoff mean concentrations based on data reported by LA County Stormwater Monitoring Report by land use

2 - Runoff mean concentrations as reported by Ventura County Stormwater Monitoring Report for agricultural land

3 - N is the sum of Nitrate-N, Nitrite-N, and TKN

Several project design values are used in estimating pollutant discharge. These values include acreages of various land uses (Exhibit 2) and lake water volume, and are based on land use plans for the project. The anticipated water quality in the lakes before a storm event is based on several years of monthly monitoring data collected at Bridgeport Lake in Santa Clarita, California. Bridgeport Lake incorporates the same water quality systems as Mariposa Lakes does and has been reliably monitored for an extended period of time (Table 4.2.3). However, not all of the constituents being modeled in this report have been monitored in Bridgeport Lake.

Table 4.2.3 Pollutant Concentration within Lake [1]						
Lake TP (mg/l)	Lake TN [2] (mg/l)	Lake TSS (mg/l)	Lake BOD (mg/l)	Lake Total Coliform (MPN/100ml)	Lake Oil/Grease (mg/l)	Lake TPH (mg/l)
0.1	1.5	N/A	N/A	N/A	N/A	N/A

1 - Lake concentrations of Total P and Total N based on monitoring data for Bridgeport Lake, 2002-2005

2 - Lake concentrations of Total N include only NO3. Total N data are not available.

The treatment efficiency of the lakes is modeled based on average efficiency of wet ponds throughout the United States (Table 4.2.4, Appendix E). Although runoff in the industrial region will not drain into a lake, it still drains into wet pond detention basin. Due to water quality systems, the lakes will have significantly improved treatment capability compared to standard wet ponds, however, they are modeled as standard wet ponds to provide a conservative estimate of pollutant discharges.

Table 4.2.4 BMP Averaged Efficiency							
BMP	TSS	TP	TN	Bacteria	O/G	BOD	TPH
Wet Pond	78	55	35	82	66	47	57

4.3 Model Calculations

The calculations used in the water quality model are described in four steps. The four steps described are all found in the model titled "Proposed Conditions with PACE Lake." Other versions of the model used to predict runoff from existing condition or proposed conditions with alternative stormwater management scenarios may not include all four steps.

Step 1 calculates the volume of runoff generated by the project site and the expected concentrations and loads of pollutants for each design storm. The first column, runoff depth, is based on calculations prepared by PACE following the SCS runoff curve number method. The next column, runoff volume, is runoff depth multiplied by watershed area. The remaining columns are total pollutant loads in runoff for the various constituents. These values are calculated by multiplying the runoff volume by the EMC, presented in Table 4.2.2, and the conversion factor to produce load in the unit of pounds.

Step 2 simulates the effect of mixing urban runoff from the site with lake water, which is generally less polluted than the runoff. This step assumes complete mixing of runoff and lake water, which is reasonable because runoff will be released into the lake from multiple entry points spread around the lake perimeter. The lake will also include aeration and pumping equipment to provide constant mixing of water within the lake. The first column contains lake volume in acre-feet. This volume is based on proposed lake area (Exhibit 4) and an average depth of seven feet. The remaining columns are the diluted pollutant concentrations after mixing with the lake water. These values are calculated by first summing the pollutant load produced from runoff and from lake water and then dividing the total load by the sum of lake and runoff volume. In the cases where lake water quality data is not available, values of zero are assumed. The

Existing Condition and Alternative Design model do not include this step because they do not contain any available lakes to dilute.

Step 3 simulates the removal of constituents expected in a standard wet pond or dry extended detention basin BMP. Although the Mariposa Lakes will include water quality enhancements that are expected to significantly improve the pollutant removal efficiency of the lake as compared to a standard wet pond, the impact of these enhancements is not simulated in step 3. This is because qualitative values of the treatment efficiency of the lake are not available, whereas a large body of data on wet pond removal efficiency is available. The columns reporting treated concentration are calculated by multiplying the diluted concentration from step 2 by (1-efficiency). Step 3 is not included in the Existing Condition and Alternative Design models because there are no detention basins or lakes in either model.

Step 4 calculates the loads of pollutants that will be discharged. The first column, volume of water discharged, is the volume of runoff that is produced for the watershed. This number is presented in step 1 also. The remaining columns show pollutant load for each constituent and is calculated by multiplying the treated concentration from step 3 by the volume of water discharged and the conversion factor to result in pollutant load in pounds. In the existing and alternative proposed models where step 3 is not included, the discharged load are calculated by multiplying the discharged volume of water by the runoff concentrations provided in Table 4.2.2. These loads are the quantities of pollutants that are discharged from the project site and can be used to compare one proposed scenario with another or to compare the proposed project condition with the existing condition.

4.4 Model Results and Discussion

Modeling of Duck watershed, which comprises 2300 acres, shows that the volume of water discharged from the site increases from existing to proposed conditions by 10%, approximately 200 ac-ft.

Loads produced in the proposed PACE design for all constituents except BOD and TPH show a decrease from the load produced in the existing condition. Loads for total phosphorus, nitrogen, suspended solids, and coliform show a minimum decrease of 92%, while loads for oil and grease show a decrease of 52%. BOD and TPH loads increase for both the alternative proposed design as well as the proposed PACE design. The increase that results from the proposed PACE design is less than half of the increase that results from the alternative proposed design. For all constituents, loads from the proposed PACE design show a minimum difference of 40% from loads from the alternative proposed design.

A similar trend results with the concentrations produced by the three conditions. Total phosphorous, nitrogen, suspended solids, and coliform concentrations resulting from the proposed PACE design show a minimum decrease of 93%, while oil and grease concentrations show a decrease of 56% from existing condition concentrations. Again, there is an increase in concentration for BOD and TPH. Due to the low existing BOD and TPH concentrations, calculations show a significant increase in terms of percentage. However, concentrations actually only increase by 3 mg/l and 0.4 mg/l respectively, which is again, less than half of the increase that results from the alternative proposed design, at 13 mg/l and 1.3 mg/l.

The proposed development in the 1200 acres of Branch watershed increases the amount of runoff by approximately 75 ac-ft, which is less than 10% of the runoff produced in the existing condition. Although Branch watershed shows very similar trends, Branch watershed shows slightly greater decreases in load and concentrations than Duck watershed does. Loads for total phosphorous, nitrogen, suspended solids, and coliform decrease by a minimum of 93% in the proposed PACE condition, relative to the existing condition, and oil and grease decrease by 67%. Again, BOD and TPH show an increase from the existing condition but the increase that results from the proposed PACE design is less than half of the increase that results from the alternative proposed design.

Concentrations for total phosphorous, nitrogen, suspended solids, and coliform concentrations resulting from the proposed PACE design show a minimum decrease of 94%, while oil and grease concentrations show a decrease of 70% from existing condition concentrations. Again, there is also an increase in concentration for BOD and TPH, however, concentrations only increase by 0.8 mg/l and 0.2 mg/l respectively. These increases in concentration for BOD and TPH are again less than half of the increases that result from the alternative proposed design.

North Little Johns watershed, which is approximately 300 acres, is a very small subarea of the project site (3800 acres), which produces approximately 300 ac-ft of runoff. Like Branch watershed, the amount of runoff increased by less than 10% from existing condition to the proposed PACE design. Reductions in pollutant load and concentrations in this watershed are very similar to that in both Duck and Branch watersheds. Loads for total phosphorus, nitrogen, suspended solids, and coliform show a minimum decrease of 92% in the proposed PACE design. For oil and grease, loads decrease by 57% in the proposed PACE design. BOD and TPH loads increase in both proposed designs, but less so for the proposed PACE design.

Concentrations for total phosphorous, nitrogen, suspended solids, and coliform concentrations resulting from the proposed PACE design show a minimum decrease of 93%, while oil and grease concentrations show a decrease of 60% from existing condition concentrations. BOD and TPH concentrations increase by 2.9 mg/l and 0.3 mg/l respectively.

Increases in BOD and TPH are expected with development because they are anthropogenic pollutants that commonly result from lawns, cars, people, and industrial production. In the case of Duck watershed, most of the pollutants are a result of region A where runoff does not receive dilution treatment by lakes. Region A accounts for 65% of the total Duck watershed acreage.

The summary of the calculations and results are shown in Appendix F. Tables 4.4.1 and 4.4.2 present the total loads and concentrations for the entire Mariposa Lakes project site as a whole. Due to the proposed development, the volume of water discharged increased by 9%, approximately 300 ac-ft. However, four of the seven pollutants show a significant reduction (greater than 90%) in both load and concentration from the existing condition. One pollutant, oil and grease, shows a lesser but still significant reduction in load and concentration at 57% and 61% respectively. BOD and TPH show increases in both load and concentration from the existing condition to the proposed PACE design. However, this increase is considerably less than the increase that arises from the alternative proposed design. Also, the actual increase in concentration for BOD and TPH are only 3 mg/l and 0.3 mg/l respectively. In general, the proposed PACE design shows greater reductions in pollutant loads and concentrations than the alternative proposed design does. In addition, the alternative proposed design results in reductions of fewer pollutants than does the proposed PACE design. The model shows that Mariposa Lakes will generally discharge lower concentrations (mg/l) and loads (lbs) of pollutants than both the alternative development and the existing agricultural land use.

Table 4.4.1 - Discharged Pollutant Load for Average Annual Storm Event for Mariposa Lakes

Site Condition	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Existing (Agricultural Land)	3337	1198138	246526	3884872	48107	9.2E+16	9077	1815
Alternative Design	3629	2945	32528	1140857	176475	3.6E+16	14246	14150
Proposed PACE Design	3629	1169	18842	216445	75100	4.7E+15	3889	4883
Reduction [1]	-9%	100%	92%	94%	-56%	95%	57%	-169%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Table 4.4.2 - Discharged Pollutant Concentration for Average Annual Storm Event for Mariposa Lakes

Site Condition	TP Discharged (mg/l)	TN Discharged (mg/l)	TSS Discharged (mg/l)	BOD Discharged (mg/l)	Total Coliform Discharged (MPN/100ml)	Oil/Grease Discharged (mg/l)	TPH Discharged (mg/l)
Existing (Agricultural Land)	132	27	428	5	2.2E+06	1.0	0.2
Alternative Design	0.3	3.3	116	18	8.0E+05	1.4	1.4
Proposed PACE Design	0.1	1.9	22	8	1.1E+05	0.4	0.5
Reduction [1]	100%	93%	95%	-44%	95%	61%	-147%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

5 Conclusion

The models presented in this report demonstrate that the Mariposa Lakes project will result in smaller loads (lbs per year) and concentrations (mg/l) for most of the pollutants typically found in urban runoff. The existing land use is agriculture, which tends to produce significant loads of sediment, nutrients, and some other pollutants. The proposed urban land uses will also produce many of the same pollutants, but the proposed lakes and detention basins will significantly reduce the loads and concentrations of these pollutants before runoff is discharged from the site. The development of the site will increase the average annual volume of stormwater runoff by approximately 10%. This report does not attempt to address the impacts of the project on flooding and peak discharges downstream.

The model examines discharges from three watersheds of approximately 2300, 1200 and 300 acres in the project site that will drain toward 11 lakes and a number of detention basins. Duck watershed results in the greatest amount of discharge due to its larger acreage. Trends in load and concentration change for each constituent is similar for all three watersheds. Generally, there is a significant decrease in load and concentration for phosphorus, nitrogen, suspended solids, and coliform and a less significant decrease for oil and grease. BOD and TPH increase for each watershed due to their anthropogenic nature and dramatic change in land use. Although other pollutants are anthropogenic as well, the increase is more dramatic for these two constituents due to the existing land use (agricultural) which produces very slight amounts of TPH and milder amounts of BOD. TPH increase is an expected result of developing industrial areas and introduction of machinery, automobiles, and other contributors due to population increases. BOD increase is likely a result of the residential areas arising from development. This increases the amount of parks, lawns, and open space that result in grass clippings, leaves, and lawn fertilizer. In addition, the addition of residential area may also lead to paper and food wastes not expected in an agricultural setting. The net impact of the proposed PACE design is a general reduction of pollutant loads and concentrations ranging from 50% to near 100%.

In conclusion, the water quality model presented here demonstrates that Mariposa Lakes will discharge significantly smaller loads and concentrations of pollutants than alternate development schemes or existing agricultural land use. Mariposa Lakes represent the best available water treatment technology for residential development and the project will serve as a model for water quality sensitive development in the region.

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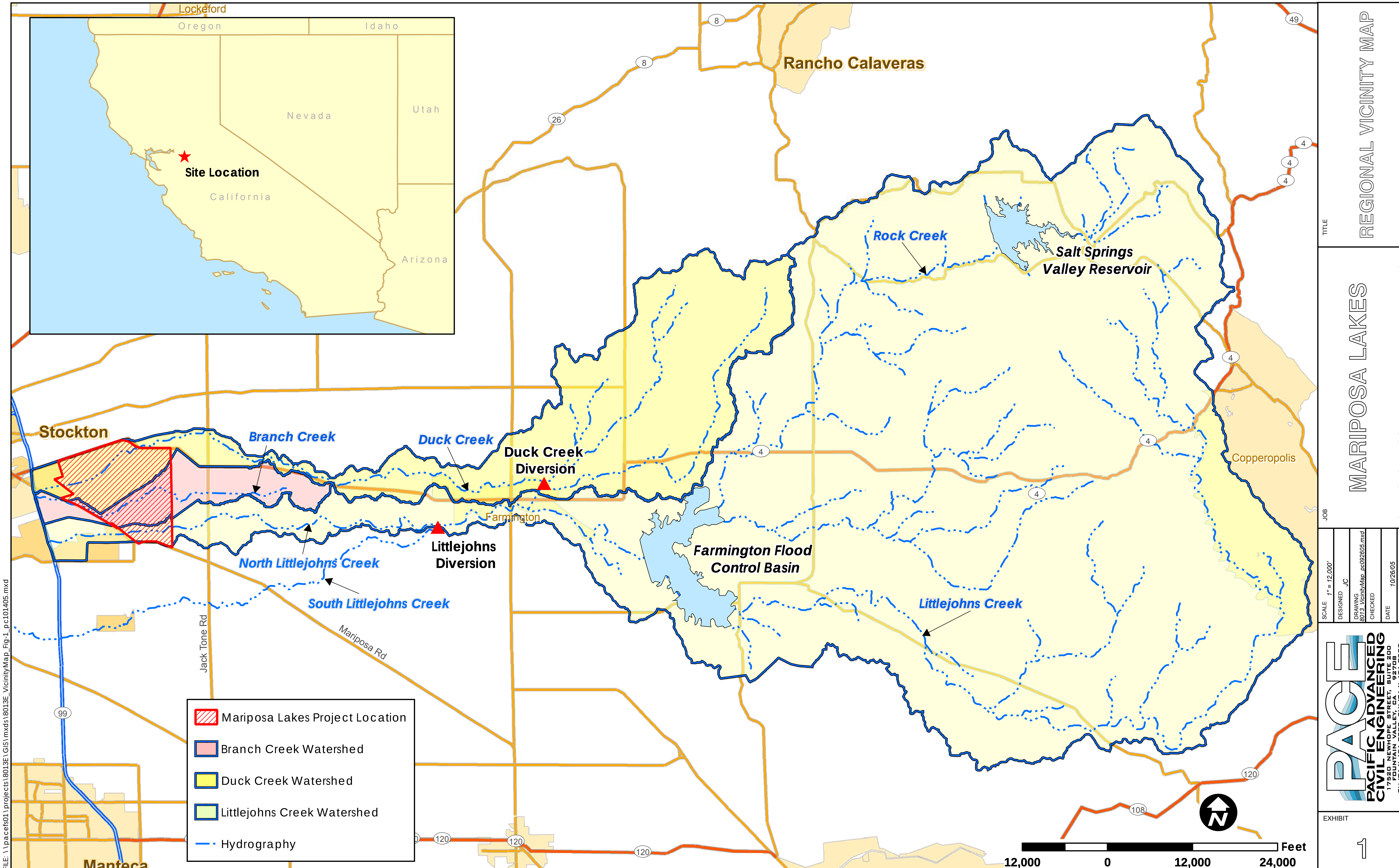
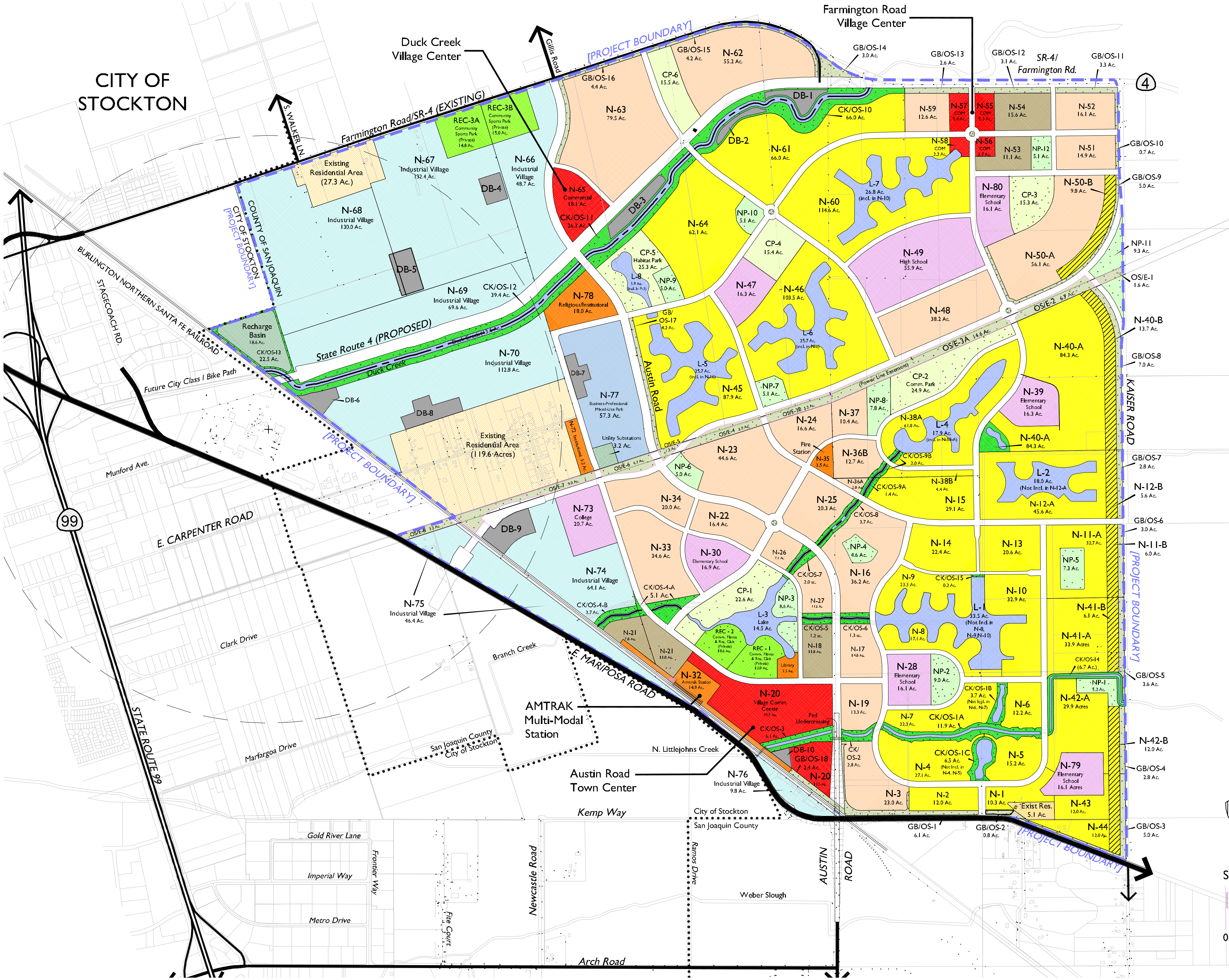


Lockeford
Oregon
Idaho
Nevada
Utah
California
Arizona
Site Location
Rancho Calaveras
Rock Creek
Salt Springs Valley Reservoir
Stockton
Branch Creek
Duck Creek
Duck Creek Diversion
Farmington
Copperopolis
North Littlejohns Creek
Littlejohns Diversion
South Littlejohns Creek
Farmington Flood Control Basin
Littlejohns Creek
Jack Tone Rd
Mariposa Rd
Manteca
Mariposa Lakes Project Location
Branch Creek Watershed
Duck Creek Watershed
Littlejohns Creek Watershed
Hydrography
Feet
12,000
0
12,000
24,000
TITLE
REGIONAL VICINITY MAP
JOB
MARIPOSA LAKES
SAN JOAQUIN COUNTY
CA
SCALE 1" = 12,000'
DESIGNED JC
DRAWING 8013_VicinityMap_pc092605.mxd
CHECKED
DATE 10/26/05
JOB NO. 8013-E
PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299
EXHIBIT
1
FILE: \\pacefs01\projects\8013E\GIS\mxds\8013E_VicinityMap_Fig-1_pc101405.mxd

Mariposa Lakes

Stockton, California

Land Use Plan



Land Use Legend

Key	Land Use	Acres
	Village Residential Estate	53 ac
	Village Low Density Residential	1,016 ac
	Village Medium Density Residential	536 ac
	Village High Density Residential	59 ac
	Village Center/Commercial	93 ac
	Industrial	614 ac
	Business-Professional	57 ac
	Institutional	43 ac
	Elementary/High Schools	154 ac
	College	21 ac
	Parks & Open Space	508 ac
	Private Recreation Center	52 ac
	Existing Residential	152 ac
	Public Utilities	22 ac
	Lakes 1, 2, & 3	66 ac
	Major Circulation (Roads & R.R.)	364 ac
	Total:	3,810 acres

July 5, 2006

LAND PLANNER / LANDSCAPE ARCHITECT:

RANDALL PLANNING & DESIGN INC.
Landscape Architecture * Golf Facilities
Site and Environmental Planning
1475 N. Broadway Suite 290
Walnut Creek, California 94596
Office: (925) 934-8002
Facsimile: (925) 934-8053

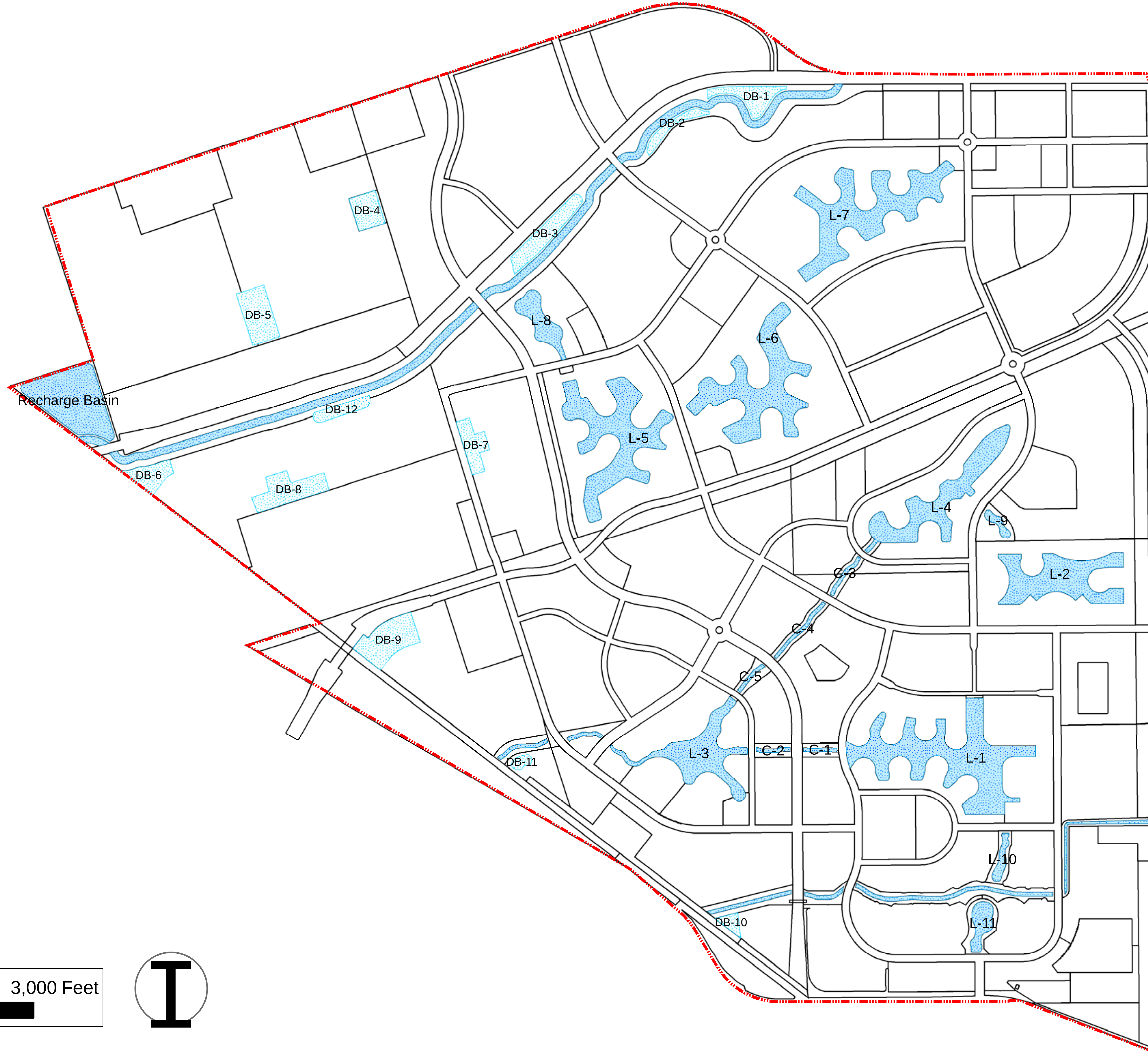
SCALE: 1" = 1800'

0 900 1800 3600 5400

EXHIBIT 2

Legend

- Lakes
- Wet Pond Detention Basins
- Project Boundary



Name	Acreage
L-1	33.6
L-2	18.0
L-3	14.5
L-4	17.9
L-5	25.8
L-6	25.8
L-7	26.9
L-8	5.9
L-9	1.2
L-10	1.6
L-11	3.4

1,500 0 1,500 3,000 Feet

TITLE
LAKE ACREAGES

JOB
MARIPOSA LAKES
SAN JOAQUIN CNTY CA

SCALE 1"= 1500'
DESIGNED BJ
DRAWING TH
CHECKED BJ
DATE 3/28/06
JOB NO. 8013-E

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299

FIGURE
3

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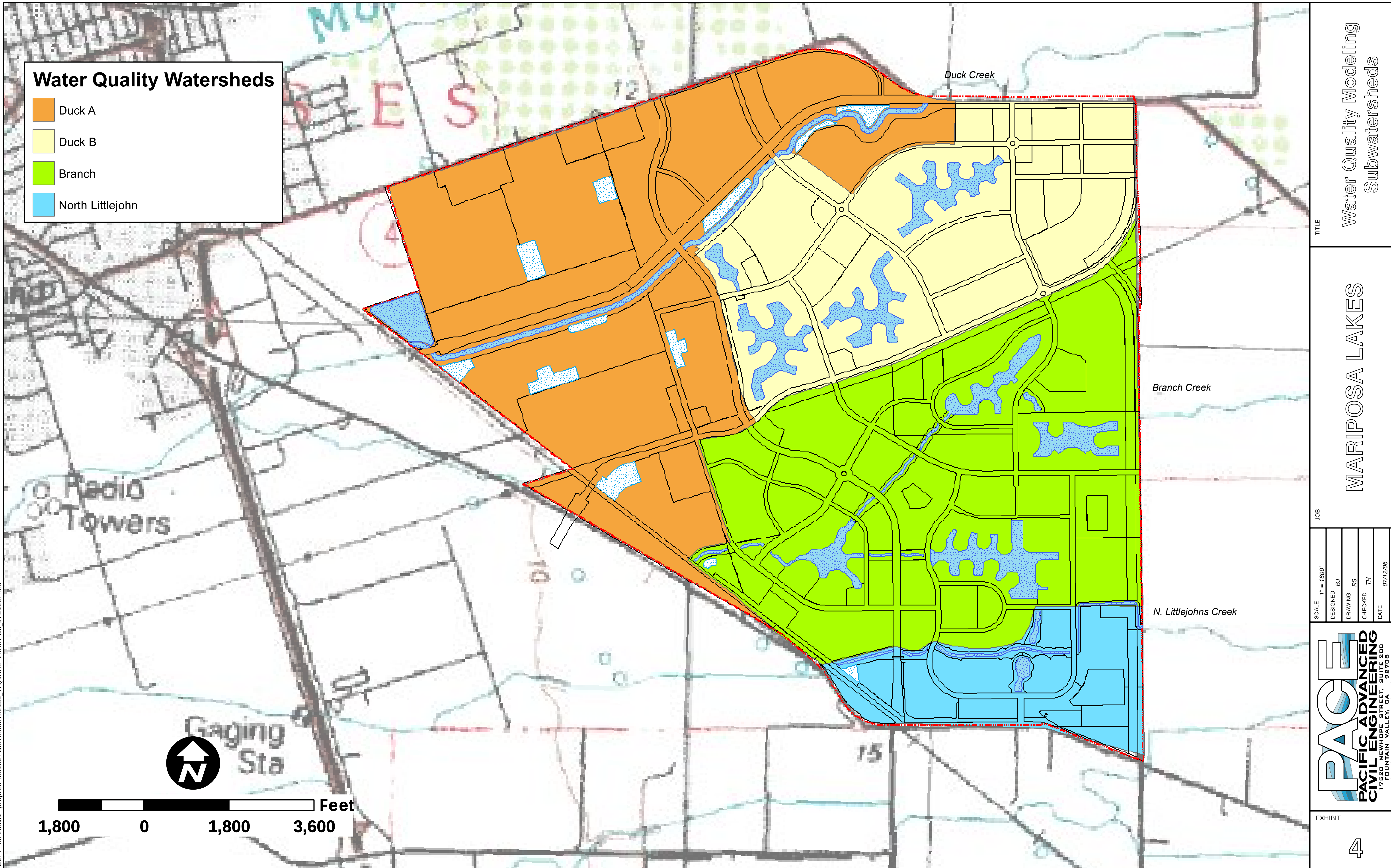
Water Quality Watersheds
Duck A
Duck B
Branch
North Littlejohn
Duck Creek
Branch Creek
N. Littlejohns Creek
Radio Towers
Gaging Sta
Feet
1,800
0
1,800
3,600
FILE: \\pacefs01\projects\8013E\GIS\mxds\8013E_WQwatershedsPC3_072106.mxd
TITLE
Water Quality Modeling Subwatersheds
JOB
MARIPOSA LAKES
SAN JOAQUIN COUNTY
CA
SCALE 1" = 1800'
DESIGNED BJ
DRAWING RS
CHECKED TH
DATE 07/12/06
JOB NO. 8013-E
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17520 NEWHOPE STREET, SUITE 200
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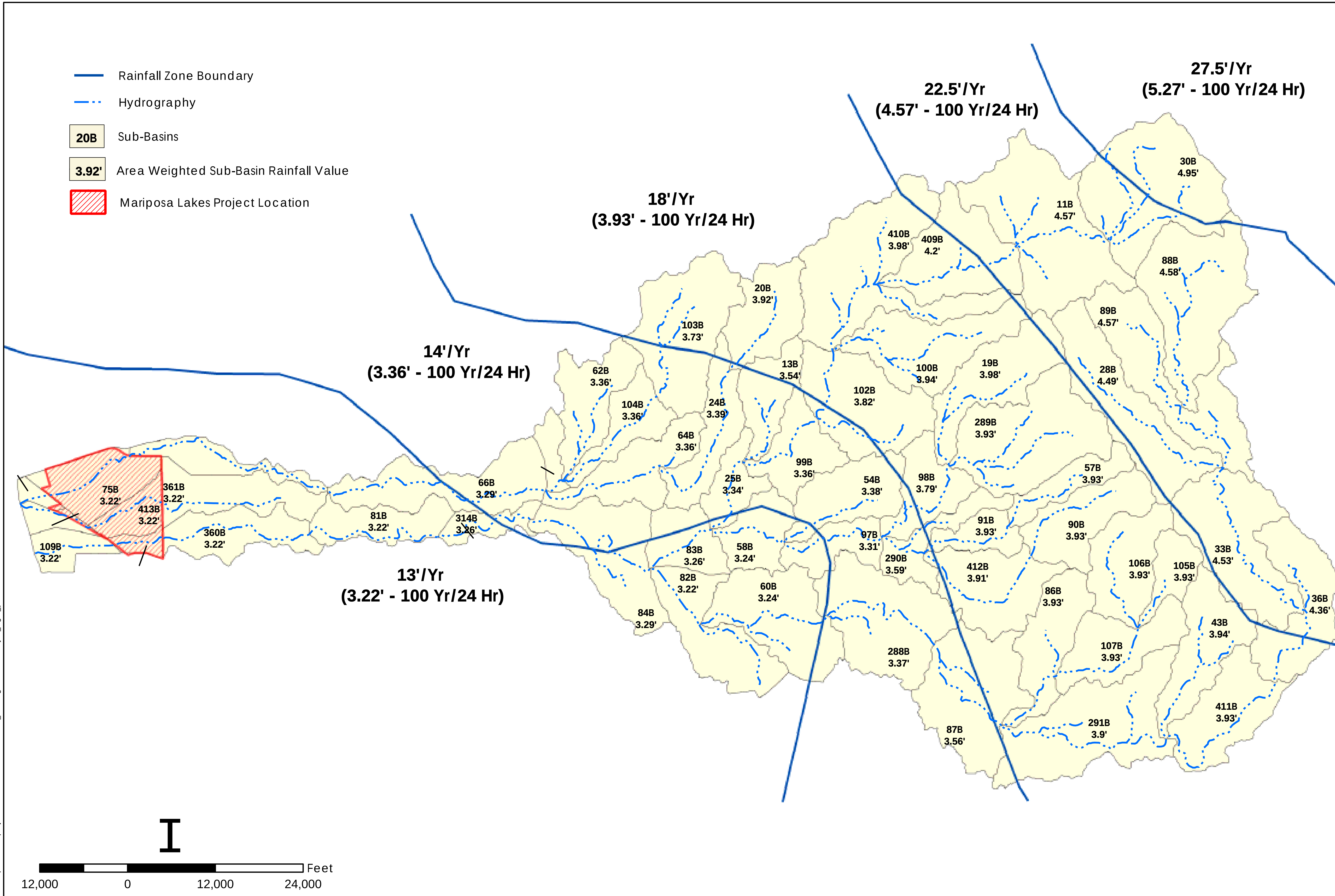
EXHIBIT
4



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TITLE
RAINFALL

JOB
MARIPOSA LAKES
SAN JOAQUIN COUNTY
CA

SCALE	DESIGNED	DRAWING	CHECKED	DATE	JOB NO.
1" = 12,000'	JC	8013E_AverageRainfallAnalysis_pc092005.mxd		10/26/05	8013-E

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EXHIBIT
5

Appendix A

San Joaquin County
East Stockton
Soil Survey Soil Map & Table 19

TABLE 19.--WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
101: Acampo	C	None	---	---	>6.0	---	---
102: Alamo	D	Rare	---	---	0-1.0	Perched	Dec-Apr
103*, 104*:							
Alo	D	None	---	---	>6.0	---	---
Vaquero	D	None	---	---	>6.0	---	---
105*:							
Amador	D	None	---	---	>6.0	---	---
Lithic Xerorthents.							
106, 107: Archerdale	C	Rare	---	---	>6.0	---	---
108. Arents							
109: Bisgani	B	Rare	---	---	3.5-5.0	Perched	Dec-Feb
110: Boggiano	B	Rare	---	---	>6.0	---	---
111: Bruella	B	None	---	---	>6.0	---	---
112: Bruella	C	None	---	---	>6.0	---	---
113: Calla	B	None	---	---	>6.0	---	---
114*, 115*:							
Calla	B	None	---	---	>6.0	---	---
Carbona	D	None	---	---	>6.0	---	---
116*:							
Calla	B	None	---	---	>6.0	---	---
Pleito	B	None	---	---	>6.0	---	---
117: Capay	D	Rare	---	---	>6.0	---	---
118, 119: Capay	D	None	---	---	>6.0	---	---
120, 121: Capay	D	None	---	---	4.0-6.0	Perched	Jan-Dec

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
122*:							
Capay	D	None	---	---	>6.0	---	---
Urban land.							
123 Carbona	D	None	---	---	>6.0	---	---
124*, 125*:							
Carbona	D	None	---	---	>6.0	---	---
Orognen	D	None	---	---	>6.0	---	---
126*:							
Carbona	D	None	---	---	>6.0	---	---
Carbona, bedrock substratum	D	None	---	---	>6.0	---	---
127 Chuloak	B	None	---	---	>6.0	---	---
128, 129 Cogna	B	Rare	---	---	>6.0	---	---
130 Columbia	B	Rare	---	---	>6.0	---	---
131 Columbia	C	Occasional	Brief to long	Dec-Apr	3.0-5.0	Apparent	Dec-Mar
132 Columbia	C	Frequent	Brief to long	Dec-Apr	3.0-5.0	Apparent	Dec-Mar
133 Columbia	C	Rare	---	---	3.0-5.0	Apparent	Dec-Apr
134 Cometa	D	None	---	---	>6.0	---	---
135*, 136*:							
Corning	D	None	---	---	>6.0	---	---
Redding	D	None	---	---	>6.0	---	---
137 Cortina	B	None	---	---	>6.0	---	---
138 Cosumnes	C	Rare	---	---	>6.0	---	---
139 Cosumnes	C	Occasional	Brief to long	Dec-Apr	>6.0	---	---
140 Coyotecreek	B	Occasional	Very brief or brief.	Dec-Apr	>6.0	---	---
141, 142 Delhi	A	None	---	---	>6.0	---	---
143*:							
Delhi	A	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
143*: Urban land.							
144------ Dello	C	Occasional------	Long----------	Nov-Mar	3.0-4.0	Apparent	Jan-Dec
145------ Dello	A	Rare------------	---	---	>6.0	---	---
146------ Dello	C	Rare------------	---	---	3.0-4.0	Apparent	Jan-Dec
147------ Dello	B	Rare------------	---	---	>5.0	Apparent	Jan-Dec
148------ Dello	A	Rare------------	---	---	>5.0	Apparent	Jan-Dec
149------ Devries	C	Rare------------	---	---	>5.0	Apparent	Jan-Dec
150*, 151*. Dumps							
152, 153------ Egbert	C	Rare------------	---	---	4.0-6.0	Apparent	Jan-Dec
154------ Egbert	C	Rare------------	---	---	3.0-4.0	Apparent	Jan-Dec
155*:							
Egbert------	C	Rare------------	---	---	4.0-6.0	Apparent	Jan-Dec
Urban land.							
156------ El Solyo	C	None------------	---	---	>6.0	---	---
157------ Exeter	C	Rare------------	---	---	>6.0	---	---
158------ Finrod	C	Rare------------	---	---	>6.0	---	---
159. Fluvaquents							
160------ Galt	D	Rare------------	---	---	>6.0	---	---
161------ Galt	D	None------------	---	---	>6.0	---	---
162*:							
Galt------	D	Rare------------	---	---	>6.0	---	---
Urban land.							
163*:							
Gonzaga------	D	None------------	---	---	>6.0	---	---

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
163*:							
Franciscan	C	None	---	---	>6.0	---	---
164*, 165*:							
Gonzaga	D	None	---	---	>6.0	---	---
Honker	D	None	---	---	>6.0	---	---
Franciscan	C	None	---	---	>6.0	---	---
166, 167 Grangeville	B	Rare	---	---	4.0-6.0	Apparent	Jan-Dec
168 Guard	C	Rare	---	---	1.5-3.0	Perched	Jan-Dec
169 Guard	C	Rare	---	---	>5.0	Apparent	Jan-Dec
170 Hicksville	B	Occasional	Very brief	Dec-Apr	5.0-6.0	Apparent	Dec-Apr
171 Hicksville	C	Occasional	Very brief	Dec-Apr	3.0-4.0	Perched	Dec-Apr
172 Hicksville	B	Occasional	Very brief	Dec-Apr	5.0-6.0	Apparent	Dec-Apr
173, 174 Hollenbeck	D	Rare	---	---	>6.0	---	---
175 Honcut	B	None	---	---	>6.0	---	---
176*:							
Honker	D	None	---	---	>6.0	---	---
Vallecitos	D	None	---	---	>6.0	---	---
Gonzaga	D	None	---	---	>6.0	---	---
177*, 178*:							
Honker	D	None	---	---	>6.0	---	---
Vallecitos	D	None	---	---	>6.0	---	---
Honker, eroded	D	None	---	---	>6.0	---	---
179 Itano	C	Rare	---	---	3.0-4.5	Apparent	Jan-Dec
180 Jacktone	D	Rare	---	---	>5.0	Apparent	Dec-Apr
181*:							
Jacktone	D	Rare	---	---	>5.0	Apparent	Dec-Apr
Urban land.							
182, 183 Jahant	D	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
184, 185, 186----------- Kaseberg	D	None------------	---	---	>6.0	---	---
187*:							
Keyes------------------	D	None------------	---	---	>6.0	---	---
Bellota----------------	D	None------------	---	---	>6.0	---	---
188*:							
Keyes------------------	D	None------------	---	---	>6.0	---	---
Redding----------------	D	None------------	---	---	>6.0	---	---
189-------------------- Kingdon	B	None------------	---	---	>5.0	Perched	Dec-Mar
190-------------------- Kingile	C	Rare------------	---	---	3.0-4.0	Apparent	Jan-Dec
191*:							
Kingile----------------	C	Rare------------	---	---	3.0-4.0	Apparent	Jan-Dec
Ryde-------------------	C	Rare------------	---	---	3.0-4.0	Apparent	Jan-Dec
192*:							
Lithic Xerorthents.							
Toomes-----------------	D	None------------	---	---	>6.0	---	---
193, 194--------------- Madera	D	None------------	---	---	>6.0	---	---
195*:							
Madera-----------------	D	Rare------------	---	---	>6.0	---	---
Alamo------------------	D	Rare------------	---	---	0-1.0	Perched	Dec-Apr
196-------------------- Manteca	C	Rare------------	---	---	>6.0	---	---
197-------------------- Merritt	B	Rare------------	---	---	4.0-6.0	Apparent	Jan-Dec
198-------------------- Merritt	B	Occasional------	Long----------	Dec-Mar	4.0-6.0	Apparent	Jan-Dec
199-------------------- Montpellier	C	None------------	---	---	>6.0	---	---
200*:							
Montpellier------------	C	None------------	---	---	>6.0	---	---
Cometa-----------------	D	None------------	---	---	>6.0	---	---
201-------------------- Nord	B	Rare------------	---	---	>6.0	---	---
202, 203--------------- Pardee	D	None------------	---	---	>6.0	---	---

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
204, 205 Peltier	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
206, 207, 208 Pentz	D	None	---	---	>6.0	---	---
209*:							
Pentz	D	None	---	---	>6.0	---	---
Bellota	D	None	---	---	>6.0	---	---
210*:							
Pentz	D	None	---	---	>6.0	---	---
Redding	D	None	---	---	>6.0	---	---
211 Pescadero	D	Rare	---	---	3.0-6.0	Apparent	Dec-Mar
212 Peters	D	None	---	---	>6.0	---	---
213 Piper	C	Rare	---	---	3.0-5.0	Apparent	Jan-Dec
214*. Pits							
215 Pleito	B	None	---	---	>6.0	---	---
216, 217, 218 Ramoth	B	None	---	---	>6.0	---	---
219, 220, 221 Redding	D	None	---	---	>6.0	---	---
222 Reiff	B	Occasional	Very brief or brief.	Dec-Apr	>6.0	---	---
223 Reiff	B	Rare	---	---	>6.0	---	---
224, 225 Rindge	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
226 Rioblancho	C	Rare	---	---	>6.0	---	---
227*:							
Rioblancho	C	Rare	---	---	>6.0	---	---
Urban land.							
228, 229 Rocklin	D	None	---	---	>6.0	---	---
230, 231, 232 Ryde	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
233*:							
Ryde	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
Peltier	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
234 Sailboat	B	Rare	---	---	>6.0	---	---
235 Sailboat	B	Occasional	Brief	Dec-Apr	>6.0	---	---
236, 237, 238, 239, 240 San Joaquin	D	None	---	---	>6.0	---	---
241*:							
San Joaquin	D	None	---	---	>6.0	---	---
San Joaquin, thick surface	D	None	---	---	>6.0	---	---
242*:							
San Joaquin	D	None	---	---	>6.0	---	---
Urban land.							
243, 244 Scribner	C	Rare	---	---	3.0-5.0	Apparent	Dec-Apr
245*:							
Scribner	C	Rare	---	---	3.0-5.0	Apparent	Dec-Apr
Urban land.							
246 Shima	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
247 Shinkee	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
248, 249, 250 Stockton	D	Rare	---	---	>5.0	Perched	Nov-Mar
251*:							
Stockton	D	Rare	---	---	>5.0	Perched	Nov-Mar
Urban land.							
252 Stomar	C	None	---	---	>6.0	---	---
253 Stomar	C	None	---	---	4.0-6.0	Apparent	Jan-Dec
254 Timor	A	Rare	---	---	>6.0	---	---
255 Tinnin	A	None	---	---	---	---	---
256 Tokay	B	None	---	---	>6.0	---	---

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
257*:							
Tokay	B	None	---	---	>6.0	---	---
Urban land.							
258 Trahern	D	Rare	---	---	4.0-6.0	Apparent	Jan-Dec
259 Tujunga	A	Rare	---	---	>6.0	---	---
260*. Urban land							
261 Valdez	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
262*:							
Vaquero	D	None	---	---	>6.0	---	---
Carbona	D	None	---	---	>6.0	---	---
263, 264 Venice	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
265 Veritas	B	Rare	---	---	4.0-5.0	Perched	Dec-Mar
266, 267 Veritas	B	Rare	---	---	>6.0	---	---
268 Vernalis	B	None	---	---	>6.0	---	---
269 Vernalis	B	None	---	---	4.0-6.0	Apparent	Jan-Dec
270, 271 Vignolo	C	Rare	---	---	>6.0	---	---
272 Vina	B	Rare	---	---	>6.0	---	---
273 Webile	C	Rare	---	---	3.0-4.0	Apparent	Jan-Dec
274 Willows	D	Rare	---	---	4.0-6.0	Apparent	Jan-Dec
275*, 276*:							
Wisflat	D	None	---	---	>6.0	---	---
Arburua	C	None	---	---	>6.0	---	---
San Timoteo	B	None	---	---	>6.0	---	---
277. Xerofluvents							
278*: Xerofluvents.							

See footnote at end of table.

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
278*: Xerorthents.							
279, 280----------------- Yellowlark	C	None-------------	---	---	3.0-4.0	Perched	Dec-Mar
281, 282, 283----------- Zacharias	B	None-------------	---	---	>6.0	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

Appendix B

TR-55
Tables 2.2a, 2.2c
Figure 2-3

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description — Cover type	Hydrologic condition	Curve numbers for hydrologic soil group — A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Appendix C

Los Angeles County
Stormwater Monitoring Data
(Excerpt)

Los Angeles County Department of Public Works
Stormwater Quality Monitoring Data

Complete data available at http://ladpw.org/wmd/npdes/wq_data.cfm

Table 4-12. Summary of 1994-2000 Land Use Results by Site

	Data Included Since[a]	DL	Units	Commercial						Vacant						High Density Single Family Residential					
				No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV
Miscellaneous Constituents																					
Cyanide	96	0.01	mg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	15	15	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
TPH	94	1	mg/l	8	2	75	3.1	2.9	0.63	21	19	10	S.I.D.	S.I.D.	S.I.D.	3	0	100	1.3	1.2	0.23
Oil and Grease	94	1	mg/l	8	1	88	3.3	2.9	0.51	21	17	19	S.I.D.	S.I.D.	S.I.D.	3	0	100	1.3	1.2	0.23
Total Phenols	94	0.1	mg/l	8	8	0	S.I.D.	S.I.D.	S.I.D.	21	21	0	S.I.D.	S.I.D.	S.I.D.	3	3	0	S.I.D.	S.I.D.	S.I.D.
Indicator Bacteria																					
Total Coliform	94	20	MPN/100ml	8	0	100	1,140,000	1,250,000	0.71	21	1	95	9,187	2,200	1.25	3	0	100	1,366,667	1,600,000	0.30
Fecal Coliform	94	20	MPN/100ml	8	0	100	528,750	90,000	1.35	21	2	90	1,397	500	2.60	3	0	100	933,333	900,000	0.70
Ratio Fecal Coliform/Total Coliform	94			0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	0	100	52%	64%	0.79	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Fecal Streptococcus	94	20	MPN/100ml	8	0	100	212,875	150,000	1.37	21	1	95	2,254	800	1.57	3	0	100	1,233,333	1,600,000	0.51
Fecal Enterococcus	94	20	MPN/100ml	8	0	100	86,250	40,000	1.18	21	1	95	679	500	0.98	3	0	100	610,000	140,000	1.41
General Minerals																					
Ammonia	94	0.1	mg/l	33	7	79	1.26	0.30	2.11	41	27	34	0.13	0.05	2.48	34	6	82	0.41	0.30	1.05
Calcium	96	1.0	mg/l	30	0	100	19	11	0.86	39	0	100	50	50	0.09	32	1	97	6.7	5.8	0.55
Magnesium	96	1.0	mg/l	30	0	100	6.8	3.9	0.92	39	0	100	15	16	0.26	32	8	75	1.5	1.2	0.66
Potassium	94	1.0	mg/l	36	0	100	4.0	2.8	0.81	45	0	100	2.4	2.4	0.22	38	0	100	3.6	2.9	0.66
Sodium	96	1.0	mg/l	33	0	100	37	19	1.03	45	0	100	13	14	0.20	36	0	100	6.2	5.0	0.81
Bicarbonate	94	2.0	mg/l	33	0	100	48	21	0.93	42	0	100	175	176	0.15	35	0	100	21	13	1.04
Carbonate	94	2.0	mg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	42	36	14	S.I.D.	S.I.D.	S.I.D.	35	35	0	S.I.D.	S.I.D.	S.I.D.
Chloride	94	2.0	mg/l	33	0	100	50	15.8	1.28	43	0	100	6.6	6.5	0.26	33	2	94	5.0	4.2	0.69
Fluoride	94	0.1	mg/l	33	18	45	0.13	0.05	0.81	43	0	100	0.37	0.36	0.21	33	27	18	S.I.D.	S.I.D.	S.I.D.
Nitrate	94	0.1	mg/l	33	1	97	2.6	2.0	0.63	43	0	100	5.2	4.6	0.56	33	1	97	3.9	2.1	1.38
Sulfate	94	0.1	mg/l	33	0	100	35	11	1.18	43	0	100	17	15	0.40	33	0	100	6.9	3.8	1.05
Alkalinity	94	4.0	mg/l	33	0	100	48	21	0.93	42	0	100	169	174	0.13	35	0	100	20	13	0.91
Hardness	96	2.0	mg/l	30	0	100	76	42	0.87	39	0	100	185	190	0.11	31	0	100	23	20	0.53
COD	97	5	mg/l	24	0	100	98	89	0.80	34	15	56	17	11	1.35	32	5	84	89	39	1.87
pH	94	0-14		33	0	100	7.0	6.8	0.07	42	0	100	8.1	8.1	0.03	35	0	100	6.5	6.5	0.06
Specific Conductance	94	1.0	umhos/cm	31	0	100	356	167	0.99	38	0	100	386	390	0.11	33	0	100	90	61	0.77
Total Dissolved Solids	96	2.0	mg/l	29	0	100	226	106	0.93	36	0	100	237	240	0.09	32	0	100	58	38	0.80
Turbidity	94	0.1	NTU	33	0	100	31	24	0.67	41	0	100	69	5.6	2.30	34	0	100	34	19	1.17
Total Suspended Solids	96	2.0	mg/l	29	0	100	66	53	0.65	39	1	97	186	18	3.27	30	0	100	95	61	1.16
Volatile Suspended Solids	94	1.0	mg/l/hr	31	0	100	32	29	0.54	41	7	83	36	12	2.48	31	0	100	48	31	0.91
MBAS	97	0.05	mg/l	22	11	50	0.18	0.04	1.52	30	30	0	S.I.D.	S.I.D.	S.I.D.	29	26	10	S.I.D.	S.I.D.	S.I.D.
Total Organic Carbon	94	1.0	mg/l	35	0	100	10	7.3	0.74	43	0	100	5.3	3.6	0.84	38	0	100	9.8	7.1	0.76
BOD	94	2.0	mg/l	26	1	96	27	24	0.58	39	4	90	12	5.0	1.01	27	0	100	16	15	0.68
Nutrients																					
Dissolved Phosphorus	94	0.05	mg/l	33	1	97	0.30	0.19	0.86	37	21	43	0.11	0.03	3.38	32	0	100	0.29	0.25	0.57
Total Phosphorus	94	0.05	mg/l	32	1	97	0.39	0.28	0.77	39	16	59	0.16	0.05	2.63	32	0	100	0.39	0.32	0.77
NH3-N	94	0.1	mg/l	33	8	76	1.04	0.25	2.11	41	30	27	0.11	0.05	2.41	34	7	79	0.34	0.25	1.04
Nitrate-N	96	0.1	mg/l	31	7	77	0.48	0.43	0.82	40	1	98	1.05	0.94	0.53	32	11	66	0.86	0.46	1.51
Nitrite-N	94	0.1	mg/l	34	7	79	0.16	0.07	1.74	43	30	30	0.05	0.05	0.20	33	12	64	0.10	0.05	1.01
TKN	96	0.1	mg/l	32	0	100	3.4	2.2	0.94	40	0	100	0.79	0.68	0.60	35	0	100	2.9	2.0	1.04
Metals																					
Dissolved Aluminum	96	100	µg/l	33	24	27	241	50	3.19	42	29	31	190	50	2.39	36	26	28	105	50	1.03
Total Aluminum	96	100	µg/l	33	8	76	4055	295	4.87	42	13	69	1681	234	5.25	36	6	83	599	287	1.08
Dissolved Antimony	97	5	µg/l	24	24	0	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Total Antimony	97	5	µg/l	24	24	0	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Arsenic	97	5	µg/l	24	23	4	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Total Arsenic	97	5	µg/l	24	22	8	S.I.D.	S.I.D.	S.I.D.	34	32	6	S.I.D.	S.I.D.	S.I.D.	32	29	9	S.I.D.	S.I.D.	S.I.D.
Dissolved Barium	97	10	µg/l	24	2	92	39	33	0.81	34	2	94	57	58	0.41	32	17	47	14	5.0	0.92
Total Barium	97	10	µg/l	24	2	92	114	41	2.64	34	2	94	83	62	1.59	32	11	66	21	21	0.72
Dissolved Beryllium	97	1	µg/l	17	17	0	S.I.D.	S.I.D.	S.I.D.	22	22	0	S.I.D.	S.I.D.	S.I.D.	19	19	0	S.I.D.	S.I.D.	S.I.D.
Total Beryllium	97	1	µg/l	24	23	4	S.I.D.	S.I.D.	S.I.D.	34	33	3	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Boron	97	100	µg/l	24	3	88	198	188	0.49	32	14	56	121	116	0.65	32	12	63	126	125	0.58
Total Boron	97	100	µg/l	24	1	96	261	254	0.41	32	8	75	178	170	0.59	32	5	84	181	171	0.52
Dissolved Cadmium	97	1	µg/l	24	21	13	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	31	3	S.I.D.	S.I.D.	S.I.D.
Total Cadmium	97	1	µg/l	24	19	21	0.73	0.50	0.71	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	30	6	S.I.D.	S.I.D.	S.I.D.
Dissolved Chromium	97	5	µg/l	24	24	0	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Total Chromium	97	5	µg/l	24	18	25	27	2.5	4.18	34	33	3	S.I.D.	S.I.D.	S.I.D.	32	29	9	S.I.D.	S.I.D.	S.I.D.
Dissolved Chromium +6	94	10	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	41	41	0	S.I.D.	S.I.D.	S.I.D.	36	36	0	S.I.D.	S.I.D.	S.I.D.
Total Chromium +6	94	10	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	41	41	0	S.I.D.	S.I.D.	S.I.D.	36	36	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Copper	97	5	µg/l	24	3	88	14	11	0.84	34	31	9	S.I.D.	S.I.D.	S.I.D.	32	15	53	8.5	6.7	0.95

Table 4-12. Summary of 1994-2000 Land Use Results by Site

	Data Included Since[a]	DL	Units	Commercial						Vacant						High Density Single Family Residential					
				No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV
Total Copper	97	5	µg/l	24	0	100	39	22	1.57	34	15	56	15	5.5	3.14	32	2	94	15	11	0.57
Dissolved Iron	94	100	µg/l	39	17	56	382	106	2.81	45	35	22	202	50	3.27	38	27	29	123	50	1.20
Total Iron	94	100	µg/l	40	2	95	5319	587	5.24	45	14	69	3003	233	5.23	38	7	82	1117	546	1.36
Dissolved Lead	97	5	µg/l	24	20	17	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	28	13	S.I.D.	S.I.D.	S.I.D.
Total Lead	97	5	µg/l	24	15	38	18	2.5	2.80	34	31	9	S.I.D.	S.I.D.	S.I.D.	32	14	56	10	5.4	1.03
Dissolved Manganese	98	100	µg/l	14	14	0	S.I.D.	S.I.D.	S.I.D.	18	18	0	S.I.D.	S.I.D.	S.I.D.	11	10	9	S.I.D.	S.I.D.	S.I.D.
Total Manganese	98	100	µg/l	14	13	7	S.I.D.	S.I.D.	S.I.D.	18	14	22	67	50	0.48	11	10	9	S.I.D.	S.I.D.	S.I.D.
Dissolved Mercury	94	1	µg/l	37	35	5	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.	35	35	0	S.I.D.	S.I.D.	S.I.D.
Total Mercury	94	1	µg/l	37	35	5	S.I.D.	S.I.D.	S.I.D.	43	42	2	S.I.D.	S.I.D.	S.I.D.	35	34	3	S.I.D.	S.I.D.	S.I.D.
Dissolved Nickel	97	5	µg/l	24	21	13	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Nickel	97	5	µg/l	24	16	33	15	2.5	3.69	34	29	15	S.I.D.	S.I.D.	S.I.D.	32	27	16	S.I.D.	S.I.D.	S.I.D.
Dissolved Selenium	94	5	µg/l	40	40	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.	38	38	0	S.I.D.	S.I.D.	S.I.D.
Total Selenium	94	5	µg/l	40	35	13	S.I.D.	S.I.D.	S.I.D.	45	44	2	S.I.D.	S.I.D.	S.I.D.	38	38	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Silver	97	1	µg/l	24	23	4	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Total Silver	97	1	µg/l	24	22	8	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	31	3	S.I.D.	S.I.D.	S.I.D.
Dissolved Thallium	97	5	µg/l	24	24	0	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Total Thallium	97	5	µg/l	24	24	0	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Zinc	94	50	µg/l	40	4	90	152	130	0.66	45	43	4	S.I.D.	S.I.D.	S.I.D.	38	30	21	44	25	1.42
Total Zinc	94	50	µg/l	40	0	100	241	192	0.71	45	33	27	46	25	1.67	38	13	66	79	66	0.75
SVOCs																					
Bis(2-ethylhexyl)phthalate	99	1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
PAHs																					
Acenaphthene	99	0.05	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
Acenaphthylene	99	0.05	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
Antracene	99	0.05	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
Benzo(a)anthracene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	4	20	S.I.D.	S.I.D.	1.24
Benzo(a)pyrene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
Benzo(b)fluoranthene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	4	20	S.I.D.	S.I.D.	1.29
Benzo(k)fluoranthene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	4	20	S.I.D.	S.I.D.	1.18
Chrysene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	4	20	S.I.D.	S.I.D.	1.18
Dibenz(a,h)anthracene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
Fluoranthene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.	5	3	40	0.53	0.050	1.67
Fluorene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
Indeno (1,2,3-cd)pyrene	99	0.1	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.
Naphthalene	99	0.05	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.	5	3	40	0.04	0.025	0.59
Phenanthrene	99	0.05	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.	5	3	40	0.13	0.025	1.66
Pyrene	99	0.05	µg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.	5	1	80	0.83	0.37	1.44
All other SVOCs	94	0.05-5.0	µg/l	23	23	0	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	26	26	0	S.I.D.	S.I.D.	S.I.D.
Pesticides																					
Organochlorine Pesticides & PCBs	94	0.05-1.0	µg/l	19	19	0	S.I.D.	S.I.D.	S.I.D.	38	38	0	S.I.D.	S.I.D.	S.I.D.	31	31	0	S.I.D.	S.I.D.	S.I.D.
Carbofuran	96	5	µg/l	28	28	0	S.I.D.	S.I.D.	S.I.D.	38	38	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Glyphosate	98	25	µg/l	14	14	0	S.I.D.	S.I.D.	S.I.D.	18	18	0	S.I.D.	S.I.D.	S.I.D.	11	11	0	S.I.D.	S.I.D.	S.I.D.
Organo-Phosphate Pesticides																					
Diazinon	96	0.01	µg/l	24	21	13	S.I.D.	S.I.D.	S.I.D.	36	36	0	S.I.D.	S.I.D.	S.I.D.	30	28	7	S.I.D.	S.I.D.	S.I.D.
Chlorpyrifos	96	0.05	µg/l	24	24	0	S.I.D.	S.I.D.	S.I.D.	36	36	0	S.I.D.	S.I.D.	S.I.D.	30	30	0	S.I.D.	S.I.D.	S.I.D.
N- and P-Containing Pesticides																					
Thiobencarb	96	1	µg/l	24	24	0	S.I.D.	S.I.D.	S.I.D.	36	36	0	S.I.D.	S.I.D.	S.I.D.	30	30	0	S.I.D.	S.I.D.	S.I.D.
All other N- and P- Pesticieds	94	1.0-2.0	µg/l	28	28	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.	32	32	0	S.I.D.	S.I.D.	S.I.D.
Phenoxyacetic Acid Herbicides																					
2,4-D	96	10	µg/l	17	17	0	S.I.D.	S.I.D.	S.I.D.	35	35	0	S.I.D.	S.I.D.	S.I.D.	27	27	0	S.I.D.	S.I.D.	S.I.D.
2,4,5-TP	96	1	µg/l	17	17	0	S.I.D.	S.I.D.	S.I.D.	35	35	0	S.I.D.	S.I.D.	S.I.D.	27	27	0	S.I.D.	S.I.D.	S.I.D.
Bentazon	96	2	µg/l	17	17	0	S.I.D.	S.I.D.	S.I.D.	35	35	0	S.I.D.	S.I.D.	S.I.D.	27	27	0	S.I.D.	S.I.D.	S.I.D.

CV = Coeffiecient of variation
DL = Detection Limit
S.I.D. = Statistically Invalid Data, not enough data above detection limit collected
a) Detection limtis have changed throughout the monitoring process. Only data matching the current detection limit is displayed in this table. The *Data Included Since* field indicates the first year of the storm season with the current detection limit.

Table 4-12. Summary of 1994-2000 Land Use Results by Site

	Data Included Since[a]	DL	Units	Transportation						Light Industrial						Educational					
				No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV
Miscellaneous Constituents																					
Cyanide	96	0.01	mg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
TPH	94	1	mg/l	4	0	100	3.1	2.8	0.47	5	1	80	1.7	1.4	0.68	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Oil and Grease	94	1	mg/l	4	0	100	3.1	2.8	0.47	5	1	80	1.7	1.4	0.68	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Total Phenols	94	0.1	mg/l	4	4	0	S.I.D.	S.I.D.	S.I.D.	5	5	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Indicator Bacteria																					
Total Coliform	94	20	MPN/100ml	4	0	100	692,500	600,000	0.82	5	0	100	454,000	160,000	1.42	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Fecal Coliform	94	20	MPN/100ml	4	0	100	328,750	205,000	1.22	5	0	100	338,220	30,000	2.09	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Ratio Fecal Coliform/Total Coliform	94			0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Fecal Streptococcus	94	20	MPN/100ml	4	0	100	176,000	195,000	0.68	5	0	100	253,000	160,000	1.46	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Fecal Enterococcus	94	20	MPN/100ml	4	0	100	32,000	32,000	0.65	5	0	100	98,200	130,000	0.73	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
General Minerals																					
Ammonia	94	0.1	mg/l	62	16	74	0.29	0.16	1.52	47	7	85	0.59	0.32	1.35	40	12	70	0.33	0.18	1.62
Calcium	96	1.0	mg/l	61	0	100	8.4	7.7	0.46	40	0	100	12	8.8	1.01	39	0	100	16	10	0.71
Magnesium	96	1.0	mg/l	61	4	93	1.6	1.5	0.48	40	0	100	2.3	1.9	1.13	39	8	79	3.2	2.4	0.96
Potassium	94	1.0	mg/l	63	2	97	2.1	1.7	0.56	50	1	98	2.7	2.2	0.59	41	0	100	3.4	2.7	0.49
Sodium	96	1.0	mg/l	62	0	100	8.3	6.4	0.81	47	0	100	14	12	0.69	41	0	100	26	8.0	2.21
Bicarbonate	94	2.0	mg/l	63	0	100	20	18	0.57	47	0	100	26	20	0.92	40	0	100	39	28	0.76
Carbonate	94	2.0	mg/l	63	63	0	S.I.D.	S.I.D.	S.I.D.	47	47	0	S.I.D.	S.I.D.	S.I.D.	40	40	0	S.I.D.	S.I.D.	S.I.D.
Chloride	94	2.0	mg/l	64	3	95	5.6	4.4	0.82	47	0	100	12	8.6	0.80	40	4	90	34	4.6	2.89
Fluoride	94	0.1	mg/l	64	41	36	0.10	0.05	0.97	47	22	53	0.13	0.11	0.94	40	24	40	0.14	0.050	1.21
Nitrate	94	0.1	mg/l	64	2	97	2.9	1.8	1.27	47	0	100	4.1	2.4	1.09	40	2	95	2.6	2.2	0.73
Sulfate	94	0.1	mg/l	64	0	100	9.5	6.4	1.07	47	0	100	12.6	9.2	1.02	40	0	100	17.3	9.3	1.23
Alkalinity	94	4.0	mg/l	63	0	100	20	16	0.55	47	0	100	25	19	0.94	40	0	100	36	26	0.72
Hardness	96	2.0	mg/l	61	0	100	27	24	0.46	40	0	100	39	30	1.02	39	0	100	52	40	0.79
COD	97	5	mg/l	52	7	87	50	33	0.99	36	4	89	80	51	0.92	40	10	75	37	34	0.85
pH	94	0-14		63	0	100	6.7	6.6	0.05	47	0	100	6.8	6.8	0.06	40	0	100	7.0	6.9	0.07
Specific Conductance	94	1.0	umhos/cm	63	0	100	99	84	0.66	43	0	100	147	119	0.77	39	0	100	243	111	1.41
Total Dissolved Solids	96	2.0	mg/l	61	0	100	62	54	0.69	40	0	100	95	77	0.80	39	0	100	147	68	1.35
Turbidity	94	0.1	NTU	64	0	100	31	22	1.25	47	0	100	76	55	1.59	41	0	100	64	36	1.14
Total Suspended Solids	96	2.0	mg/l	61	0	100	78	50	1.30	41	0	100	240	129	1.36	39	0	100	95	61	1.05
Volatile Suspended Solids	94	1.0	mg/l/hr	63	1	98	31	20	1.22	43	0	100	57	46	0.79	39	0	100	23	21	0.69
MBAS	97	0.05	mg/l	51	30	41	2.6	0.025	6.95	32	10	69	0.13	0.11	0.90	38	33	13	S.I.D.	S.I.D.	S.I.D.
Total Organic Carbon	94	1.0	mg/l	63	0	100	8.7	6.8	0.71	47	0	100	11.9	9.8	0.77	42	0	100	7.5	6.5	0.50
BOD	94	2.0	mg/l	54	0	100	21	19	0.80	37	0	100	20	17	0.67	34	0	100	13	12	0.68
Nutrients																					
Dissolved Phosphorus	94	0.05	mg/l	59	3	95	0.34	0.28	0.79	46	4	91	0.27	0.20	1.01	37	1	97	0.27	0.20	0.86
Total Phosphorus	94	0.05	mg/l	59	1	98	0.44	0.32	0.84	45	2	96	0.41	0.30	0.92	37	0	100	0.31	0.23	0.65
NH3-N	94	0.1	mg/l	62	19	69	0.24	0.14	1.51	48	9	81	0.48	0.26	1.36	40	12	70	0.28	0.15	1.58
Nitrate-N	96	0.1	mg/l	61	15	75	0.70	0.40	1.68	43	2	95	0.87	0.52	1.32	39	12	69	0.51	0.48	0.86
Nitrite-N	94	0.1	mg/l	64	10	84	0.09	0.06	0.72	47	9	81	0.09	0.06	0.73	39	13	67	0.09	0.05	1.41
TKN	96	0.1	mg/l	61	0	100	1.9	1.3	0.93	45	0	100	3.0	2.3	0.72	39	0	100	1.6	1.3	0.73
Metals																					
Dissolved Aluminum	96	100	µg/l	62	29	53	159	107	1.18	47	23	51	460	117	1.96	42	11	74	397	248	1.21
Total Aluminum	96	100	µg/l	63	10	84	672	354	1.65	47	7	85	1824	470	2.37	42	2	95	881	720	0.83
Dissolved Antimony	97	5	µg/l	54	53	2	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Total Antimony	97	5	µg/l	54	53	2	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Arsenic	97	5	µg/l	54	54	0	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	39	7	S.I.D.	S.I.D.	S.I.D.
Total Arsenic	97	5	µg/l	54	52	4	S.I.D.	S.I.D.	S.I.D.	37	34	8	S.I.D.	S.I.D.	S.I.D.	42	39	7	S.I.D.	S.I.D.	S.I.D.
Dissolved Barium	97	10	µg/l	54	15	72	19	17	0.75	37	6	84	34	26	0.81	42	6	86	28	26	0.72
Total Barium	97	10	µg/l	54	9	83	34	27	0.88	37	4	89	68	36	1.38	42	6	86	37	33	0.74
Dissolved Beryllium	97	1	µg/l	40	40	0	S.I.D.	S.I.D.	S.I.D.	34	34	0	S.I.D.	S.I.D.	S.I.D.	29	29	0	S.I.D.	S.I.D.	S.I.D.
Total Beryllium	97	1	µg/l	54	54	0	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Boron	97	100	µg/l	54	16	70	146	132	0.55	37	18	51	122	102	0.71	42	5	88	189	153	0.65
Total Boron	97	100	µg/l	54	5	91	219	214	0.50	36	10	72	187	181	0.63	42	4	90	254	227	0.58
Dissolved Cadmium	97	1	µg/l	54	50	7	S.I.D.	S.I.D.	S.I.D.	37	34	8	S.I.D.	S.I.D.	S.I.D.	42	40	5	S.I.D.	S.I.D.	S.I.D.
Total Cadmium	97	1	µg/l	54	32	41	1.1	0.50	1.04	37	30	19	S.I.D.	S.I.D.	S.I.D.	42	34	19	S.I.D.	S.I.D.	S.I.D.
Dissolved Chromium	97	5	µg/l	54	51	6	S.I.D.	S.I.D.	S.I.D.	37	33	11	S.I.D.	S.I.D.	S.I.D.	42	41	2	S.I.D.	S.I.D.	S.I.D.
Total Chromium	97	5	µg/l	54	40	26	4.8	2.5	1.15	37	25	32	6.8	2.5	1.60	42	33	21	3.6	2.5	0.74
Dissolved Chromium +6	94	10	µg/l	63	63	0	S.I.D.	S.I.D.	S.I.D.	47	47	0	S.I.D.	S.I.D.	S.I.D.	43	43	0	S.I.D.	S.I.D.	S.I.D.
Total Chromium +6	94	10	µg/l	63	63	0	S.I.D.	S.I.D.	S.I.D.	47	47	0	S.I.D.	S.I.D.	S.I.D.	43	43	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Copper	97	5	µg/l	54	0	100	33	27	0.63	37	5	86	20	14	1.07	42	8	81	13	9.9	0.94

Table 4-12. Summary of 1994-2000 Land Use Results by Site

	Data Included Since[a]	DL	Units	Transportation						Light Industrial						Educational					
				No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV
Total Copper	97	5	µg/l	54	0	100	56	39	1.15	37	0	100	32	21	1.03	42	0	100	24	15	1.49
Dissolved Iron	94	100	µg/l	65	34	48	200	50	1.90	51	25	51	698	104	2.99	42	15	64	454	190	2.30
Total Iron	94	100	µg/l	65	2	97	1188	512	1.74	51	5	90	6504	600	4.26	42	4	90	2705	625	3.32
Dissolved Lead	97	5	µg/l	54	48	11	S.I.D.	S.I.D.	S.I.D.	37	32	14	S.I.D.	S.I.D.	S.I.D.	42	40	5	S.I.D.	S.I.D.	S.I.D.
Total Lead	97	5	µg/l	54	29	46	10	2.5	1.57	37	18	51	17	5.1	1.88	42	30	29	4.9	2.5	1.09
Dissolved Manganese	98	100	µg/l	27	25	7	S.I.D.	S.I.D.	S.I.D.	26	23	12	S.I.D.	S.I.D.	S.I.D.	17	17	0	S.I.D.	S.I.D.	S.I.D.
Total Manganese	98	100	µg/l	27	25	7	S.I.D.	S.I.D.	S.I.D.	26	23	12	S.I.D.	S.I.D.	S.I.D.	17	17	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Mercury	94	1	µg/l	63	63	0	S.I.D.	S.I.D.	S.I.D.	48	48	0	S.I.D.	S.I.D.	S.I.D.	40	40	0	S.I.D.	S.I.D.	S.I.D.
Total Mercury	94	1	µg/l	63	62	2	S.I.D.	S.I.D.	S.I.D.	48	45	6	S.I.D.	S.I.D.	S.I.D.	40	40	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Nickel	97	5	µg/l	54	41	24	3.9	2.5	0.93	37	23	38	5.0	2.5	0.90	42	38	10	S.I.D.	S.I.D.	S.I.D.
Nickel	97	5	µg/l	54	29	46	6.0	2.5	1.07	37	15	59	9.8	6.0	1.47	42	26	38	4.7	2.5	0.69
Dissolved Selenium	94	5	µg/l	65	65	0	S.I.D.	S.I.D.	S.I.D.	51	51	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Total Selenium	94	5	µg/l	65	61	6	S.I.D.	S.I.D.	S.I.D.	51	48	6	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Silver	97	1	µg/l	54	54	0	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Total Silver	97	1	µg/l	54	54	0	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Thallium	97	5	µg/l	54	54	0	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Total Thallium	97	5	µg/l	54	54	0	S.I.D.	S.I.D.	S.I.D.	37	37	0	S.I.D.	S.I.D.	S.I.D.	42	42	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Zinc	94	50	µg/l	65	5	92	192	152	0.74	51	3	94	407	303	1.18	42	19	55	66	56	0.83
Total Zinc	94	50	µg/l	65	0	100	291	218	0.99	51	0	100	639	366	1.53	42	5	88	138	98	1.73
SVOCs																					
Bis(2-ethylhexyl)phthalate	99	1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
PAHs																					
Acenaphthene	99	0.05	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Acenaphthylene	99	0.05	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Antracene	99	0.05	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Benzo(a)anthracene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Benzo(a)pyrene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Benzo(b)fluoranthene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Benzo(k)fluoranthene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Chrysene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Dibenz(a,h)anthracene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Fluoranthene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Fluorene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Indeno (1,2,3-cd)pyrene	99	0.1	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Naphthalene	99	0.05	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Phenanthrene	99	0.05	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Pyrene	99	0.05	µg/l	1	1	0	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
All other SVOCs	94	0.05-5.0	µg/l	40	40	0	S.I.D.	S.I.D.	S.I.D.	24	24	0	S.I.D.	S.I.D.	S.I.D.	23	23	0	S.I.D.	S.I.D.	S.I.D.
Pesticides																					
Organochlorine Pesticides & PCBs	94	0.05-1.0	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	20	20	0	S.I.D.	S.I.D.	S.I.D.	22	22	0	S.I.D.	S.I.D.	S.I.D.
Carbofuran	96	5	µg/l	60	60	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.	43	43	0	S.I.D.	S.I.D.	S.I.D.
Glyphosate	98	25	µg/l	27	25	7	S.I.D.	S.I.D.	S.I.D.	26	26	0	S.I.D.	S.I.D.	S.I.D.	17	15	12	S.I.D.	S.I.D.	S.I.D.
Organo-Phosphate Pesticides																					
Diazinon	96	0.01	µg/l	57	56	2	S.I.D.	S.I.D.	S.I.D.	40	40	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Chlorpyrifos	96	0.05	µg/l	57	57	0	S.I.D.	S.I.D.	S.I.D.	40	40	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
N- and P-Containing Pesticides																					
Thiobencarb	96	1	µg/l	57	57	0	S.I.D.	S.I.D.	S.I.D.	40	40	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
All other N- and P- Pesticieds	94	1.0-2.0	µg/l	58	58	0	S.I.D.	S.I.D.	S.I.D.	43	43	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Phenoxyacetic Acid Herbicides																					
2,4-D	96	10	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	22	22	0	S.I.D.	S.I.D.	S.I.D.	24	24	0	S.I.D.	S.I.D.	S.I.D.
2,4,5-TP	96	1	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	22	22	0	S.I.D.	S.I.D.	S.I.D.	24	24	0	S.I.D.	S.I.D.	S.I.D.
Bentazon	96	2	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	22	22	0	S.I.D.	S.I.D.	S.I.D.	24	24	0	S.I.D.	S.I.D.	S.I.D.

CV = Coeffiecient of variation
DL = Detection Limit
S.I.D. = Statistically Invalid Data, not enough data above detection limit collected
a) Detection limtis have changed through out the monitoring process. Only data matching the current detection limit is displayed in this table. The Data Included Since field indicates the first year of the strom season with the current detection limit.

Table 4-12. Summary of 1994-2000 Land Use Results by Site

	Data Included Since[a]	DL	Units	Multifamily Residential						Mixed Residential					
				No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV
Miscellaneous Constituents															
Cyanide	96	0.01	mg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	1	0	100	S.I.D.	S.I.D.	S.I.D.
TPH	94	1	mg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	1	0	100	S.I.D.	S.I.D.	S.I.D.
Oil and Grease	94	1	mg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.
Total Phenols	94	0.1	mg/l	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	1	1	0	S.I.D.	S.I.D.	S.I.D.
Indicator Bacteria															
Total Coliform	94	20	MPN/100ml	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	1	0	100	S.I.D.	S.I.D.	S.I.D.
Fecal Coliform	94	20	MPN/100ml	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	1	0	100	S.I.D.	S.I.D.	S.I.D.
Ratio Fecal Coliform/Total Coliform	94			0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
Fecal Streptococcus	94	20	MPN/100ml	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	1	0	100	S.I.D.	S.I.D.	S.I.D.
Fecal Enterococcus	94	20	MPN/100ml	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.	0	0	S.I.D.	S.I.D.	S.I.D.	S.I.D.
General Minerals															
Ammonia	94	0.1	mg/l	38	9	76	0.47	0.29	1.44	42	4	90	0.67	0.39	1.13
Calcium	96	1.0	mg/l	35	0	100	19.3	8.0	1.20	39	1	97	7.5	6.4	0.70
Magnesium	96	1.0	mg/l	35	9	74	3.3	1.9	1.24	39	7	82	1.7	1.5	0.82
Potassium	94	1.0	mg/l	44	4	91	2.3	2.1	0.65	45	6	87	2.2	2.1	0.89
Sodium	96	1.0	mg/l	44	1	98	10	5.4	1.20	45	2	96	6.5	4.8	1.31
Bicarbonate	94	2.0	mg/l	39	0	100	39	17	1.19	40	0	100	17	14	0.82
Carbonate	94	2.0	mg/l	39	39	0	S.I.D.	S.I.D.	S.I.D.	40	40	0	S.I.D.	S.I.D.	S.I.D.
Chloride	94	2.0	mg/l	37	8	78	13	3.0	1.49	38	10	74	3.5	2.7	0.93
Fluoride	94	0.1	mg/l	37	20	46	0.16	0.05	1.07	38	25	34	0.11	0.05	0.98
Nitrate	94	0.1	mg/l	37	1	97	5.3	3.6	0.87	38	3	92	6.8	2.3	3.74
Sulfate	94	0.1	mg/l	37	0	100	15	4.1	1.52	38	0	100	7.4	5.0	0.94
Alkalinity	94	4.0	mg/l	39	0	100	37	17	1.18	40	0	100	16	14	0.73
Hardness	96	2.0	mg/l	35	0	100	55	26	1.11	39	1	97	25	20	0.75
COD	97	5	mg/l	43	6	86	60	26	2.02	45	8	82	64	34	1.27
pH	94	0-14		39	0	100	6.9	6.6	0.10	40	0	100	6.5	6.4	0.05
Specific Conductance	94	1.0	umhos/cm	33	0	100	169	61	1.18	40	1	98	85	58	0.85
Total Dissolved Solids	96	2.0	mg/l	33	0	100	105	42	1.19	40	1	98	53	37	0.88
Turbidity	94	0.1	NTU	39	0	100	23	10	1.55	40	0	100	21	15	1.06
Total Suspended Solids	96	2.0	mg/l	36	1	97	46	24	1.41	38	0	100	63	40	1.19
Volatile Suspended Solids	94	1.0	mg/l/hr	36	2	94	19	13	1.01	37	2	95	35	25	1.33
MBAS	97	0.05	mg/l	36	26	28	0.049	0.025	1.13	39	25	36	0.068	0.025	1.86
Total Organic Carbon	94	1.0	mg/l	37	0	100	6.9	6.0	0.85	43	0	100	8.8	6.8	0.74
BOD	94	2.0	mg/l	31	2	94	11	9	0.91	34	0	100	18	14	0.90
Nutrients															
Dissolved Phosphorus	94	0.05	mg/l	30	1	97	0.16	0.10	1.04	39	2	95	0.20	0.14	0.87
Total Phosphorus	94	0.05	mg/l	30	1	97	0.19	0.14	1.00	39	1	97	0.26	0.18	0.99
NH3-N	94	0.1	mg/l	38	9	76	0.39	0.24	1.43	42	5	88	0.56	0.33	1.13
Nitrate-N	96	0.1	mg/l	37	12	68	1.10	0.80	1.01	38	13	66	0.55	0.44	0.91
Nitrite-N	94	0.1	mg/l	37	10	73	0.10	0.05	1.65	38	7	82	0.12	0.06	1.47
TKN	96	0.1	mg/l	41	0	100	2.0	1.5	1.11	43	1	98	2.5	1.7	0.95
Metals															
Dissolved Aluminum	96	100	µg/l	45	33	27	115	50	1.58	44	33	25	182	50	2.72
Total Aluminum	96	100	µg/l	45	5	89	387	300	0.91	45	6	87	513	271	1.89
Dissolved Antimony	97	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Antimony	97	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	44	2	S.I.D.	S.I.D.	S.I.D.
Dissolved Arsenic	97	5	µg/l	45	44	2	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Arsenic	97	5	µg/l	45	44	2	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Barium	97	10	µg/l	45	18	60	20	14	0.92	45	19	58	18	14	1.11
Total Barium	97	10	µg/l	45	13	71	25	20	0.81	45	12	73	29	22	1.45
Dissolved Beryllium	97	1	µg/l	31	31	0	S.I.D.	S.I.D.	S.I.D.	31	31	0	S.I.D.	S.I.D.	S.I.D.
Total Beryllium	97	1	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Boron	97	100	µg/l	42	12	71	148	128	0.65	44	21	52	114	111	0.66
Total Boron	97	100	µg/l	43	7	84	202	168	0.58	44	11	75	164	161	0.58
Dissolved Cadmium	97	1	µg/l	45	44	2	S.I.D.	S.I.D.	S.I.D.	45	43	4	S.I.D.	S.I.D.	S.I.D.
Total Cadmium	97	1	µg/l	45	44	2	S.I.D.	S.I.D.	S.I.D.	45	43	4	S.I.D.	S.I.D.	S.I.D.
Dissolved Chromium	97	5	µg/l	45	43	4	S.I.D.	S.I.D.	S.I.D.	45	44	2	S.I.D.	S.I.D.	S.I.D.
Total Chromium	97	5	µg/l	45	39	13	S.I.D.	S.I.D.	S.I.D.	45	42	7	S.I.D.	S.I.D.	S.I.D.
Dissolved Chromium +6	94	10	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Chromium +6	94	10	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Copper	97	5	µg/l	45	20	56	6.9	5.0	0.91	45	17	62	12	8.0	1.42

Table 4-12. Summary of 1994-2000 Land Use Results by Site

	Data Included Since[a]	DL	Units	Multifamily Residential						Mixed Residential					
				No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV
Total Copper	97	5	µg/l	45	4	91	12	12	0.54	45	1	98	19	13	1.29
Dissolved Iron	94	100	µg/l	45	33	27	194	50	2.40	45	33	27	353	50	3.45
Total Iron	94	100	µg/l	45	9	80	791	350	2.14	45	10	78	1475	400	2.67
Dissolved Lead	97	5	µg/l	45	41	9	S.I.D.	S.I.D.	S.I.D.	45	40	11	S.I.D.	S.I.D.	S.I.D.
Total Lead	97	5	µg/l	45	31	31	5.8	2.5	1.48	45	23	49	11	2.5	2.60
Dissolved Manganese	98	100	µg/l	21	21	0	S.I.D.	S.I.D.	S.I.D.	20	18	10	S.I.D.	S.I.D.	S.I.D.
Total Manganese	98	100	µg/l	21	20	5	S.I.D.	S.I.D.	S.I.D.	20	18	10	S.I.D.	S.I.D.	S.I.D.
Dissolved Mercury	94	1	µg/l	40	40	0	S.I.D.	S.I.D.	S.I.D.	44	44	0	S.I.D.	S.I.D.	S.I.D.
Total Mercury	94	1	µg/l	40	40	0	S.I.D.	S.I.D.	S.I.D.	44	44	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Nickel	97	5	µg/l	45	44	2	S.I.D.	S.I.D.	S.I.D.	45	42	7	S.I.D.	S.I.D.	S.I.D.
Nickel	97	5	µg/l	45	39	13	S.I.D.	S.I.D.	S.I.D.	45	42	7	S.I.D.	S.I.D.	S.I.D.
Dissolved Selenium	94	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Selenium	94	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	44	2	S.I.D.	S.I.D.	S.I.D.
Dissolved Silver	97	1	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Silver	97	1	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Thallium	97	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Thallium	97	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Zinc	94	50	µg/l	45	21	53	83	53	1.53	45	9	80	133	89	1.33
Total Zinc	94	50	µg/l	45	5	89	146	89	1.37	45	1	98	203	125	1.35
SVOCs															
Bis(2-ethylhexyl)phthalate	99	1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
PAHs															
Acenaphthene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.
Acenaphthylene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Antracene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Benzo(a)anthracene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	4	43	0.38	0.05	1.70
Benzo(a)pyrene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Benzo(b)fluoranthene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.
Benzo(k)fluoranthene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.
Chrysene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	2	71	0.62	0.30	1.32
Dibenz(a,h)anthracene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Fluoranthene	99	0.1	µg/l	6	4	33	0.17	0.050	1.54	7	2	71	0.29	0.27	1.00
Fluorene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Indeno (1,2,3-cd)pyrene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Naphthalene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Phenanthrene	99	0.05	µg/l	6	4	33	0.21	0.025	2.08	7	2	71	0.50	0.24	1.43
Pyrene	99	0.05	µg/l	6	4	33	0.20	0.025	1.95	7	2	71	0.35	0.30	1.03
All other SVOCs	94	0.05-5.0	µg/l	30	30	0	S.I.D.	S.I.D.	S.I.D.	33	33	0	S.I.D.	S.I.D.	S.I.D.
Pesticides															
Organochlorine Pesticides & PCBs	94	0.05-1.0	µg/l	36	36	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Carbofuran	96	5	µg/l	43	43	0	S.I.D.	S.I.D.	S.I.D.	44	44	0	S.I.D.	S.I.D.	S.I.D.
Glyphosate	98	25	µg/l	21	20	5	S.I.D.	S.I.D.	S.I.D.	20	20	0	S.I.D.	S.I.D.	S.I.D.
Organo-Phosphate Pesticides															
Diazinon	96	0.01	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	33	15	S.I.D.	S.I.D.	S.I.D.
Chlorpyrifos	96	0.05	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
N- and P-Containing Pesticides															
Thiobencarb	96	1	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
All other N- and P- Pesticieds	94	1.0-2.0	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Phenoxyacetic Acid Herbicides															
2,4-D	96	10	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
2,4,5-TP	96	1	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Bentazon	96	2	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.

CV = Coeffiecient of variation
DL = Detection Limit
S.I.D. = Statistically Invalid Data, not enough data above detection limit collected
a) Detection limtis have changed through out the monitoring process. Only data matching the current detection limit is displayed in this table. The Data Included Since field indicates the first year of the strom season with the current detection limit.

Table 4-12. Summary of 1994-2000 Land Use Results by Site

	Data Included Since[a]	DL	Units	Multifamily Residential: No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV	Mixed Residential: No. of Samples	No. of Non-detects	Percent Detects	Mean	Median	CV
Total Copper	97	5	µg/l	45	4	91	12	12	0.54	45	1	98	19	13	1.29
Dissolved Iron	94	100	µg/l	45	33	27	194	50	2.40	45	33	27	353	50	3.45
Total Iron	94	100	µg/l	45	9	80	791	350	2.14	45	10	78	1475	400	2.67
Dissolved Lead	97	5	µg/l	45	41	9	S.I.D.	S.I.D.	S.I.D.	45	40	11	S.I.D.	S.I.D.	S.I.D.
Total Lead	97	5	µg/l	45	31	31	5.8	2.5	1.48	45	23	49	11	2.5	2.60
Dissolved Manganese	98	100	µg/l	21	21	0	S.I.D.	S.I.D.	S.I.D.	20	18	10	S.I.D.	S.I.D.	S.I.D.
Total Manganese	98	100	µg/l	21	20	5	S.I.D.	S.I.D.	S.I.D.	20	18	10	S.I.D.	S.I.D.	S.I.D.
Dissolved Mercury	94	1	µg/l	40	40	0	S.I.D.	S.I.D.	S.I.D.	44	44	0	S.I.D.	S.I.D.	S.I.D.
Total Mercury	94	1	µg/l	40	40	0	S.I.D.	S.I.D.	S.I.D.	44	44	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Nickel	97	5	µg/l	45	44	2	S.I.D.	S.I.D.	S.I.D.	45	42	7	S.I.D.	S.I.D.	S.I.D.
Nickel	97	5	µg/l	45	39	13	S.I.D.	S.I.D.	S.I.D.	45	42	7	S.I.D.	S.I.D.	S.I.D.
Dissolved Selenium	94	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Selenium	94	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	44	2	S.I.D.	S.I.D.	S.I.D.
Dissolved Silver	97	1	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Silver	97	1	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Thallium	97	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Total Thallium	97	5	µg/l	45	45	0	S.I.D.	S.I.D.	S.I.D.	45	45	0	S.I.D.	S.I.D.	S.I.D.
Dissolved Zinc	94	50	µg/l	45	21	53	83	53	1.53	45	9	80	133	89	1.33
Total Zinc	94	50	µg/l	45	5	89	146	89	1.37	45	1	98	203	125	1.35
SVOCs															
Bis(2-ethylhexyl)phthalate	99	1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
PAHs															
Acenaphthene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.
Acenaphthylene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Antracene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Benzo(a)anthracene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	4	43	0.38	0.05	1.70
Benzo(a)pyrene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Benzo(b)fluoranthene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.
Benzo(k)fluoranthene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	6	14	S.I.D.	S.I.D.	S.I.D.
Chrysene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	2	71	0.62	0.30	1.32
Dibenz(a,h)anthracene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Fluoranthene	99	0.1	µg/l	6	4	33	0.17	0.050	1.54	7	2	71	0.29	0.27	1.00
Fluorene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Indeno (1,2,3-cd)pyrene	99	0.1	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Naphthalene	99	0.05	µg/l	6	6	0	S.I.D.	S.I.D.	S.I.D.	7	7	0	S.I.D.	S.I.D.	S.I.D.
Phenanthrene	99	0.05	µg/l	6	4	33	0.21	0.025	2.08	7	2	71	0.50	0.24	1.43
Pyrene	99	0.05	µg/l	6	4	33	0.20	0.025	1.95	7	2	71	0.35	0.30	1.03
All other SVOCs	94	0.05-5.0	µg/l	30	30	0	S.I.D.	S.I.D.	S.I.D.	33	33	0	S.I.D.	S.I.D.	S.I.D.
Pesticides															
Organochlorine Pesticides & PCBs	94	0.05-1.0	µg/l	36	36	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Carbofuran	96	5	µg/l	43	43	0	S.I.D.	S.I.D.	S.I.D.	44	44	0	S.I.D.	S.I.D.	S.I.D.
Glyphosate	98	25	µg/l	21	20	5	S.I.D.	S.I.D.	S.I.D.	20	20	0	S.I.D.	S.I.D.	S.I.D.
Organo-Phosphate Pesticides															
Diazinon	96	0.01	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	33	15	S.I.D.	S.I.D.	S.I.D.
Chlorpyrifos	96	0.05	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
N- and P-Containing Pesticides															
Thiobencarb	96	1	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
All other N- and P- Pesticieds	94	1.0-2.0	µg/l	37	37	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Phenoxyacetic Acid Herbicides															
2,4-D	96	10	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
2,4,5-TP	96	1	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.
Bentazon	96	2	µg/l	33	33	0	S.I.D.	S.I.D.	S.I.D.	39	39	0	S.I.D.	S.I.D.	S.I.D.

CV = Coeffiecient of variation
DL = Detection Limit
S.I.D. = Statistically Invalid Data, not enough data above detection limit collected
a) Detection limtis have changed through out the monitoring process. Only data matching the current detection limit is displayed in this table. The Data Included Since field indicates the first year of the strom season with the current detection limit.

Appendix D

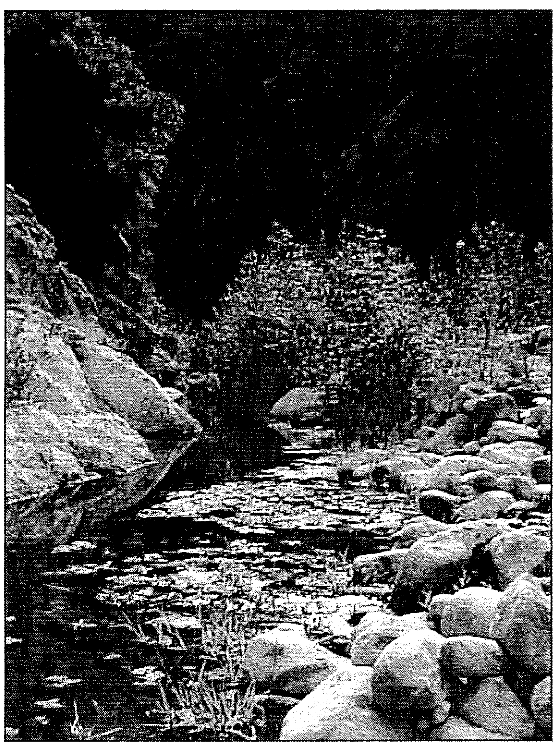
Ventura County
Stormwater Monitoring Data
(Excerpt)

Annual Report for Permit Year 5,
Reporting Year 11

October 2005

2004-05 Annual Report

Ventura Countywide Stormwater Quality Management Program



A cooperative project of the County of Ventura, the cities of Ventura County and the Ventura County Watershed Protection District

9.9.2 Monitoring Results

Land Use, Receiving Water, and Mass Emission water quality results for the 2004/05 monitoring year were generated from the collection and analysis of composite and grab samples. Results are reported as the concentrations measured from either flow-proportional or time-paced composite samples, or from single grab samples. As mentioned earlier, only samples collected from the ME-CC and ME-VR stations are collected as flow-proportional composite samples; all other composites are collected as time-paced samples. In either case, the results can be interpreted as the best available estimate of the event mean concentrations (EMC) for the given storm event.

The following constituents are collected as grab samples:

- Perchlorate
- E. Coli
- Enterococcus
- Fecal Coliform
- Total Coliform
- Conductivity
- pH
- Water Temperature
- Oil and Grease
- TRPH
- Mercury (total recoverable and dissolved)
- Ammonia Nitrogen
- MTBE (Land Use and Receiving Water sites)
- Toxicity

All other constituents are analyzed from composite samples.

9.9.3 Receiving Water and Land Use Station Results

Water quality results for the 2004/05 monitoring season from the Land Use and Receiving Water stations are presented in Table 9-40 through Table 9-55.

Table 9-40: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Residential Land Use Station R-1

Classification	Constituent	Fraction	Units	R-1 10/16/04
Anion	Bromide	n/a	mg/L	0.01
Anion	Chloride	n/a	mg/L	24.7
Anion	Perchlorate	n/a	µg/L	< 2
Conventional	BOD	n/a	mg/L	18
Conventional	Conductivity	n/a	µmhos/cm	400
Conventional	Hardness as CaCO3	Total	mg/L	62.8
Conventional	pH	n/a	pH Units	7.7
Conventional	Total Dissolved Solids	n/a	mg/L	190
Conventional	Total Organic Carbon	n/a	mg/L	41
Conventional	Total Suspended Solids	n/a	mg/L	71
Hydrocarbon	Oil and Grease	n/a	mg/L	< 1
Hydrocarbon	TRPH	n/a	mg/L	1
Nutrient	Ammonia as N	n/a	mg/L	0.6
Nutrient	Nitrate as N	n/a	mg/L	1.5
Nutrient	Nitrite as N	n/a	mg/L	0.09
Nutrient	Orthophosphate as P	n/a	mg/L	1.39 *
Nutrient	TKN	n/a	mg/L	3.1
Nutrient	Total Phosphorus	Dissolved	mg/L	< 0.016
Nutrient	Total Phosphorus	Total	mg/L	2.5 *

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-41: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Industrial Land Use Station I-2

Classification	Constituent	Fraction	Units	I-2 10/16/04
Anion	Bromide	n/a	mg/L	0.51
Anion	Chloride	n/a	mg/L	42.8
Anion	Perchlorate	n/a	µg/L	< 2
Conventional	BOD	n/a	mg/L	16
Conventional	Conductivity	n/a	µmhos/cm	800
Conventional	Hardness as CaCO3	Total	mg/L	286
Conventional	pH	n/a	pH Units	7.9
Conventional	Total Dissolved Solids	n/a	mg/L	760
Conventional	Total Organic Carbon	n/a	mg/L	40
Conventional	Total Suspended Solids	n/a	mg/L	72.5
Hydrocarbon	Oil and Grease	n/a	mg/L	1.5
Hydrocarbon	TRPH	n/a	mg/L	1.3
Nutrient	Ammonia as N	n/a	mg/L	0.8
Nutrient	Nitrate as N	n/a	mg/L	1.9
Nutrient	Nitrite as N	n/a	mg/L	0.11
Nutrient	Orthophosphate as P	n/a	mg/L	1.49
Nutrient	TKN	n/a	mg/L	2.1
Nutrient	Total Phosphorus	Dissolved	mg/L	< 0.016
Nutrient	Total Phosphorus	Total	mg/L	35

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-42: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Agricultural Land Use Station A-1

Classification	Constituent	Fraction	Units	A-1 10/16/04
Anion	Bromide	n/a	mg/L	1.1
Anion	Chloride	n/a	mg/L	18.3
Anion	Perchlorate	n/a	µg/L	< 2
Conventional	BOD	n/a	mg/L	5.3
Conventional	Conductivity	n/a	µmhos/cm	400
Conventional	Hardness as CaCO3	Total	mg/L	292
Conventional	pH	n/a	pH Units	8.0
Conventional	Total Dissolved Solids	n/a	mg/L	860
Conventional	Total Organic Carbon	n/a	mg/L	9.4
Conventional	Total Suspended Solids	n/a	mg/L	428
Hydrocarbon	Oil and Grease	n/a	mg/L	< 1
Hydrocarbon	TRPH	n/a	mg/L	0.2
Nutrient	Ammonia as N	n/a	mg/L	0.3
Nutrient	Nitrate as N	n/a	mg/L	22.7
Nutrient	Nitrite as N	n/a	mg/L	0.26
Nutrient	Orthophosphate as P	n/a	mg/L	1.89
Nutrient	TKN	n/a	mg/L	4.2
Nutrient	Total Phosphorus	Dissolved	mg/L	9.5
Nutrient	Total Phosphorus	Total	mg/L	132

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-43: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Receiving Water Stations W-3 and W-4

Classification	Constituent	Fraction	Units	W-3	W-4
				10/17/04	10/16/04
Anion	Bromide	n/a	mg/L	0.73	2.58
Anion	Chloride	n/a	mg/L	60.3	27.6
Anion	Perchlorate	n/a	µg/L	< 2	< 2
Conventional	BOD	n/a	mg/L	21	10
Conventional	Conductivity	n/a	µmhos/cm	1100	500
Conventional	Hardness as CaCO3	Total	mg/L	396	609
Conventional	pH	n/a	pH Units	7.6	7.8
Conventional	Total Dissolved Solids	n/a	mg/L	930	1500
Conventional	Total Organic Carbon	n/a	mg/L	33	14
Conventional	Total Suspended Solids	n/a	mg/L	282	482
Hydrocarbon	Oil and Grease	n/a	mg/L	< 1	1.1
Hydrocarbon	TRPH	n/a	mg/L	0.5	0.3
Nutrient	Ammonia as N	n/a	mg/L	0.8	0.7
Nutrient	Nitrate as N	n/a	mg/L	11.4	23.4
Nutrient	Nitrite as N	n/a	mg/L	0.26	0.09
Nutrient	Orthophosphate as P	Total	mg/L	1.38	0.85
Nutrient	TKN	n/a	mg/L	2.1	1.6
Nutrient	Total Phosphorus	Dissolved	mg/L	< 0.016	< 0.016
Nutrient	Total Phosphorus	Total	mg/L	< 0.016	4.5

*See Appendix C for a description of the data qualifier(s) associated with this sample result.

"<" – Constituent not detected above specified detection limit.

Table 9-44: Metals Results from the Residential Land Use Station R-1

Constituent	Fraction	Units	R-1 10/16/04
Aluminum	Total	µg/L	1860
Arsenic	Total	µg/L	2.85
Cadmium	Total	µg/L	0.48
Chromium	Total	µg/L	6.91
Chromium VI	Total	µg/L	40 *
Copper	Total	µg/L	21.7
Lead	Total	µg/L	5.02
Mercury	Total	ng/L	12.2
Nickel	Total	µg/L	12.8
Selenium	Total	µg/L	1.48
Silver	Total	µg/L	< 0.1
Thallium	Total	µg/L	< 0.1
Zinc	Total	µg/L	126
Aluminum	Dissolved	µg/L	81.1
Arsenic	Dissolved	µg/L	2.07
Cadmium	Dissolved	µg/L	0.21
Chromium	Dissolved	µg/L	1.99
Copper	Dissolved	µg/L	15.2
Lead	Dissolved	µg/L	1.02
Mercury	Dissolved	ng/L	7.08
Nickel	Dissolved	µg/L	9.26
Selenium	Dissolved	µg/L	1.25
Silver	Dissolved	µg/L	< 0.1
Thallium	Dissolved	µg/L	< 0.1
Zinc	Dissolved	µg/L	68.1

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-45: Metals Results from the Industrial Land Use Station I-2

Constituent	Fraction	Units	I-2
			10/16/04
Aluminum	Total	µg/L	2460
Arsenic	Total	µg/L	4.03
Cadmium	Total	µg/L	0.61
Chromium	Total	µg/L	8.42
Chromium VI	Total	µg/L	30
Copper	Total	µg/L	43.5
Lead	Total	µg/L	6.75
Mercury	Total	ng/L	21.7
Nickel	Total	µg/L	16.8
Selenium	Total	µg/L	9.25
Silver	Total	µg/L	0.18
Thallium	Total	µg/L	< 0.1
Zinc	Total	µg/L	138
Aluminum	Dissolved	µg/L	16.1
Arsenic	Dissolved	µg/L	3.14
Cadmium	Dissolved	µg/L	0.33
Chromium	Dissolved	µg/L	1.37
Copper	Dissolved	µg/L	31.1
Lead	Dissolved	µg/L	< 0.1
Mercury	Dissolved	ng/L	4.71
Nickel	Dissolved	µg/L	11.7
Selenium	Dissolved	µg/L	9.3
Silver	Dissolved	µg/L	< 0.1
Thallium	Dissolved	µg/L	< 0.1
Zinc	Dissolved	µg/L	68.8

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-46: Metals Results from the Agricultural Land Use Station A-1

Constituent	Fraction	Units	A-1
			10/16/04
Aluminum	Total	µg/L	8630
Arsenic	Total	µg/L	6.45
Cadmium	Total	µg/L	3.09
Chromium	Total	µg/L	23.7
Chromium VI	Total	µg/L	40
Copper	Total	µg/L	42.1
Lead	Total	µg/L	10.9
Mercury	Total	ng/L	62.1
Nickel	Total	µg/L	30.7
Selenium	Total	µg/L	5
Silver	Total	µg/L	0.18
Thallium	Total	µg/L	0.15
Zinc	Total	µg/L	136
Aluminum	Dissolved	µg/L	11.2
Arsenic	Dissolved	µg/L	3.51
Cadmium	Dissolved	µg/L	0.24
Chromium	Dissolved	µg/L	0.88
Copper	Dissolved	µg/L	7.68
Lead	Dissolved	µg/L	< 0.1
Mercury	Dissolved	ng/L	1.73
Nickel	Dissolved	µg/L	6.03
Selenium	Dissolved	µg/L	3.68
Silver	Dissolved	µg/L	< 0.1
Thallium	Dissolved	µg/L	< 0.1
Zinc	Dissolved	µg/L	4.96

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-47: Metals Results from the Receiving Water Stations W-3 and W-4

Constituent	Fraction	Units	W-3	W-4
			2/2/04	2/2/04
Aluminum	Total	µg/L	10200	907
Arsenic	Total	µg/L	6.1	7.09
Cadmium	Total	µg/L	0.77	1.24
Chromium	Total	µg/L	18.9	20.6
Chromium VI	Total	µg/L	40	20
Copper	Total	µg/L	36.4	26.7
Lead	Total	µg/L	12.6	11.7
Mercury	Total	ng/L	162	104
Nickel	Total	µg/L	20.4	21.7
Selenium	Total	µg/L	40.4	12.2
Silver	Total	µg/L	< 0.1	0.1
Thallium	Total	µg/L	0.17	0.16
Zinc	Total	µg/L	65.6	88
Aluminum	Dissolved	µg/L	15.2	3.75
Arsenic	Dissolved	µg/L	3.67	3.54
Cadmium	Dissolved	µg/L	0.15	< 0.1
Chromium	Dissolved	µg/L	1.19	0.86
Copper	Dissolved	µg/L	17.6	3.16
Lead	Dissolved	µg/L	< 0.1	< 0.1
Mercury	Dissolved	ng/L	6.07	1.83
Nickel	Dissolved	µg/L	5.07	4.68
Selenium	Dissolved	µg/L	46.3	11.6
Silver	Dissolved	µg/L	< 0.1	< 0.1
Thallium	Dissolved	µg/L	< 0.1	< 0.1
Zinc	Dissolved	µg/L	6.38	4.81

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-48: Detected Trace Organic Results from the Residential Land Use Station R-1

Classification	***Method***	***Constituent***	***Units***	***R-1***	
				10/16/04	
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0106	
Organic	EPA 625	1-Methylphenanthrene	µg/L	0.0229	*
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.018	
Organic	EPA 625	Acenaphthene	µg/L	0.0225	
Organic	EPA 625	Benzo(a)anthracene	µg/L	0.0367	
Organic	EPA 625	Benzo(a)pyrene	µg/L	0.0397	
Organic	EPA 625	Benzo(b)fluoranthene	µg/L	0.0711	
Organic	EPA 625	Benzo(e)pyrene	µg/L	0.0599	
Organic	EPA 625	Benzo(g,h,i)perylene	µg/L	0.0724	
Organic	EPA 625	Benzo(k)fluoranthene	µg/L	0.0541	
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	5.14	
Organic	EPA 625	Butyl benzyl phthalate	µg/L	0.496	
Organic	EPA 625	Chrysene	µg/L	0.113	
Organic	EPA 625	Diethyl phthalate	µg/L	0.361	
Organic	EPA 625	Dimethyl phthalate	µg/L	0.0719	
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.293	
Organic	EPA 625	Di-n-octylphthalate	µg/L	0.731	
Organic	EPA 625	Fluoranthene	µg/L	0.155	*
Organic	EPA 625	Indeno(1,2,3-cd)pyrene	µg/L	0.0599	
Organic	EPA 625	Naphthalene	µg/L	0.0328	
Organic	EPA 625	Pentachlorophenol	µg/L	0.0873	
Organic	EPA 625	Perylene	µg/L	0.0227	
Organic	EPA 625	Phenanthrene	µg/L	0.0815	
Organic	EPA 625	Phenol	µg/L	1.15	
Organic	EPA 625	Pyrene	µg/L	0.147	
Pesticide	EPA 625	4,4'-DDE	µg/L	0.0757	*
Pesticide	EPA 625	Diazinon	µg/L	1.06	
Pesticide	EPA 625	Malathion	µg/L	1.29	

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-49: Detected Trace Organic Results from the Industrial Land Use Station I-2

Classification	Method	Constituent	Units	I-2 10/16/04
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0051
Organic	EPA 625	2,6-Dimethylnaphthalene	µg/L	0.0157
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.0109
Organic	EPA 625	Acenaphthene	µg/L	0.0102
Organic	EPA 625	Anthracene	µg/L	0.011
Organic	EPA 625	Benzo(a)anthracene	µg/L	0.028
Organic	EPA 625	Benzo(a)pyrene	µg/L	0.0406
Organic	EPA 625	Benzo(b)fluoranthene	µg/L	0.0907
Organic	EPA 625	Benzo(e)pyrene	µg/L	0.0608
Organic	EPA 625	Benzo(g,h,i)perylene	µg/L	0.0442
Organic	EPA 625	Benzo(k)fluoranthene	µg/L	0.0851
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	13.4
Organic	EPA 625	Butyl benzyl phthalate	µg/L	0.365
Organic	EPA 625	Chrysene	µg/L	0.103
Organic	EPA 625	Diethyl phthalate	µg/L	0.433
Organic	EPA 625	Dimethyl phthalate	µg/L	0.0815
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.2
Organic	EPA 625	Di-n-octylphthalate	µg/L	0.247
Organic	EPA 625	Fluoranthene	µg/L	0.138
Organic	EPA 625	Indeno(1,2,3-cd)pyrene	µg/L	0.0433
Organic	EPA 625	Naphthalene	µg/L	0.0139
Organic	EPA 625	Perylene	µg/L	0.0182
Organic	EPA 625	Phenanthrene	µg/L	0.0439
Organic	EPA 625	Pyrene	µg/L	0.111
Pesticide	EPA 625	4,4'-DDE	µg/L	0.0819
Pesticide	EPA 625	Chlorpyrifos	µg/L	0.0168
Pesticide	EPA 547	Glyphosate	µg/L	R

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.
"R" – Data point rejected due to irreproducibility of result caused by lab instrument calibration problems.

Table 9-50: Detected Trace Organic Results from the Agricultural Land Use Station A-1

Classification	Method	Constituent	Units	A-1 10/16/04
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0045
Organic	EPA 625	1-Methylphenanthrene	µg/L	0.0077
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.0269
Organic	EPA 625	Acenaphthene	µg/L	0.0077
Organic	EPA 625	Benzo(b)fluoranthene	µg/L	0.0074
Organic	EPA 625	Benzo(k)fluoranthene	µg/L	0.0091
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	0.249
Organic	EPA 625	Butyl benzyl phthalate	µg/L	0.048 *
Organic	EPA 625	Chrysene	µg/L	0.0094
Organic	EPA 625	Diethyl phthalate	µg/L	0.622
Organic	EPA 625	Dimethyl phthalate	µg/L	0.133
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.0445 *
Organic	EPA 625	Fluoranthene	µg/L	0.0196
Organic	EPA 625	Fluorene	µg/L	0.0043
Organic	EPA 625	Naphthalene	µg/L	0.0105
Organic	EPA 625	Pentachlorophenol	µg/L	0.351
Organic	EPA 625	Phenanthrene	µg/L	0.0204
Organic	EPA 625	Pyrene	µg/L	0.0172
Pesticide	EPA 625	2,4'-DDD	µg/L	0.0612
Pesticide	EPA 625	2,4'-DDE	µg/L	0.0124
Pesticide	EPA 625	2,4'-DDT	µg/L	0.0927
Pesticide	EPA 625	4,4'-DDD	µg/L	0.0799
Pesticide	EPA 625	4,4'-DDE	µg/L	0.546
Pesticide	EPA 625	4,4'-DDT	µg/L	0.544
Pesticide	EPA 625	Chlorpyrifos	µg/L	0.0507
Pesticide	EPA 625	Ethoprop	µg/L	0.0507
Pesticide	EPA 547	Glyphosate	µg/L	133

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-51: Detected Trace Organic Results from the Receiving Water Stations W-3 and W-4

Classification	Method	Constituent	Units	W-3 10/17/04	W-4 10/16/04
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0053	0.0065
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.0119	0.033
Organic	EPA 625	Acenaphthene	µg/L	0.0188	0.0087
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	0.29	4.57
Organic	EPA 625	Butyl benzyl phthalate	µg/L	< 0.005	0.0907
Organic	EPA 625	Diethyl phthalate	µg/L	0.202 *	0.227 *
Organic	EPA 625	Dimethyl phthalate	µg/L	0.041	0.0411
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.056 *	0.0568 *
Organic	EPA 625	Di-n-octylphthalate	µg/L	< 0.005	0.0243
Organic	EPA 625	Fluoranthene	µg/L	0.0083	0.0256
Organic	EPA 625	Naphthalene	µg/L	0.012	0.0141
Organic	EPA 625	Phenanthrene	µg/L	0.0192	0.0192
Organic	EPA 625	Phenol	µg/L	0.11	< 0.1
Organic	EPA 625	Pyrene	µg/L	0.009	0.0188
Pesticide	EPA 625	2,4'-DDD	µg/L	< 0.001	0.0272
Pesticide	EPA 625	2,4'-DDT	µg/L	< 0.001	0.0161
Pesticide	EPA 625	4,4'-DDD	µg/L	< 0.001	0.0337
Pesticide	EPA 625	4,4'-DDE	µg/L	0.128	0.174
Pesticide	EPA 625	4,4'-DDT	µg/L	0.0615	0.0448
Pesticide	EPA 625	Chlorpyrifos	µg/L	2.14	0.074
Pesticide	EPA 547	Glyphosate	µg/L	67.5	17.3

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-52: Bacteriological Results from the Residential Land Use Station R-1

Constituent	Units	R-1 10/16/04
E. Coli	MPN/100 mL	31000 *
Enterococcus	MPN/100 mL	10000 *
Fecal Coliform	MPN/100 mL	16000 *
Total Coliform	MPN/100 mL	323000 *

*See Appendix C for a description of the data qualifier(s) associated with this sample result.

Table 9-53: Bacteriological Results from the Industrial Land Use Station I-2

Constituent	Units	I-2 10/16/04
E. Coli	MPN/100 mL	288000
Enterococcus	MPN/100 mL	10000
Fecal Coliform	MPN/100 mL	50000
Total Coliform	MPN/100 mL	1935000

Table 9-54: Bacteriological Results from the Agricultural Land Use Station A-1

Constituent	Units	A-1
		10/16/04
E. Coli	MPN/100 mL	1000
Enterococcus	MPN/100 mL	20000
Fecal Coliform	MPN/100 mL	1100
Total Coliform	MPN/100 mL	2247000

Table 9-55: Bacteriological Results from the Receiving Water Stations W-3 and W-4

Constituent	Units	W-3	W-4
		10/17/04	10/16/04
E. Coli	MPN/100 mL	52000	20000
Enterococcus	MPN/100 mL	20000	10000
Fecal Coliform	MPN/100 mL	30000	30000
Total Coliform	MPN/100 mL	2382000	583000

Appendix E

BMP Efficiency
Data & Sources

Wet Pond	TSS	TP	TN	Bacteria	O/G	BOD	TPH
1	67	48	31				
2	70	50	30				
3	60	45	35				
4	80	51	33	70			
5		46					
6A		57			66	39	
6B	88			94		40	
7	85	62	15				57
8A	93	87	50			61	
8B	77	47	30				
8C	83	52	55				
average	**78**	**55**	**35**	**82**	**66**	**47**	**57**

[grey box] No data avaliable

1 US EPA NPDES <cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm>
2 New Jersey Department of Environtmental Protection Stormwater BMP Manual <www.njstormwater.org/tier_A/bmp_manual.htm>
3 US EPA Polluted Runoff Nonpoint Source Pollution Publications <www.epa.gov/owow/NPS/MMGI/Chapter 4/index.html>
4 Stormwater Manager's Resource Center Fact Sheets for Stormwater Management <www.stormwatercenter.net>
5 Chesapeake Bay Program 1998 reference <www.waterboards.ca.gov/lahontan/TMDL/Indian_Ck_Res.irctechproofed2.pdf>
6 International BMP Database <www.bmpdatabase.org>
7 Austin City Connection Publication <http://www.ci.austin.tx.us/watershed/rptcontsed.htm>
8 The Practice of Watershed Publication <http://www.stormwatercenter.net/Library/Practice/74.pdf>

Appendix F

Water Quality Modeling
Calculations & Summaries

Duck Watershed
Region A & Region B

Water Quality Modeling
Summary

Mariposa Lakes, Stockton, CA
Water Quality Modeling Summary

Duck Watershed

Discharged Pollutant Load for Average Annual Storm Event								
Site Condition	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Existing (Agricultural Land)	2018	724693	149111	2349762	29098	5.6E+16	5490	1098
Alternative Design	2219	1896	20204	798501	109639	1.9E+16	9034	8973
Proposed PACE Design	2219	784	12109	162503	50106	2.5E+15	2649	3325
Reduction [1]	-10%	100%	92%	93%	-72%	95%	52%	-203%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Discharged Pollutant Concentration for Average Annual Storm Event							
Site Condition	TP Discharged (mg/l)	TN Discharged (mg/l)	TSS Discharged (mg/l)	BOD Discharged (mg/l)	Total Coliform Discharged (MPN/100ml)	Oil/Grease Discharged (mg/l)	TPH Discharged (mg/l)
Existing (Agricultural Land)	132	27	428	5	2.2E+06	1.0	0.2
Alternative Design	0.3	3.3	132	18	6.8E+05	1.5	1.5
Proposed PACE Design	0.1	2.0	27	8	9.2E+04	0.4	0.6
Reduction [1]	100%	93%	94%	-57%	96%	56%	-175%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Duck Watershed
Region A – Industrial

Water Quality Modeling
Calculations & Summary

Mariposa Lakes, Stockton, CA
Water Quality Modeling Summary

Duck Watershed - Region A

Discharged Pollutant Load for Average Annual Storm Event								
Site Condition	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Existing (Agricultural Land)	1285	461447	94946	1496208	18528	3.6E+16	3496	699
Alternative Design	1435	1304	13335	620702	73060	7.9E+15	6134	6080
Proposed PACE Design	1435	590	8668	139658	38965	1.4E+15	2085	2614
Reduction [1]	-12%	100%	91%	91%	-110%	96%	40%	-274%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Discharged Pollutant Concentration for Average Annual Storm Event							
Site Condition	TP Discharged (mg/l)	TN Discharged (mg/l)	TSS Discharged (mg/l)	BOD Discharged (mg/l)	Total Coliform Discharged (MPN/100ml)	Oil/Grease Discharged (mg/l)	TPH Discharged (mg/l)
Existing (Agricultural Land)	132	27	428	5.3	2.2E+06	1.0	0.2
Alternative Design	0.4	4.0	240	20	4.5E+05	1.7	1.7
Proposed PACE Design	0.2	2.2	36	10	8.0E+04	0.5	0.7
Reduction [1]	100%	92%	92%	-88%	96%	47%	-235%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Duck Watershed Region A Existing Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site based on Agricultural Land									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	10.7	1285	461447	94946	1496208	18528	3.6E+16	3496	699

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in existing condition)
Step 3 - Lake Treatment (n/a because no lakes in existing condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site based on Agricultural Land								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	1285	461447	94946	1496208	18528	3.6E+16	3496	699

Duck Watershed Region A Alternative Proposed Design Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.9	1435	1304	13335	620702	73060	7.9E+15	6134	6080

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in alternative proposed condition)
Step 3 - Lake Treatment (n/a because no lakes in alternative proposed condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	1435	1304	13335	620702	73060	7.9E+15	6134	6080

Duck Watershed Region A Proposed PACE Design Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.9	1435	1304	13335	620702	73060	7.9E+15	6134	6080

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution

Pollutant Concentration after Mixing of Urban Runoff and Lake Water								
Precipitation	Lake Volume (AF)	Diluted TP (mg/l)	Diluted TN (mg/l)	Diluted TSS [1] (mg/l)	Diluted BOD [1] (mg/l)	Diluted Total Coliform [1] (MPN/100ml)	Diluted Oil/Grease [1] (mg/l)	Diluted TPH [1] (mg/l)
Average Annual	0	0.3	3.4	159	19	4.4E+05	1.6	1.6

1 - Lake concentrations n/a for these constituents. However, dilution will occur but as of yet, is unmonitored for these constituents. Thus, dilution is not applied for these constituents.

Step 3 - Lake Treatment

Pollutant Concentration after Wet Pond BMP Application							
Precipitation	Treated TP (mg/l)	Treated TN (mg/l)	Treated TSS (mg/l)	Treated BOD (mg/l)	Treated Total Coliform (MPN/100ml)	Treated Oil/Grease (mg/l)	Treated TPH (mg/l)
Average Annual	0.2	2.2	36	10	80024	1	0.7

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	1435	590	8668	139658	38965	1.4E+15	2085	2614

Duck Watershed
Region B – Residential

Water Quality Modeling
Calculations & Summary

Mariposa Lakes, Stockton, CA
Water Quality Modeling Summary

Duck Watershed - Region B

Discharged Pollutant Load for Average Annual Storm Event								
Site Condition	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Existing (Agricultural Land)	733	263245	54165	853554	10570	2.0E+16	1994	399
Alternative Design	784	592	6869	177799	36579	1.1E+16	2901	2893
Proposed PACE Design	784	194	3441	22845	11141	1.1E+15	563	710
Reduction [1]	-7%	100%	94%	97%	-5%	95%	72%	-78%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Discharged Pollutant Concentration for Average Annual Storm Event							
Site Condition	TP Discharged (mg/l)	TN Discharged (mg/l)	TSS Discharged (mg/l)	BOD Discharged (mg/l)	Total Coliform Discharged (MPN/100ml)	Oil/Grease Discharged (mg/l)	TPH Discharged (mg/l)
Existing (Agricultural Land)	132	27	428	5.3	2.2E+06	1.0	0.2
Alternative Design	0.4	3.9	95	16	1.4E+06	1.3	1.3
Proposed PACE Design	0.1	1.6	10.7	5.2	1.1E+05	0.3	0.33
Reduction [1]	100%	94%	97%	1%	95%	74%	-67%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Duck Watershed Region B Existing Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site based on Agricultural Land									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	10.7	733	263245	54165	853554	10570	2.0E+16	1994	399

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in existing condition)
Step 3 - Lake Treatment (n/a because no lakes in existing condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site based on Agricultural Land								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	733	263245	54165	853554	10570	2.0E+16	1994	399

Duck Watershed Region B Alternative Proposed Design Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.4	784	592	6869	177799	36579	1.1E+16	2901	2893

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in alternative proposed condition)
Step 3 - Lake Treatmetn (n/a because no lakes in alternative proposed condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	784	592	6869	177799	36579	1.1E+16	2901	2893

Duck Watershed Region B Proposed PACE Design Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.4	784	592	6869	177799	36579	1.1E+16	2901	2893

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution

Pollutant Concentration after Mixing of Urban Runoff and Lake Water								
Precipitation	Lake Volume (AF)	Diluted TP (mg/l)	Diluted TN (mg/l)	Diluted TSS [1] (mg/l)	Diluted BOD [1] (mg/l)	Diluted Total Coliform [1] (MPN/100ml)	Diluted Oil/Grease [1] (mg/l)	Diluted TPH [1] (mg/l)
Average Annual	589	0.20	2.5	47.6	9.8	6.4E+05	0.78	0.77

1 - Lake concentrations n/a for these constituents. However, dilution will occur but as of yet, is unmonitored for these constituents. Thus, dilution is not applied for these constituents.

Step 3 - Lake Treatment

Pollutant Concentration after Wet Pond BMP Application							
Precipitation	Treated TP (mg/l)	Treated TN (mg/l)	Treated TSS (mg/l)	Treated BOD (mg/l)	Treated Total Coliform (MPN/100ml)	Treated Oil/Grease (mg/l)	Treated TPH (mg/l)
Average Annual	0.09	1.6	10.7	5.2	1.1E+05	0.26	0.33

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	784	194.3	3441	22845	11141	1.1E+15	563.2	710.3

Branch Watershed

Water Quality Modeling
Calculations & Summary

Mariposa Lakes, Stockton, CA
Water Quality Modeling Summary

Branch Watershed

Discharged Pollutant Load for Average Annual Storm Event								
Site Condition	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Existing (Agricultural Land)	1052	377688	77712	1224623	15165	2.9E+16	2861	572
Alternative Design	1125	839	9873	267426	53447	1.4E+16	4192	4164
Proposed PACE Design	1125	296	5228	39337	18635	1.7E+15	932	1171
Reduction [1]	-7%	100%	93%	97%	-23%	94%	67%	-105%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Discharged Pollutant Concentration for Average Annual Storm Event							
Site Condition	TP Discharged (mg/l)	TN Discharged (mg/l)	TSS Discharged (mg/l)	BOD Discharged (mg/l)	Total Coliform Discharged (MPN/100ml)	Oil/Grease Discharged (mg/l)	TPH Discharged (mg/l)
Existing (Agricultural Land)	132	27	428	5.3	2.2E+06	1.0	0.2
Alternative Design	0.4	3.9	95	16	1.4E+06	1.3	1.3
Proposed PACE Design	0.1	1.7	12.9	6.1	1.2E+05	0.3	0.4
Reduction [1]	100%	94%	97%	-15%	95%	70%	-91%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Branch Watershed Existing Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site based on Agricultural Land									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	10.7	1052	377688	77712	1224623	15165	2.9E+16	2861	572

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in existing condition)
Step 3 - Lake Treatment (n/a because no lakes in existing condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site based on Agricultural Land								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	1052	377688	77712	1224623	15165	2.9E+16	2861	572

Branch Watershed Alternative Proposed Design Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.4	1125	839	9873	267426	53447	1.4E+16	4192	4164

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in alternative proposed condition)
Step 3 - Lake Treatment (n/a because no lakes in alternative proposed condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	1125	839	9873	267426	53447	1.4E+16	4192	4164

Branch Watershed Proposed PACE Design Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.4	1125	839	9873	267426	53447	1.4E+16	4192	4164

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution

Pollutant Concentration after Mixing of Urban Runoff and Lake Water								
Precipitation	Lake Volume (AF)	Diluted TP (mg/l)	Diluted TN (mg/l)	Diluted TSS [1] (mg/l)	Diluted BOD [1] (mg/l)	Diluted Total Coliform [1] (MPN/100ml)	Diluted Oil/Grease [1] (mg/l)	Diluted TPH [1] (mg/l)
Average Annual	596	0.21	2.6	57.1	11.4	6.6E+05	0.90	0.89

1 - Lake concentrations n/a for these constituents. However, dilution will occur but as of yet, is unmonitored for these constituents. Thus, dilution is not applied for these constituents.

Step 3 - Lake Treatment

Pollutant Concentration after Wet Pond BMP Application							
Precipitation	Treated TP (mg/l)	Treated TN (mg/l)	Treated TSS (mg/l)	Treated BOD (mg/l)	Treated Total Coliform (MPN/100ml)	Treated Oil/Grease (mg/l)	Treated TPH (mg/l)
Average Annual	0.10	1.7	12.9	6.1	1.2E+05	0.30	0.38

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	1125	296.1	5228	39337	18635	1.7E+15	931.7	1170.7

North Little Johns Watershed

Water Quality Modeling
Calculations & Summary

Mariposa Lakes, Stockton, CA
Water Quality Modeling Summary

North Little Johns Watershed

Discharged Pollutant Load for Average Annual Storm Event								
Site Condition	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Existing (Agricultural Land)	267	95758	19703	310487	3845	7.4E+15	725	145
Alternative Design	285	210	2452	74929	13389	3.3E+15	1020	1013
Proposed PACE Design	285	89	1505	14605	6359	5.2E+14	309	388
Reduction [1]	-7%	100%	92%	95%	-65%	93%	57%	-167%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

Discharged Pollutant Concentration for Average Annual Storm Event							
Site Condition	TP Discharged (mg/l)	TN Discharged (mg/l)	TSS Discharged (mg/l)	BOD Discharged (mg/l)	Total Coliform Discharged (MPN/100ml)	Oil/Grease Discharged (mg/l)	TPH Discharged (mg/l)
Existing (Agricultural Land)	132	27	428	5.3	2.2E+06	1.0	0.2
Alternative Design	0.4	3.9	95	16	1.4E+06	1.3	1.3
Proposed PACE Design	0.1	1.9	18.9	8.2	1.5E+05	0.4	0.5
Reduction [1]	100%	93%	96%	-55%	93%	60%	-151%

1 - Reduction is calculated as % difference from existing condition to proposed PACE design, where (-) represents an increase & (+) represents a decrease

North Little Johns Watershed Existing Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	10.7	267	95758	19703	310487	3845	7.4E+15	725	145

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in existing condition)
Step 3 - Lake Treatment (n/a because no lakes in existing condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	267	95758	19703	310487	3845	7.4E+15	725	145

North Little Johns Watershed Alternative Proposed Design Condition

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.4	285	210	2452	74929	13389	3.3E+15	1020	1013

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution (n/a because no lakes in alternative proposed condition)
Step 3 - Lake Treatment (n/a because no lakes in alternative proposed condition)

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	285	210	2452	74929	13389	3.3E+15	1020	1013

North Little Johns Watershed Proposed PACE Design Condition

Step 1 - Onsite Runoff

Pollutant Load in Runoff for Project Site									
Precipitation	Runoff Depth [1] (in)	Runoff Volume (AF)	Runoff TP (lbs)	Runoff TN (lbs)	Runoff TSS (lbs)	Runoff BOD (lbs)	Runoff Total Coliform (MPN)	Runoff Oil/Grease (lbs)	Runoff TPH (lbs)
Average Annual	11.4	285	210	2452	74929	13389	3.3E+15	1020	1013

1 - Runoff depths provided by PACE

Step 2 - Lake Dilution

Pollutant Concentration after Mixing of Urban Runoff and Lake Water								
Precipitation	Lake Volume (AF)	Diluted TP (mg/l)	Diluted TN (mg/l)	Diluted TSS [1] (mg/l)	Diluted BOD [1] (mg/l)	Diluted Total Coliform [1] (MPN/100ml)	Diluted Oil/Grease [1] (mg/l)	Diluted TPH [1] (mg/l)
Average Annual	35	0.25	3.0	86.2	15.4	8.3E+05	1.17	1.17

1 - Lake concentrations n/a for these constituents. However, dilution will occur but as of yet, is unmonitored for these constituents. Thus, dilution is not applied for these constituents.

Step 3 - Lake Treatment

Pollutant Concentration after Wet Pond BMP Application							
Precipitation	Treated TP (mg/l)	Treated TN (mg/l)	Treated TSS (mg/l)	Treated BOD (mg/l)	Treated Total Coliform (MPN/100ml)	Treated Oil/Grease (mg/l)	Treated TPH (mg/l)
Average Annual	0.11	1.9	18.9	8.2	1.5E+05	0.40	0.50

Step 4 - Site Discharge

Pollutant Load Discharged from Project Site								
Precipitation	Volume of Water Discharged (AF)	TP Discharged (lbs)	TN Discharged (lbs)	TSS Discharged (lbs)	BOD Discharged (lbs)	Total Coliform Discharged (MPN)	Oil/Grease Discharged (lbs)	TPH Discharged (lbs)
Average Annual	285	88.9	1505	14605	6359	5.2E+14	308.9	388.0