ATTACHMENT A:

REASONABLE ASSURANCE ANALYSIS FOR LOWER LOS ANGELES RIVER, LOS CERRITOS CHANNEL, AND LOWER SAN GABRIEL RIVER

Reasonable Assurance Analysis for Lower Los Angeles River, Los Cerritos Creek, and Lower San Gabriel River

Submitted to:

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1. Introduction

The Municipal Separate Storm Sewer System Permit (Permits) for Los Angeles County[1] and the City of Long Beach[2] includes optional provisions for a Watershed Management Program (WMP) that allows permittees the flexibility to customize their stormwater programs to achieve compliance with applicable receiving water limitations (RWLs) and water quality based effluent limitations (WQBELs) through implementation of control measures. A key element of each WMP is the Reasonable Assurance Analysis (RAA), which is used to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (NPDES Permit Order No. R4-2012-0175, Section C.5.b.iv.[5], page 64; NPDES Permit Order No. R4-2014-0024, Section C.5.h.vii.[2]). This report presents the Reasonable Assurance Analysis (RAA) for the Lower Los Angeles River (LLAR), Los Cerritos Channel (LCC), and Lower San Gabriel River (LSGR) WMPs.

While the Permits prescribe the RAA as a quantitative demonstration that control measures (best management practices [BMPs]) will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their *selection*. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. The approach herein is consistent with the RAA Guidelines.

This report is organized in nine sections, as follows:

- Section 1: Introduction
- Section 2: Applicable Interim and Final Requirements
- Section 3: Modeling System to be used for the RAA
- Section 4: Current/Baseline Pollutant Loading
- Section 5: Estimated Required Pollutant Reductions
- Section 6: Determination of BMP Capacity for RAA
- Section 7: Cumulative Volume Reduction Goals to Achieve Required Reductions
- Section 8: Pollutant Reduction Plan
- Section 9: References

[1] National Pollutant Discharge Elimination System Permit Order No. R4-2012-0175

[2] National Pollutant Discharge Elimination System Permit Order No. R4-2014-0024

2. Applicable Interim and Final Requirements

The WMPs for LLAR, LCC, and LSGR follow the process in the Permits and identify the Water Quality Priorities (WQ Priorities) including the highest (Category 1) Water Quality Priorities which are subject to Total Maximum Daily Loads (TMDLs) and WQBELs. Practically all of these TMDLs include associated compliance schedules that are considered in this RAA. The TMDL and WMP milestones/compliance dates establish the pace at which BMPs must be implemented. Traditionally, the approach of TMDL implementation plans has been focused on *final* TMDL compliance, whereas the Permit compliance paths offered to WMPs increase emphasis on *milestones*. In line with the RAA Guidelines, for all final TMDL and TMDL/WMP milestones that occur in the next two Permit cycles, the combination of BMPs expected to result in attainment of the corresponding Permit limits are identified.

The TMDL milestones for the LLAR, LCC, and LSGR WMP areas are shown in Table 2-2 through Table 2-4. The Permits require each WMP to provide reasonable assurance for the TMDL milestones that occur in the current Permit term. If applicable TMDLs do not prescribe a milestone in the current Permits, a milestone must be established. The array of TMDLs creates a potentially complicated sequence based on multiple pollutants, and thus this RAA includes a limiting pollutant analysis. As described in Section 5, the identified limiting pollutant for wet weather is zinc for LLAR, LCC, and LSGR. As such, the wet weather milestones for the Los Angeles River, Los Cerritos Channel, and San Gabriel River Metals TMDLs establish the pace of stormwater BMP implementation. The wet weather milestones established for the current Permits include the following:

- **Lower Los Angeles River:** Achieve 31% of the required reduction by September 30, 2017. This milestone was created for the WMP, as the metals TMDL includes a 25% milestone in 2012 (prior to the current Permit term) and a 50% milestone in 2024 (beyond the current Permit term). Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Los Cerritos Channel:** Achieve 10% of the required reduction[3] by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Lower San Gabriel River:** Achieve 10% of the required reduction by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.

The pollutant reduction plan to achieve these milestones is described in Section 8, along with the plan to achieve the milestones for the next Permit term (achieve 35% of the required reduction in LCC and LSGR and achieve 50% of the required reduction in LLAR). A summary of the milestones within the current and next Permit terms and final milestone based on final TMDLs are summarized in Table 2-1. The required reductions that form the basis of the milestones are calculated in Section 5.

[3] The interim milestones are expressed in terms of the *required* reduction not total reduction (e.g., if the required reduction to attain final limits is 50%, then the 10% milestone equates to a 5% reduction). These reductions are calculated in Section 5.

Table 2-1. Summary of schedule for interim and final milestones

WMP Area	Milestone 1 (2017)	Milestone 2 (interim date of applicable metals TMDL)	Milestone 3 (final date of applicable metals TMDL)
LLAR	31%	50%	100%
LCC	10%	35%	100%
LSGR	10%	35%	100%

Table 2-2. Schedule of TMDL milestones for the Lower LA River

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2020	2024	2028	2032	2037
LAR Nutrients	Ammonia-N, Nitrate-N, Nitrite-N, Nitrate-N+Nitrite-N	Meet WQBELs	All	Pre 2012									
				Final									
LAR Trash	Trash	% Reduction	All	9/30	9/30	9/30	9/30	9/30					
				70%	80%	**90%**	**96.70%**	**100%**					
LAR Metals	Copper, Lead	% of MS4 area Meets WQBELs	Dry	1/11					1/11	1/11			
				50%					75%	100%			
	Copper, Lead, Zinc, Cadmium	% of MS4 area Meets WQBELs	Wet	1/11						1/11	1/11		
				25%						50%	100%		
LA River Bacteria	*E. coli*	Meet WQBELs	Wet and Dry[2]										3/23
													Final
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28								3/23	
				Interim								Final	
Long Beach City Beaches and LAR Estuary Bacteria	Total Coliform, Fecal Coliform, Enterococcus	Meet WLAs	All	USEPA TMDLs, which do not contain interim milestones or implementation schedule. The Permits allow MS4 Permittees to propose a schedule in a WMP.									

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

[2] The schedule for attaining the dry weather Bacteria TMDL is not shown in Table 3-2, which is stepwise by reach/segment and depends on whether a Load Reduction Strategy is developed for implementation.

Table 2-3. Schedule of TMDL milestones for Los Cerritos Channel WMP

TMDL	Constituents	Compliance Goal	Weather Condition	**Compliance Dates and Compliance Milestone** (Bolded numbers indicated milestone deadlines within the current Permit term)[1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
Los Cerritos Channel Metals	Copper	% Load Reduction <u>or</u> % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction <u>or</u> % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

Table 2-4. Schedule of TMDL milestones for the Lower San Gabriel River WMP

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
San Gabriel River Metals	Copper, Selenium	% Load Reduction <u>or</u> % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction <u>or</u> % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

3. Modeling System used for the RAA

The Watershed Management Modeling System (WMMS) was used to develop this RAA. WMMS is specified in the Permits as a potential tool to conduct the RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach. The WMMS encompasses Los Angeles County's coastal watersheds of approximately 3,100 square miles, representing 2,566 subwatersheds (Figure 3-1). As described in the following subsections, WMMS is a modeling system that incorporates three tools: (1) the watershed model for prediction of long-term hydrology and pollutant loading, (2) a BMP model, and (3) a BMP optimization tool to support regional, cost-effective planning efforts. A version of WMMS is available for public download from LACFCD.

The version of WMMS to be used for the RAA in the LLAR, LLC, and LSGR WMPs is customized from the public download version, including the following modification/enhancements:

- Updates to meteorological records to represent the last 10 years (per the RAA Guidelines) and to allow for simulation of the design storm;
- Calibration adjustments to incorporate the most recent 10 years of water quality data collected at the nearby mass emission station;
- Application of a second-tier of BMP optimization using System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN), which replaces the Nonlinearity-Interval Mapping Scheme (NIMS) component of WMMS.
- Optimization of BMP effectiveness for removal of bacteria pollutants (rather than metals only); and
- Updates to Geographic Information System (GIS) layers, as available.

The subwatersheds in the LLAR, LLC, and LSGR WMP areas that are represented by WMMS are shown in Figure 3-2 through Figure 3-4, which include modifications to confine to jurisdictional boundaries included in these WMP areas. Also shown are the "RAA assessment points", which are used to calculate required load reductions (described in Section 5).

3.1. Watershed Model - LSPC

The watershed model included within WMMS is the Loading Simulation Program C++ (LSPC) (Shen et al. 2004; Tetra Tech and USEPA 2002; USEPA 2003). LSPC is a watershed modeling system for simulating watershed hydrology, erosion, and water quality processes, as well as in-stream transport processes. LSPC also integrates a geographic information system (GIS), comprehensive data storage and management capabilities, and a data analysis/post-processing system into a convenient PC-based Windows environment. The algorithms of LSPC are identical to a subset of those in the Hydrologic Simulation Program–FORTRAN (HSPF) model with selected additions, such as algorithms to dynamically address land use change over time. Another advantage of LSPC is that there is no inherent limit to the size and resolution of the model than can be developed, making it an attractive option for modeling the Los Angeles region watersheds. USEPA's Office of Research and Development (Athens, Georgia) first made LSPC available as a component of USEPA's National TMDL Toolbox (http://www.epa.gov/athens/wwqtsc/index.html). LSPC has been further enhanced with expanded capabilities since its original public release.

The WMMS development effort culminated in a comprehensive watershed model of the Los Angeles County Flood Control District that includes the unique hydrology and hydraulics of the system and characterization of water quality loading, fate, and transport for all the key TMDL constituents (LACDPW 2010a, 2010b). Since the original development of the WMMS LSPC model, Los Angeles County personnel have independently updated the model with meteorological data through April 2012.

To support the objectives of the WMPs, jurisdictional boundaries were also intersected with the WMMS LSPC model subwatersheds resulting in a finer resolution spatial unit for modeling. Model land use was then resampled using this subwatershed-jurisdiction intersect, properly distributing land use categories at the jurisdictional level for attributing sources, while maintaining hydrologic connectivity within the watershed model. This refinement introduced a new layer of resolution, facilitating the rollup of modeled results by jurisdiction to better support source attribution and implementation responsibilities among the participating entities.

Figure 3-1. WMMS model domain and represented land uses and slopes by subwatershed

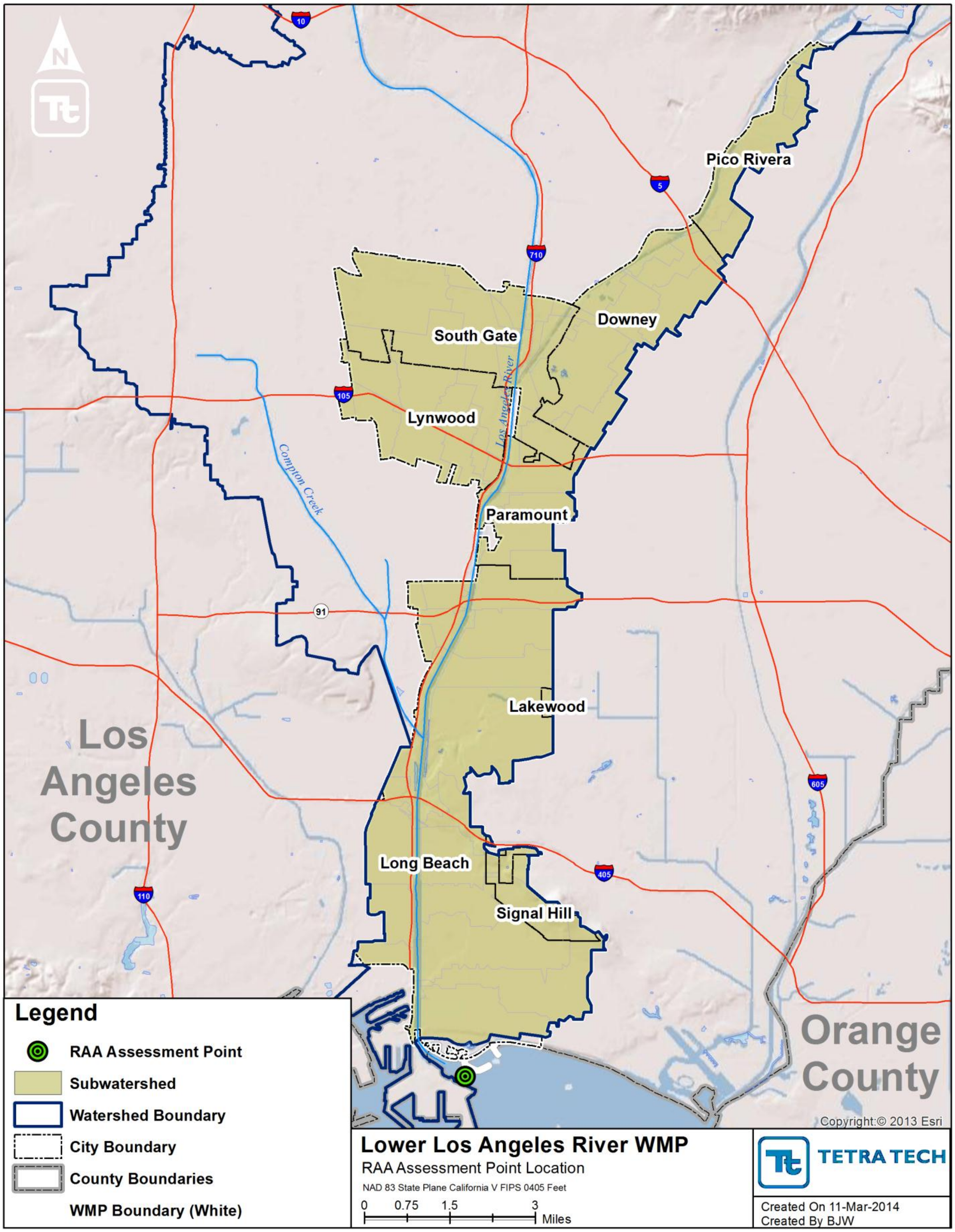

Figure 3-2. Lower LA River WMP Area subwatersheds represented by WMMS

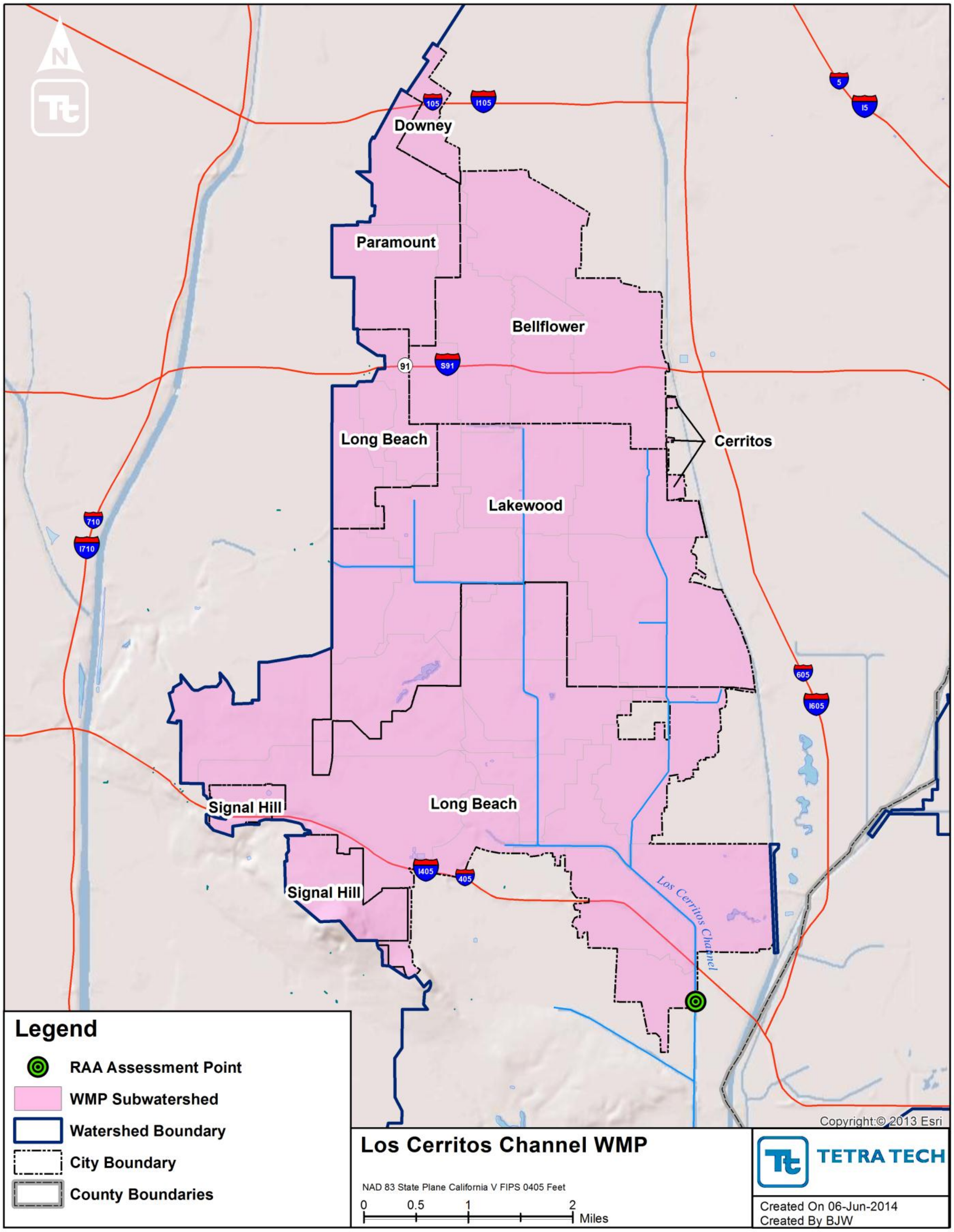

Figure 3-3. Los Cerritos WMP Area subwatersheds represented by WMMS

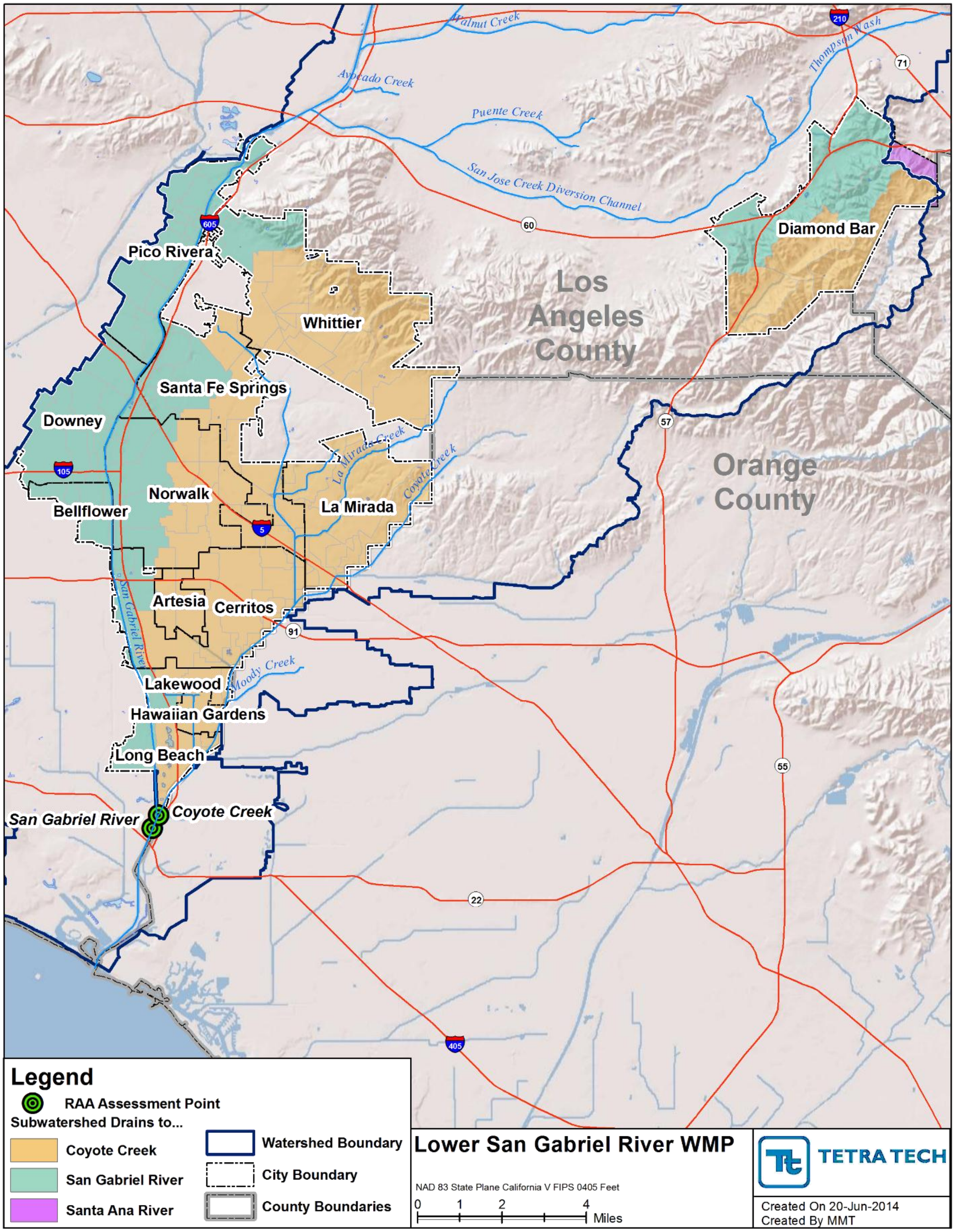

Figure 3-4. Lower San Gabriel River WMP Area subwatersheds represented by WMMS

3.2. Small-Scale BMP Model – SUSTAIN

The System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN) was developed by USEPA to support practitioners in developing cost-effective management plans for municipal storm water programs and evaluating and selecting BMPs to achieve water resource goals (USEPA, 2009). It was specifically developed as a decision-support system for selection and placement of BMPs at strategic locations in urban watersheds. It includes a process-based continuous simulation BMP module for representing flow and pollutant transport routing through various types of structural BMPs. Users are given the option to select from various algorithms for certain processes (e.g., flow routing, infiltration, etc.) depending on available data, consistency with coupled modeling assumptions, and the level of detail required. Figure 2-3 shows images from the SUSTAIN model user interface and documentation depicting some of the available BMP simulation options in a watershed context.

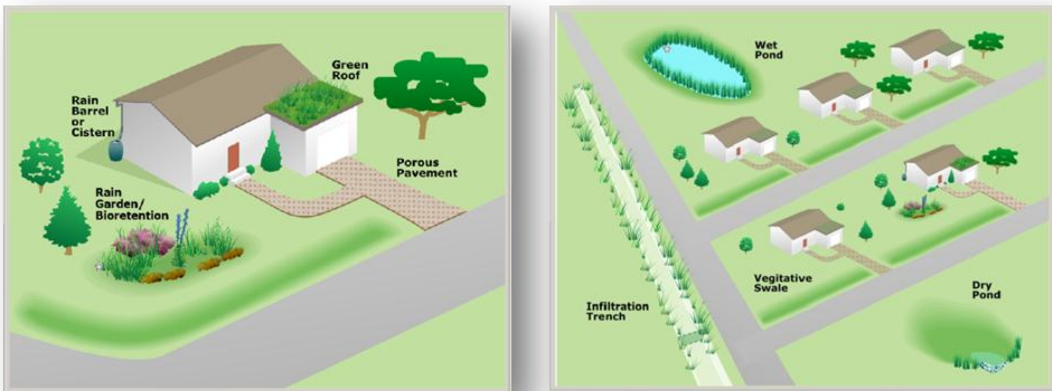

Figure 2-3. SUSTAIN model interface illustrating some available BMPs in watershed settings

SUSTAIN extends the capabilities and functionality of traditionally available models by providing integrated analysis of water quantity, quality, and *cost factors*. The SUSTAIN model in WMMS includes a cost database comprised of typical BMP component cost data from a number of published sources including BMPs constructed and maintained in Los Angeles County. SUSTAIN considers certain BMP properties as “decision variables,” meaning that they are permitted to change within a given range during model simulation to support BMP selection and placement optimization. As BMP size changes, so do cost and performance. SUSTAIN runs iteratively to generate a cost-effectiveness curve comprised of optimized BMP combinations within the modeled study area (e.g., the model evaluates the optimal width and depth of certain BMPs to determine the most cost-effective configurations for planning purposes).

3.3. Large-Scale BMP Optimization Tool – NIMS/SUSTAIN

WMMS was specifically designed to dynamically evaluate effectiveness of BMPs implemented in subwatersheds for meeting downstream RWLs while maximizing cost-benefit. WMMS employs optimization based on an algorithm names Nonlinearity-Interval Mapping Scheme (NIMS) to navigate through the many potential scenarios of BMP strategies and identify the strategies that are the most cost effective (Zou et al. 2010). Given the relatively small spatial scale of the WMP area, NIMS was not applied for this study. Instead, a two-tiered approach was applied using the NSGA-II solution technique available in SUSTAIN. For Tier 1, treatment capacities were optimized for each contributing segment, which resulted in unique cost-effectiveness curves for each segment based on available opportunities therein. For Tier 2, the search space was composed of Tier 1 solutions, thereby streamlining the search process. The resulting Tier 2 curve represents the optimal large scale solution because it is comprised of optimized Tier 1 solutions. This approach is especially useful for prioritizing areas for management for scheduling implementation milestones as described in Section 8.

4. Current/Baseline Pollutant Loading

The LSPC model within WMMS was reconfigured and recalibrated specifically for the WMP areas to provide an estimate of current/existing pollutant loads from jurisdictions within the WMPs. Reconfiguration of model subwatersheds was performed to provide specific accounting of loadings from individual jurisdictions. Calibrations were performed to meet specifications of the RAA Guidelines (LARWQCB 2014).

4.1. Model Calibration to Existing Conditions

The LSPC watershed model was originally calibrated for hydrology using a regional approach relying on USGS observed daily streamflow datasets through Water Year (WY) 2006 (LACDPW 2010a). Water Quality was then calibrated using small-scale, land use level water quality monitoring data to develop representative event mean concentrations by land use (LACDPW 2010b). Model performance was also validated at the mass emissions monitoring stations in the context of a county-wide modeling effort. The calibration period for the original WMMS LSPC model began in 1996 and ended in 2006. For the RAA, an analysis was performed to evaluate performance of the LSPC model as it relates to the LLAR, LCC, and LSGR watersheds to understand and benchmark its applicability for use as a baseline condition. The evaluation of monitoring data was extended beyond the original WMMS-LSPC calibration to include the period from 10/1/2001 through 9/30/2011 incorporating both the average year (WY 2008) and 90th percentile (WY 2003) year.

Data available for the LACDPW water quality and hydrologic monitoring stations, S10 and F319 were used to reexamine simulated water quality and hydrology conditions in LA River. The two stations are co-located just south of the West Wardlow Road overpass and drain approximately 800 square miles, or nearly the entire LA River watershed. The monitoring stations were selected for comparison due to their location near the outlet of the LA River watershed, which encompasses the aggregate contributions of all upstream pollutant sources. The selected flow gage, F319, was also used to calibrate the WMMS LSPC model and, therefore, links the current and previous efforts. Water quality and hydrologic records for WYs 2003–2011 were compared to the simulated watershed model output to determine the necessary model parameter adjustments to establish an up-to-date model calibration. The locations of these two gages are presented in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the Los Angeles River mass emission station S10 are presented in Attachment E.

Watershed model simulation of existing water quality conditions for the LCC watershed were evaluated for WYs 2003–2011 using data collected at the City of Long Beach Stearns Street monitoring location, just north of interstate 405. The water quality monitoring location is positioned at the WMP hydrologic outlet and captures the cumulative watershed loading effects impacting water quality conditions in this 27 square mile portion of the LCC watershed. No flow monitoring data are available in the watershed, thus simulated flow conditions could not be evaluated against observed data for LCC. The location of the water quality monitoring is presented in Figure 4-1 below and statistical summaries of the monitoring dataset are presented in Attachment E.

For the LSGR, hydrology was re-assessed at two monitoring locations using available data from WYs 2001-2011 The two monitoring locations selected include USGS 11087020 San Gabriel River at Whittier Narrows Dam CA and the LACDPW streamflow gage F354 located along Coyote Creek south of Spring Street (coincident with mass emission station S13). The USGS gage was selected for continuity with the development and calibration of the original WMMS LSPC modeling system. The primary monitoring location selected to calibrate water quality for LSGR was the LA County mass emission station S14. The San Gabriel River Monitoring Station is located below San Gabriel River Parkway in Pico Rivera. At this location the upstream tributary area is 450 square miles (LACDPW 2013). A second mass emission station, the Coyote Creek Monitoring Station (S13) located below Spring Street in the lower San Gabriel River watershed was also used to validate the water quality calibration. The locations of these two gages are presented below in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the San Gabriel River and Coyote Creek mass emission stations S14 and S13 are presented in Attachment E.

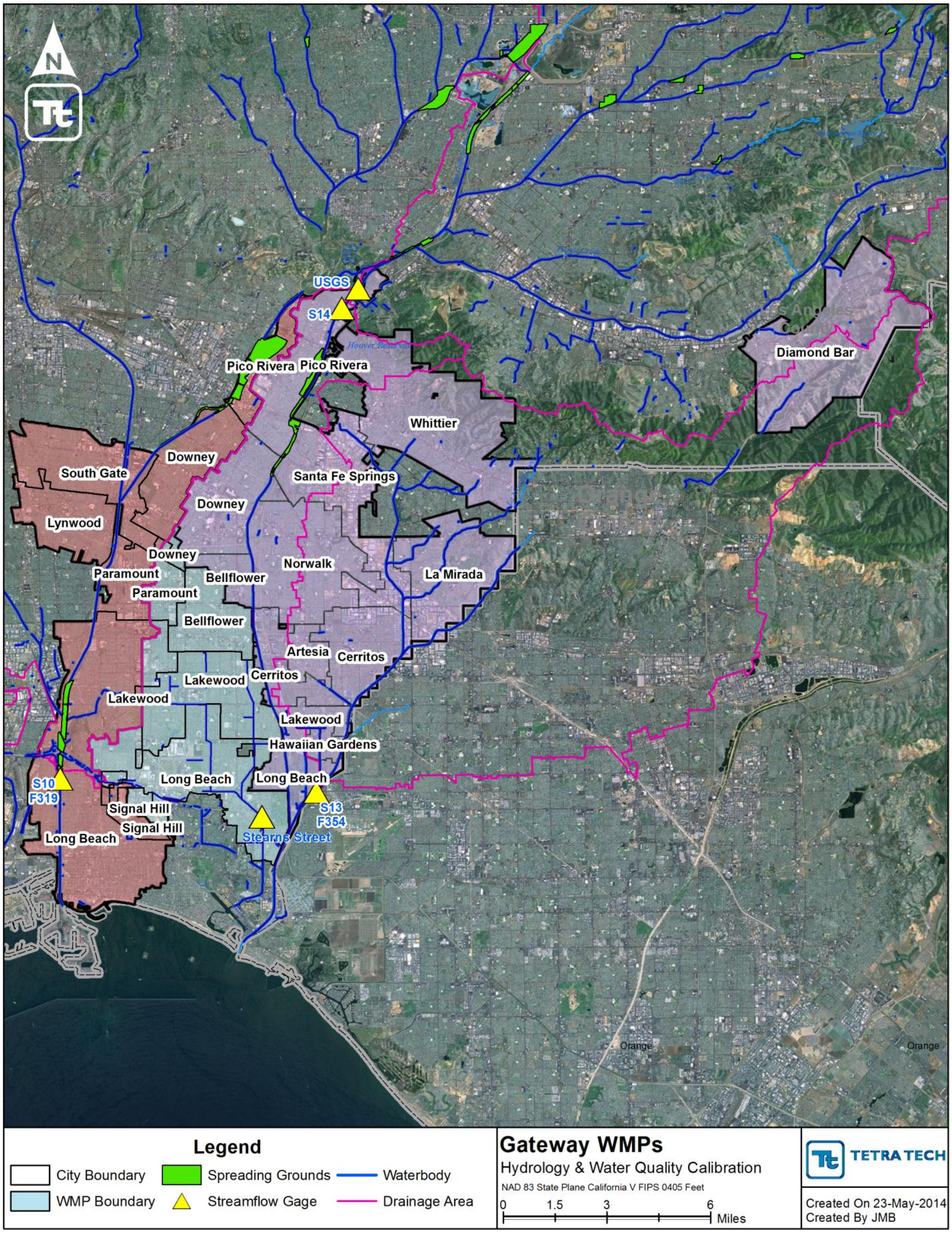

Figure 4-1. WMP groups hydrology and water quality calibration sites.

To demonstrate the ability to predict the effect of watershed processes and management actions, model calibration and validation are necessary and critical steps in any model application. Acceptable model calibration criteria for benchmarking an RAA were developed by the Regional Board and are listed below in Table 4-1 (LARWQCB 2014). The objectives of establishing model assessment criteria are to ensure the calibrated model reflects all the model conditions and properly utilizes the available modeling parameters, thus yielding meaningful results. The lower bound of "Fair" level of agreement listed in Table 4-1 is considered a target tolerance for the model calibration process.

Table 4-1. Model assessment criteria from the RAA Guidelines

Constituent Group	Percent Difference Between Modeled and Observed		
	Very Good	Good	Fair
Hydrology / Flow	0 – 10	>10 – 15	>15 – 25
Sediment	0 – 20	>20 – 30	>30 – 40
Water Quality	0 – 15	>15 – 25	>25 – 35
Pesticides / Toxics	0 – 20	>20 – 30	>30 – 40

4.1.1. Hydrology Calibration

Table 4-2 and Table 4-3 present the hydrology calibration assessment for the Lower Los Angeles River and Lower San Gabriel River gages, respectively. Nash-Sutcliffe efficiency is a correlation coefficient commonly used in hydrological modeling to measure how well a model predicts temporal variation. A value of 1.0 means a perfect match between modeled and observed. A value of 0 means that the computed mean of observed data is as good a predictor as the model. A negative value means that the data-mean is a better predictor than the model. Because the Regional Board guidance only required annual average flow volume metric, evaluating Nash-Sutcliffe helped to demonstrate that the model also performed well at predicting *intra-annual* flow variablilty.

Table 4-2. Summary of model hydrology calibration performance for Lower Los Angeles River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at Los Angeles River below Wardlow Road (LA DPW F319)	10/1/2002 – 9/30/2011	Flow Volume	8.72	Very Good
		Nash-Sutcliffe	0.680	n/a

Table 4-3. Summary of model hydrology calibration performance for Lower San Gabriel River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at SAN GABRIEL R AB WHITTIER NARROWS DAM CA (USGS 1108702)	10/1/2001 – 9/30/2011	Flow Volume	-3.31	Very Good
		Nash-Sutcliffe	0.64	n/a
Coyote Creek near Spring Street (LA DPW F354)	10/1/2003 – 9/30/2011	Flow Volume	-6.17	Very Good
		Nash-Sutcliffe	0.62	n/a

4.1.2. Water Quality Calibration

Water quality calibration for the LLAR, LCC, and LSGR incorporated sampling from LA County mass emission stations at S10 (LA River), Strearns Street (LCC), and S13 and S14 along Coyote Creek and the San Gabriel River, respectively. The updated observed concentration data collected at these sites were used to refine the calibration and benchmark model performance. Daily observed loads were calculated by multiplying observed concentration and daily observed flow. Daily loads were estimated for LCC using simulated flows due to the lack of observed data. The percent error between this daily observed load and the daily modeled load was then calculated for each constituent. The results of this evaluation at the two gages are presented in Table 4-4 through Table 4-7.

Table 4-4. Summary of model performance by constituent at the Los Angeles River (S10) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	91	-6.8	Very Good
Total Copper	58	-3.4	Very Good
Total Zinc	58	-18.1	Good
Total Lead	52	-0.1	Very Good
Fecal Coliform	57	-5.1	Very Good
Total Nitrogen	58	-4.0	Very Good
Total Phosphorous	57	6.9	Very Good

Table 4-5. Summary of model performance by constituent at Los Cerritos Channel (Stearns St.) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	85	2.7	Very Good
Total Copper	57	-2.1	Very Good
Total Zinc	56	1.5	Very Good
Total Lead	57	2.2	Very Good
Fecal Coliform	55	1.0	Very Good
Total Nitrogen	56	17.5	Good
Total Phosphorous	56	-0.4	Very Good

Table 4-6. Summary of model performance by constituent at the San Gabriel River (S14) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	45	8.57	Very Good
Total Copper	42	-9	Very Good
Total Zinc	44	16.1	Very Good
Total Lead	44	-3.97	Very Good
Fecal Coliform	43	1.85	Very Good
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous	44	-2.27	Very Good

Table 4-7. Summary of model performance by constituent at the Coyote Creek (S13) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	42	1.28	Very Good
Total Copper	27	-28.9	Fair
Total Zinc	27	-32.44	Fair
Total Lead	25	-1.58	Very Good
Fecal Coliform	24	-34.48	Fair
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous			

Two fecal coliform samples were removed from the observed dataset at the San Gabriel River S14 mass emission station prior to performing the load calculation. These two samples appear to be outliers in the dataset with concentration values 10-100x greater than the remaining samples. These observations occurred on 10/17/2005 and 10/13/2009.

For pollutants not explicitly represented in the WMMS LSPC model, and for dry weather analysis, 90th percentile concentrations were calculated based on observed monitoring data at the LACDPW mass emission sites. The 90th percentile concentration was used for compliance with the Regional Board RAA guidelines (LARWQCB 2014). A summary of the 90th percentile concentrations for each constituent and waterbody are presented below in Table 4-8. For subsequent load reduction analyses, these concentrations were assumed for all wet or dry weather conditions they were assigned to represent existing conditions within their respective watersheds.

Table 4-8. 90th percentile concentrations assumed for non-modeled pollutants

Waterbody	Pollutant	Wet Weather	Dry Weather	90th Percentile Concentration	Units
Los Angeles River (S10)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Cadmium	●		4.8	ug/l
	Copper		●	25.68	ug/l
	Lead		●	3.43	ug/l
	E. coli		●	19,600	MPN/100 mL
Los Cerritos Channel (Stearns)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	25.4	ug/l
	E. coli		●	14,200	MPN/100 mL
San Gabriel River (S14)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	29.89	ug/l
	Selenium		●	4.77	ug/l
	E. coli		●	2,190	MPN/100 mL
Coyote Creek (S13)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	28.54	ug/l
	E. coli		●	11,500	MPN/100 mL

[1] DDT, PCBs and PAHs were below MDL, so concentrations were assumed half MDL.

4.2. Current Best Management Practices/Minimum Control Measures

It is important to note the model calibration incorporates local stormwater BMPs implemented through late 2012 into the baseline condition. The only BMPs/control devices that were explicitly incorporated into the baseline model were the Dominguez Gap basins. All other BMPs, which individually were assumed to have a small effect on water quality at the watershed scale, are implicitly represented in the baseline condition. BMPs implemented in 2013 can be categorized as WMP implementation measures and their volume/load reductions are a component of the pollutant reduction plan for attaining interim and final milestones.

5. Estimated Required Pollutant Load Reductions

This section provides a description of the process for identifying critical conditions and calculating required load reductions to meet interim and final limitations.

5.1. Selected Average (Interim) and Critical (Final) Conditions

The RAA Guidelines specify that average conditions shall be used to establish load reductions for interim milestones and critical conditions shall be used to establish load reductions for final limits. In addition, the Permits provide two pathways for addressing WQ Priorities (see Figure 5-1):

- Volume-based: Retain the standard runoff volume from the 85th percentile, 24-hour storm
- Load-based: Achieve the necessary pollutant load reductions to attain Permit limits

Both types of numeric goals were evaluated as part of this RAA.

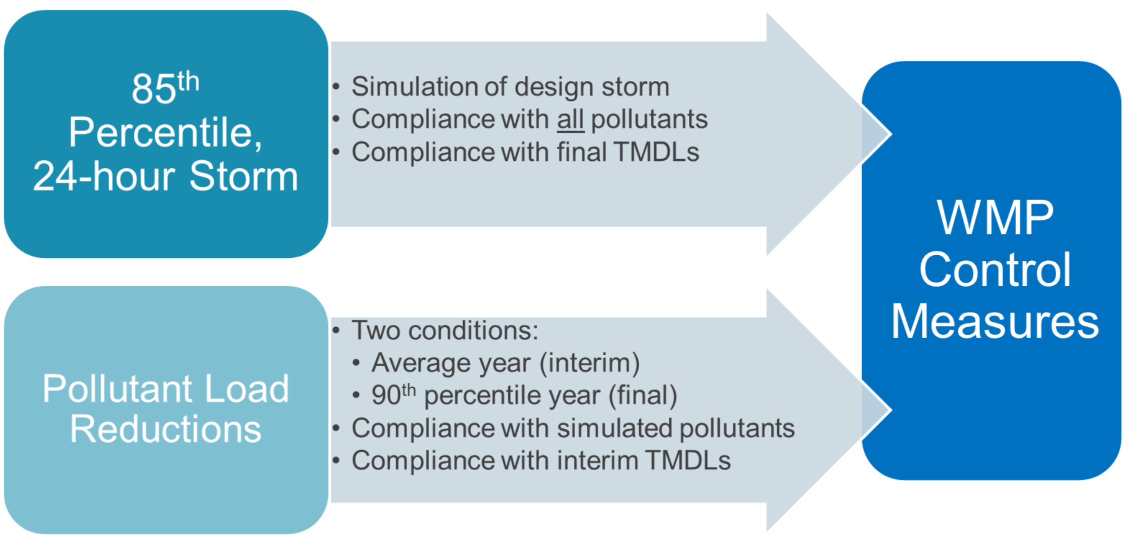

Figure 5-1. Two Types of Numeric Goals and WMP Compliance Paths according to the Permits

5.2. Representative Conditions for Wet Weather

Two approaches were considered and ultimately used in the RAA to represent wet weather critical conditions: the 90th percentile wet year and 85th percentile, 24-hour (design) storm, as described in the following subsections.

5.2.1. Average and 90th Percentile Wet Years

This RAA is based on continuous simulation, and a "representative" year-long time period was selected to represent average and critical conditions, which allows the modeling to capture the variability of rainfall and storm sizes/conditions. For LLAR, LCC, and LSGR, WY2008 was selected as the representative year for average conditions and WY2003 was selected as the representative year for the 90th percentile critical wet conditions.

To select these average and critical years for the RAA, the following steps were taken:

1. **Calculated key rainfall metrics for the last 25-years:** the average and critical years were identified by aggregating data from available rain gages across the entire Los Angeles River and San Gabriel River watersheds (LCC is in between, so the analysis for LLAR and LSGR also applies to LLC). For

comparison, other regional watersheds were also analyzed and presented. The two key metrics evaluated were: (1) total annual rainfall, and (2) average rainfall per wet day (with wet days defined as days with rainfall totals greater than 0.1 inches). The first is clearly an indicator of volume, while the second is an indicator of rainfall intensity. To evaluate long-term conditions, the analysis covered 25 water years (WY) from 1987 through 2011—the total rainfall for each precipitation gage was area-weighted and aggregated into annual totals by water year (i.e. previous October through current September).

2. **Selected years from the most recent 10-years that are most representative of average and 90th percentile**: per the RAA Guidelines, the most recent 10-year period represented in the available data were used to develop the RAA. Table 5-1 and Table 5-2 show average rainfall volumes and intensities (inches per wet day), respectively, for the most recent 10 years compared against the entire 25-years. Both the average and 90th percentile values were compared across the 10- and 25-year records. For the San Gabriel River, 2007-08 is a representative average year based on both the rainfall volume (Table 5-1) and intensity (Table 5-2) metrics. Because BMP performance is typically intensity-dependent, average rainfall per wet day (Table 5-2) was selected as a better metric for use in determining the 90th percentile than annual average rainfall (Table 5-1), which led to selection of 2002-03 as the critical year.

It should be noted that wet weather conditions were also reflective on the definition of dry/wet days. As described in Section 5, for analysis of non-bacteria pollutants (including the limiting pollutant zinc) days with greater than 90th percentile daily average flow were flagged as "wet," which aligns with the critical condition used for the LAR and LSGR metals TMDLs.

5.2.2. 85th Percentile, 24-hour Storm

The design storm is identified in the RAA Guidelines as an acceptable critical condition, and capture of design storm volumes by BMPs is a specified compliance metric in the Permits for TMDLs. The design storm was evaluated and used as a wet weather critical condition for the RAA. As described above, the design storm is a volume-based standard. Each subwatershed within each WMP area has a unique 85th percentile runoff volume, due to varying rainfall amounts and land characteristics (imperviousness, soils, slope, and the like). The rainfall depths associated with the 85th percentile, 24-hour storm are shown in Figure 5-2, based on rolling 24-hour intervals for the 25-year period between October 1, 1987 and September 30, 2011. Within the WMP area, the 85th percentile rainfall depth values range between 0.72 and 1.08 inches.

To determine the "standard volume" associated the design storm, initial conditions were set in LSPC to reflect representative conditions at the start of the simulation, along with regionally derived infiltration rates, and 85th percentile rainfall depths were used as rainfall boundary conditions. At each location the storm distribution presented in Figure 5-3 was used to temporally distribute the 24-hour rainfall volumes (LACDPW 2006). The model was then run to predict the associated runoff volumes for each subwatershed in the WMP area. Those runoff volumes represent the volumes that would need to be retained in order to attain the numeric goals associated with the 85th percentile, 24-hour storm.

Shown in Figure 5-4 are the rainfall depths and runoff depths (runoff volume divided by subwatershed area) associated with the design storm for each subwatershed in the WMP areas. About 50 percent of the subwatersheds in all three WMP areas experiences 0.4 inches or more of runoff under the 85th percentile, 24-hour storm, while about 10 percent of the area experiences about 0.55 inches or more of runoff. Figure 5-5 summarizes the total design storm volumes (in acre-feet) for each jurisdiction. The runoff depths for each subwatershed in the WMP area are graphically shown in Figure 5-6, Figure 5-7, and Figure 5-8.

Table 5-1. Average Rainfall Depths (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Totals (in./year)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	25.4	19.1	28.1	30.6	30.5
2002-03	17.1	13.9	20.8	23	20.4
2003-04	10.2	8.1	9.2	13.7	11.2
2004-05	39.3	28.4	42.6	49.6	46.7
2005-06	14.1	9.8	16.9	17.9	17.5
2006-07	4.3	3.1	6.8	6.4	5.8
2007-08	13.2	11.9	18.6	19.4	17.5
2008-09	9.6	8.5	12.3	14.6	12.5
2009-10	16.8	14.9	20.3	24.1	20.5
2010-11	21.2	18.5	25.3	28.5	25.7
Avg. (1987-2011)	15.9	12.5	18.4	20.7	19.2
90th %ile (1987-2011)	30.8	22.9	34.7	37.8	36.9

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

Table 5-2. Average Rainfall Intensity (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Per Wet Day (in./wet day)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	0.36	0.32	0.41	0.42	0.36
2002-03	0.79	0.66	0.88	0.92	0.84
2003-04	0.61	0.48	0.61	0.66	0.58
2004-05	0.98	0.69	1.03	1.07	1.03
2005-06	0.53	0.41	0.61	0.64	0.61
2006-07	0.31	0.27	0.39	0.41	0.37
2007-08	0.56	0.52	0.68	0.76	0.71
2008-09	0.49	0.48	0.56	0.65	0.57
2009-10	0.64	0.6	0.71	0.82	0.72
2010-11	0.62	0.58	0.73	0.76	0.7
Avg. (1987-2011)	0.59	0.52	0.67	0.72	0.66
90th %ile (1987-2011)	0.78	0.66	0.91	0.97	0.89

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

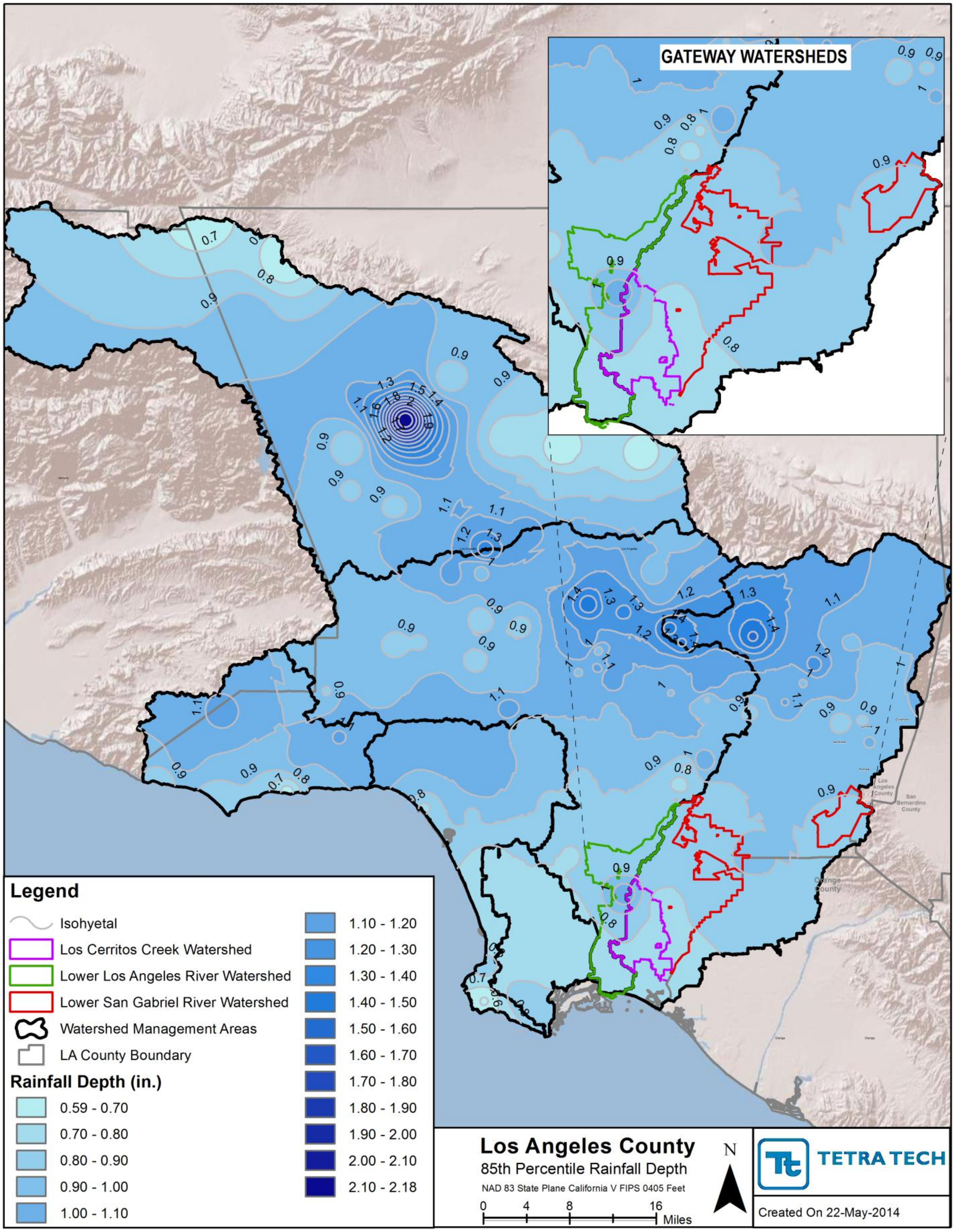

Figure 5-2. Rainfall depths associated with the 85th percentile, 24-hour storm.

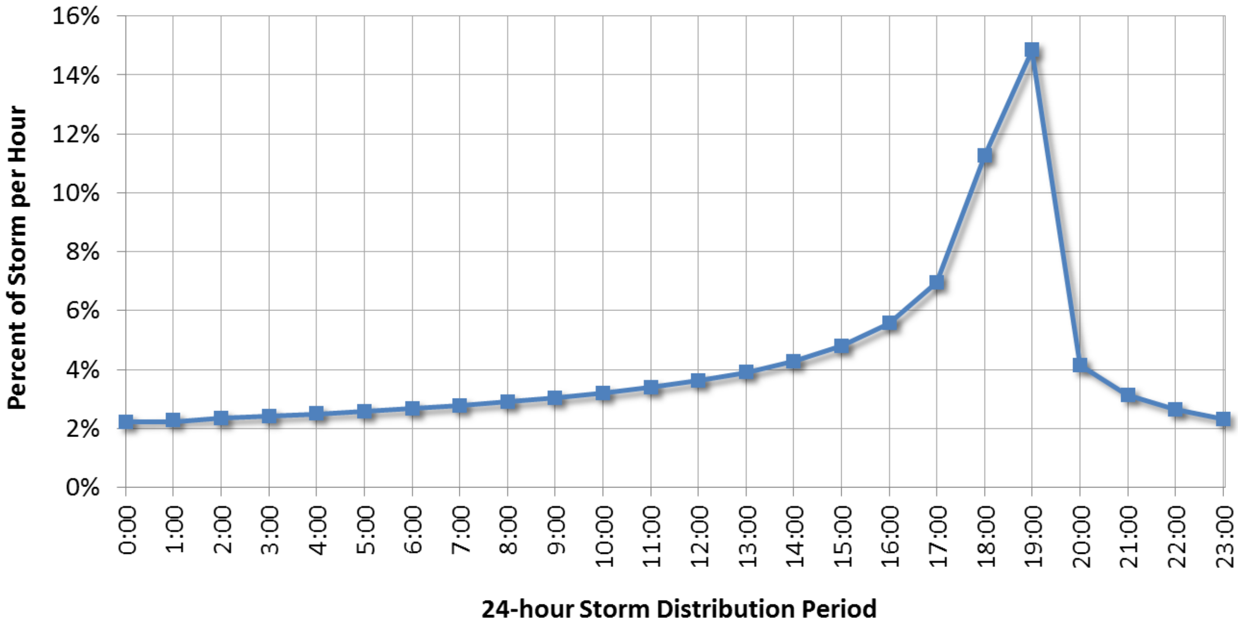

Figure 5-3. Temporal Distribution for 85th Percentile 24-hour Storm for LSPC Simulation.

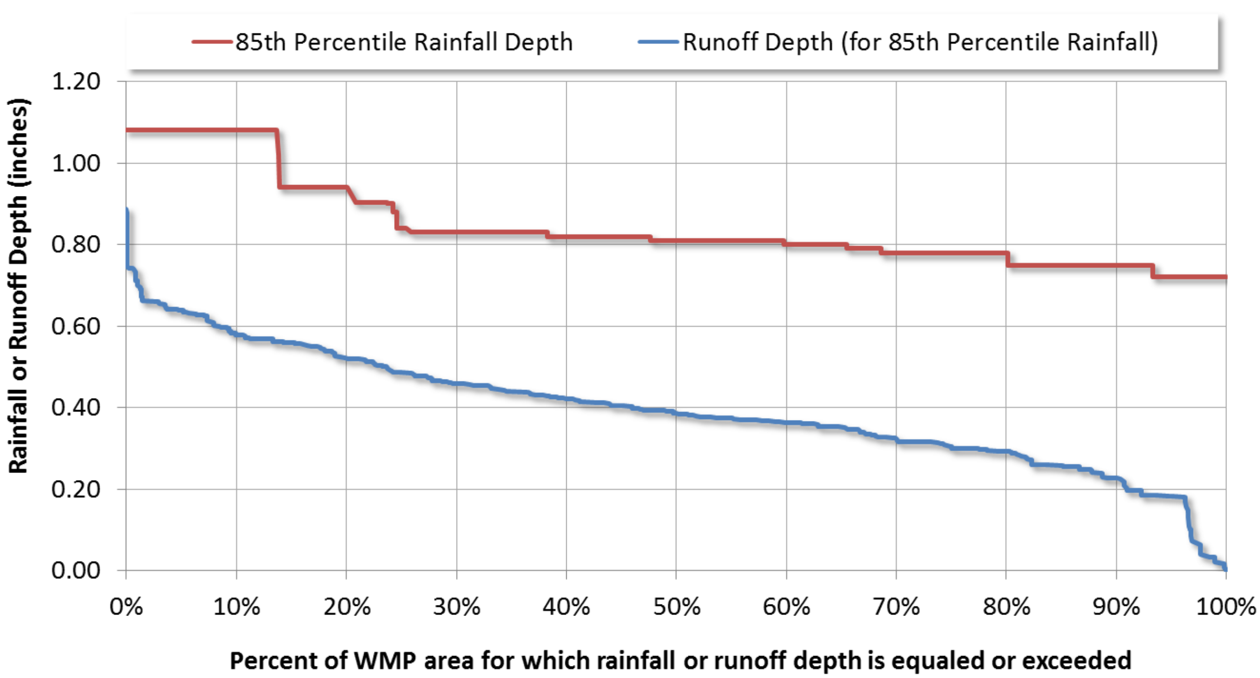

Figure 5-4. Rainfall and Runoff Depths Associated with 85th Percentile Rainfall in the WMP subwatersheds.

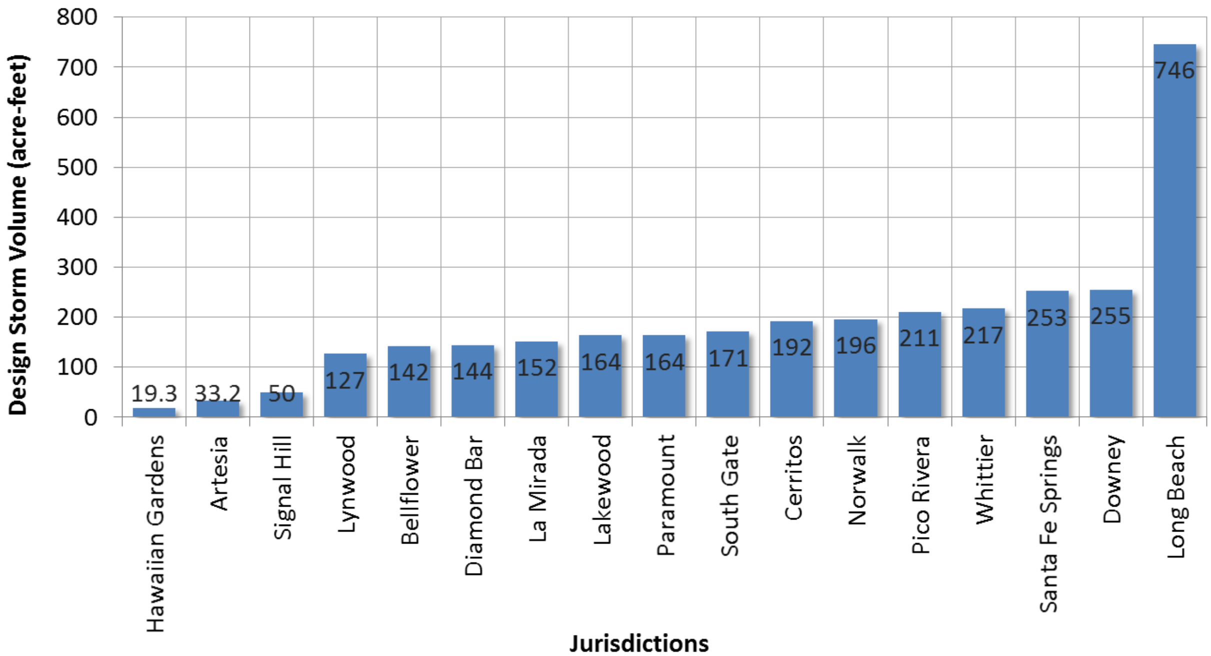

Figure 5-5. Runoff Volume Associated with the 85th Percentile, 24-hour Storm (by jurisdiction).

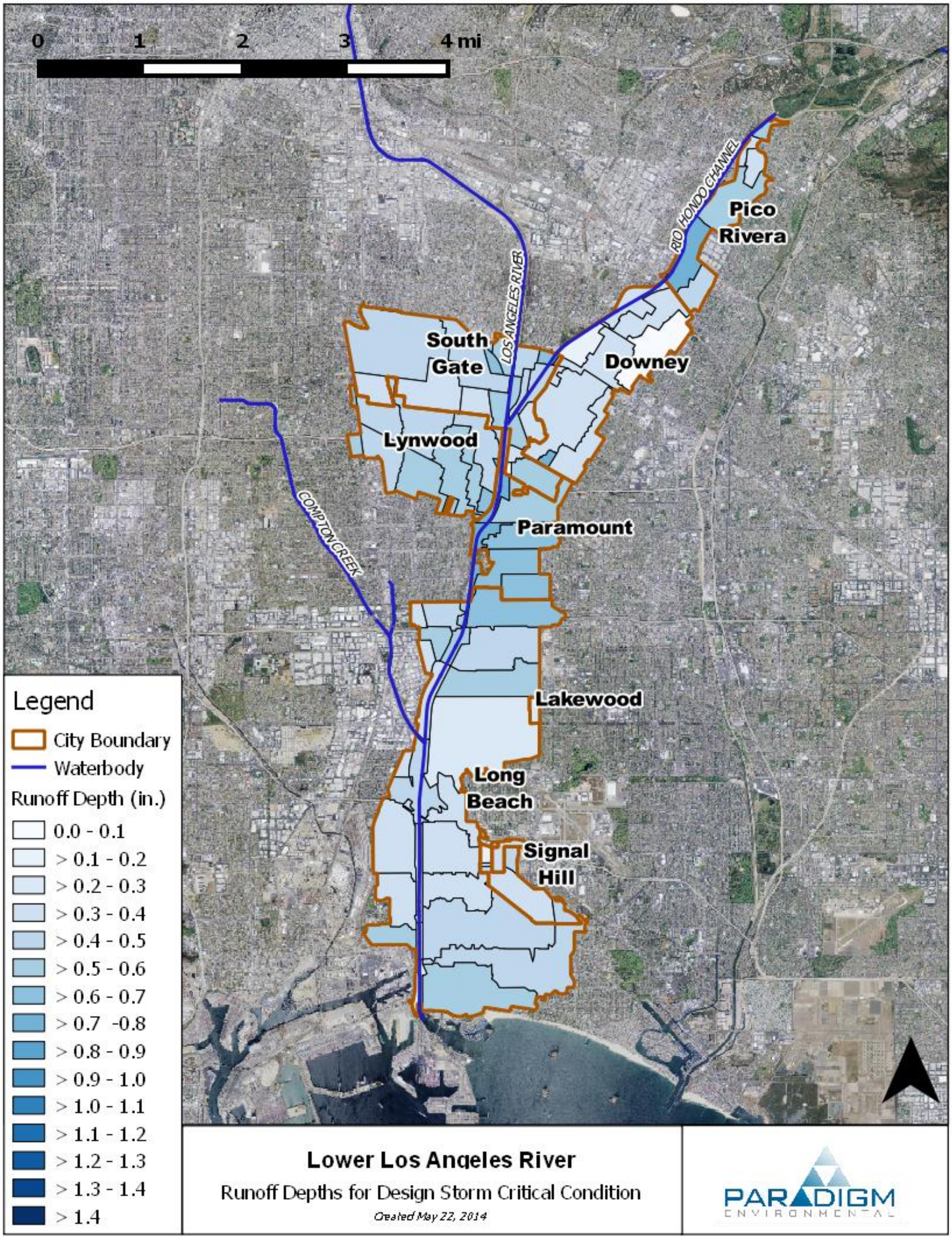

Figure 5-6. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower Los Angeles River.

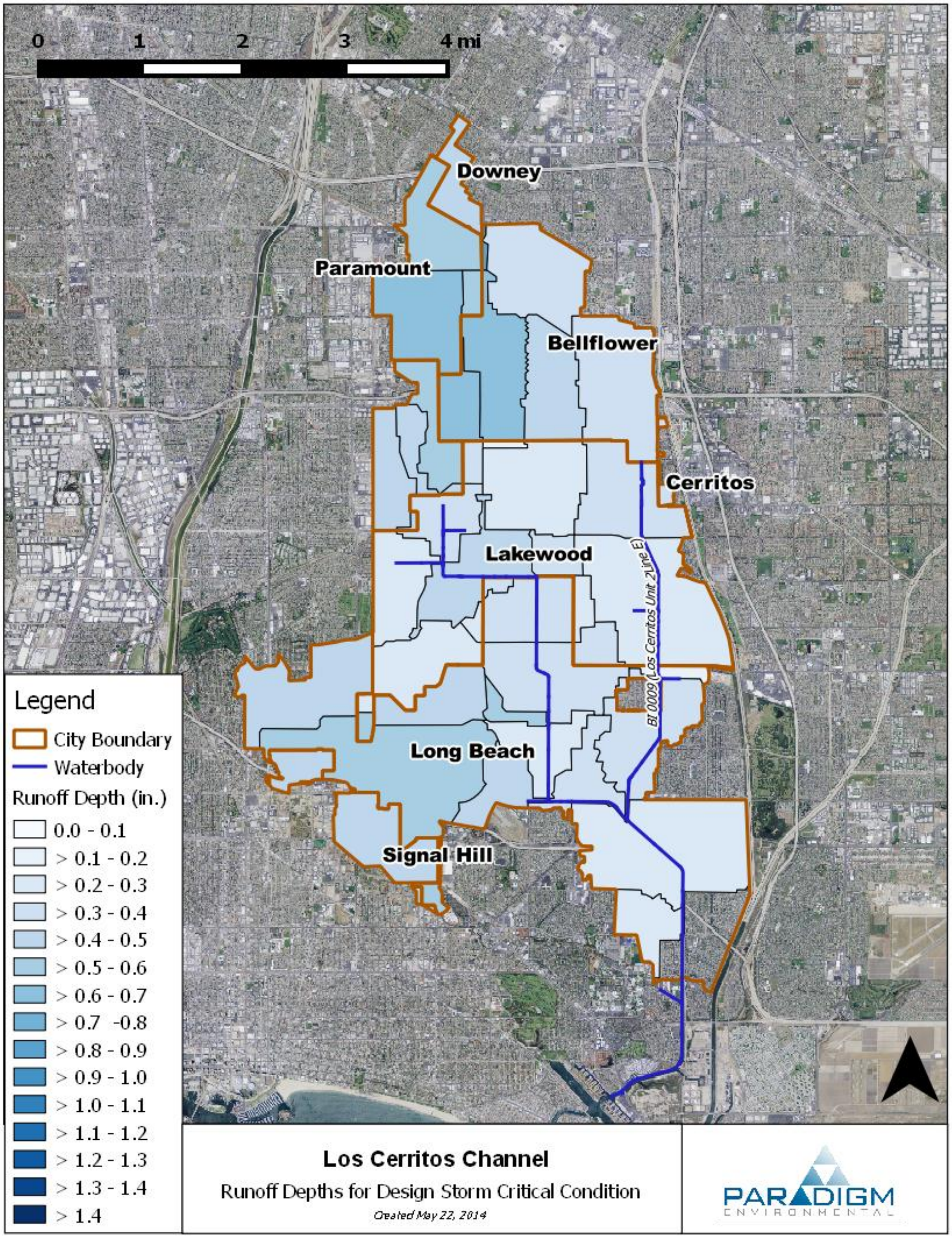

Figure 5-7. Runoff Associated with the 85th Percentile, 24-hour Storm for Los Cerritos Channel.

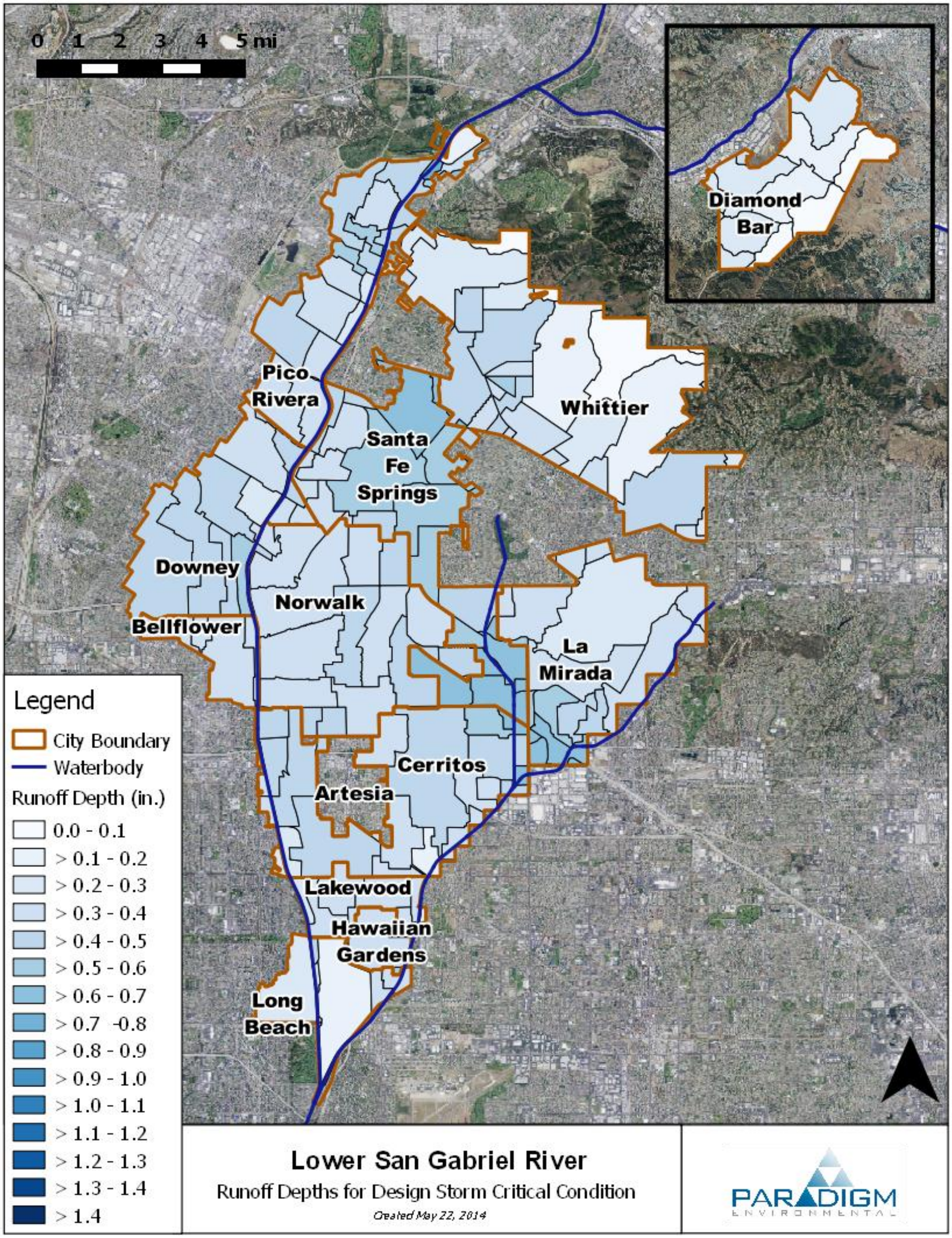

Figure 5-8. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower San Gabriel River.

5.2.3. Representative Conditions for Dry Weather

Although clearly defined definitions exist for wet periods, definitions for dry periods are less clearly defined. Wet weather periods are either defined in terms of rainfall or instream flow. For bacteria, a wet day is one with a rainfall total greater than 0.1 inches plus the three subsequent days, while metals criteria define wet days as those with instream flow above the 90th percentile. One seemingly intuitive way of defining a dry period is simply to use the "non-wet" days represented as the inverse of wet days. However, summary of model results indicate some residual influence of wet weather among the "non-wet" days. This presents some challenges for estimating loads and evaluating dry weather compliance because BMP planning would be better served by choosing design conditions that are more influenced by natural background baseflow and/or anthropogenic activities such as point source discharges or dry weather runoff from irrigation (instead of post-rain event interflow).

The RAA Guidelines recommend using the most recent 10 years of data for modeling scenarios to ensure that the plans are based on a representative range of wet and dry conditions. Regional precipitation and instream flow patterns are highly variable; therefore, a representative dry period is one that consistently represents minimal influence to wet weather conditions. To identify a representative dry period, the analysis covered 25 WYs from 1987 through 2011. The following steps were taken:

1. The total rainfall for each precipitation gage in the study area was summarized and classified into wet and non-wet periods according to the bacteria criteria definition for wet weather (i.e. days with rainfall > 0.1 inches plus the three subsequent days).
2. Dry periods were evaluated on a monthly time scale. Table 5-3 shows the average number of consecutive 30-day dry periods, counted by month of the associated mid-interval date, for each of the rainfall gages within the three WMP areas over the 25 years of rainfall evaluated. The color-ramp indicates relative dryness, with red being driest. Table 5-3 indicates that on average, the months of June, July, and August are the driest months in the year, averaging 24-30 consecutive dry intervals. Note that because this table counts mid-interval dates by month, values approaching 30 actually indicate continuous dry intervals approaching 60 days (15 days on either side of the 30 day interval).
3. Select periods within the average and critical year were identified for dry weather simulations. The areal coverage or non-wet intervals in the two selected representative years (2008 and 2003) were compared against the 10-year period (2001-2011) and the long-term 25-year period (1998-2011). Figure 5-9, Figure 5-10, and Figure 5-11 show the selected representative dry period against summaries of non-wet weather conditions in the LLAR, LCC, and LSGR WMP areas, respectively. Within the two selected years, the 45-day period between 8/17 and 9/30 was found to be the most representative of dry weather conditions because (1) no rainfall occurred at any of the gages throughout all three WMP areas, (2) it was during a time of the year that was historically shown to experience the least amount of spatially-weighted rainfall in a year, and (3) it was late in the summer following an extended period of no rainfall for both 2003 and 2008.

The identified periods between 8/17 and 9/20 during the average and critical years were used for subsequent dry weather simulations for the dry weather component of the RAA.

Table 5-3. Consecutive 30-day Dry Periods per month by WMP and rainfall gage (10/1/1987 – 9/30/2011)

WMP	StaID	Average Number of Consecutive 30-Day Dry Intervals Per Month (10/1/1987 – 9/30/2011)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Los Cerritos Channel	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower Los Angeles River	D1113	4.2	2.5	8.3	9.8	19.5	24.4	28.1	27.8	23.6	13.7	8.8	4.5
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D291	3.3	1.1	5.0	8.8	19.4	24.4	28.7	28.4	21.9	11.6	4.6	3.5
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower San Gabriel River	D106	4.2	0.6	6.0	10.9	19.7	24.6	28.6	29.0	23.9	14.0	8.2	4.0
	D1088	2.2	1.0	3.8	9.0	17.6	24.1	28.5	29.0	20.9	12.6	5.9	2.7
	D1095	2.4	0.5	4.4	10.0	19.2	24.6	28.6	29.1	21.2	14.2	7.1	4.2
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D1257	2.0	0.5	4.5	10.6	18.9	24.4	28.6	29.8	21.2	10.3	5.7	3.0
	D1271	1.8	1.6	3.9	9.4	18.1	24.4	28.6	29.7	21.6	11.7	7.3	3.4
	D156	3.0	1.5	5.2	10.1	19.2	24.6	28.5	29.3	21.0	13.4	7.2	5.0
	D17	1.7	1.2	5.2	9.1	17.5	22.4	28.6	29.0	22.6	11.3	5.2	3.7
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D269	1.8	0.5	4.2	8.1	18.0	24.2	28.6	29.1	22.2	13.0	6.7	3.2

Legend:	Wet	→	Dry

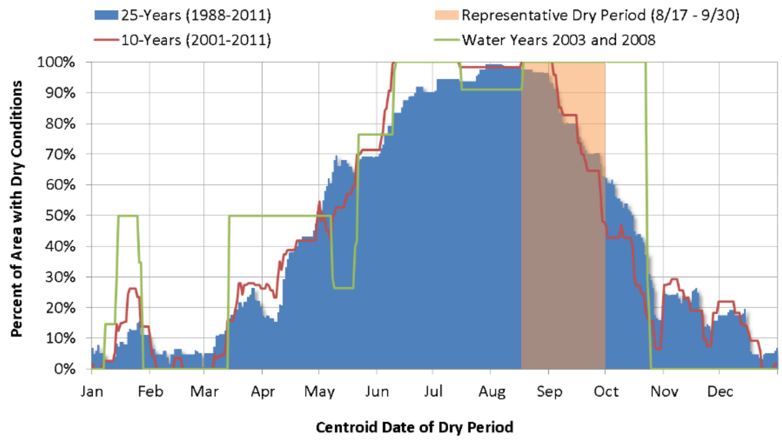

Figure 5-9. Spatiotemporal summary of non-wet weather conditions in the Lower Los Angeles River WMP area.

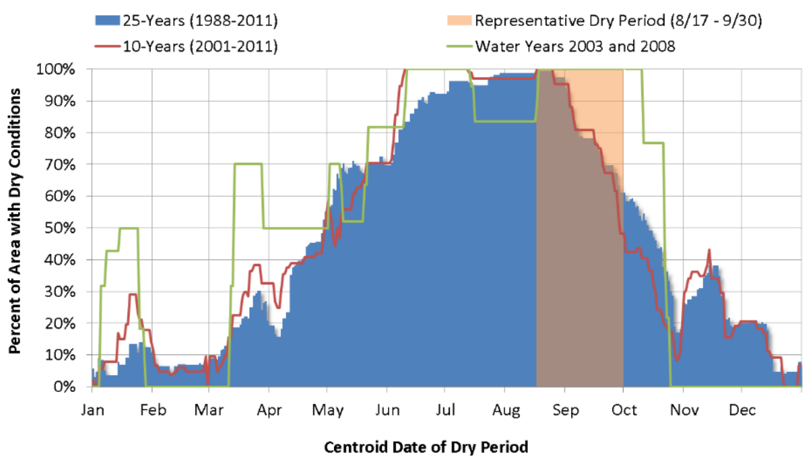

Figure 5-10. Analysis of summary of non-wet weather conditions in the Los Cerritos Channel WMP area.

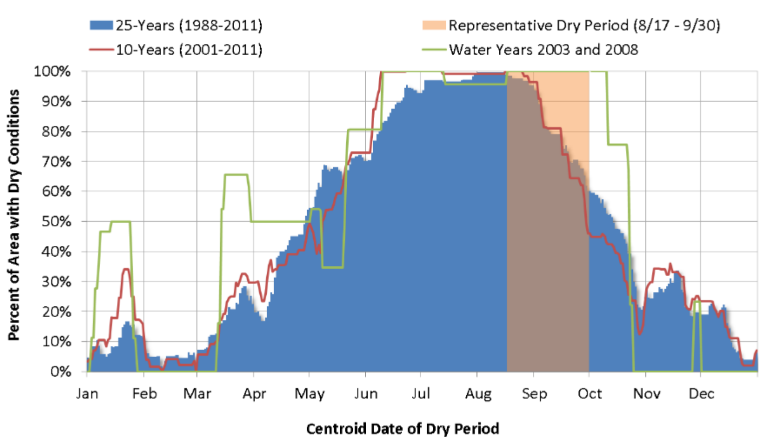

Figure 5-11. Spatiotemporal summary of non-wet weather conditions in the Lower San Gabriel River WMP area.

5.3. Calculated Required Pollutant Reductions to Achieve Final Limits

Using the average storm year (2007-08) and 90th percentile storm year (2002-03), required pollutant reductions were calculated for attainment of interim and final limitations, respectively, applicable to each WMP area. Per the RAA Guidelines, the percent reduction used to determine the control measures necessary to attain interim milestones shall be based on the average year, while the control measures for attainment of the final limits are based on the 90th percentile year.

Required load reductions were evaluated at RAA Assessment Points located at the bottom-most discharge from each WMP areas (shown in Figure 3-2 through Figure 3-4). The RAA Assessment Points represent locations where the collective discharge from each jurisdiction with each WMP area can be assessed to contribute to pollutant loads to the receiving waters. Pollutant loads outside of the WMP areas are not considered in this loading analysis at the RAA Assessment Points, although in reality other loads exist. However, transport of pollutant loads from individual jurisdictions within the WMP areas are considered, including the effect of LACFCD infrastructure and other hydraulic features that can impede flows and associated pollutant loads to the location of the RAA Assessment Points. The result is an accounting system that provides reasonable tracking and estimation of required load reductions throughout each individual WMP area so that meaningful goals can be set for BMP implementation planning.

Applicable targets for wet and dry conditions for Category 1 WQ Priorities (corresponding to the TMDLs within each watershed) are listed in Table 5-4 and Table 5-5, respectively. These targets were used to establish the daily "exceedance load" and daily "allowable load". The differences in these loads, as predicted by LSPC, were tracked across the average year and 90th percentile year and used to calculate the required pollutant reduction. While Category 1 WQ Priorities were emphasized, targets were also applied for Category 2 and Category 3 WQ Priorities. In particular, to provide a comprehensive WMP planning approach, copper, lead, zinc and *E. coli* were assessed for all RAA assessment points (even if a TMDL is not applicable).

For bacteria targets, it should be noted that Allowable Exceedance Days and high flow suspension (HFS) days were incorporated (if applicable) into the percent reduction calculation. The approach of the LA River Bacteria TMDL was used to align Exceedance Days and HFS days. The HFS applies to LLAR and LSGR but not LCC (and thus HFS days were not incorporated into the required reduction calculation for LCC). For LSGR and LCC, a bacteria TMDL has not been adopted but the RAA Guidelines state that targets and critical conditions from other TMDLs in the region should be utilized. If the Allowable Exceedance Days were removed from the percent reduction calculations for LSGR and LCC, the required reductions would increase.

Table 5-4. Applicable wet weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cd kg/d	2.8×10^{-9} X daily storm volume (L) - 1.8	WQBEL
	LAR Reach 1 (freshwater)	Cu kg/d	1.5×10^{-8} X daily storm volume (L) - 9.5	WQBEL
	LAR Reach 1 (freshwater)	Pb kg/d	5.6×10^{-8} X daily storm volume (L) - 3.85	WQBEL
	LAR Reach 1 (freshwater)	Zn kg/d	1.4×10^{-7} X daily storm volume (L) - 83	WQBEL
	All LLAR	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LLAR	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LLAR	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	235 (exceedances allowed during HFS days and 10 exceedance days)	WQBEL

WMP Area	Waterbody	Pollutant	Target	Source
LCC	All LCC	Cu g/d	$4.709X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Pb g/d	$26.852X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Zn g/d	$46.027X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LCC	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LCC	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
LSGR	SG Reach 2	Pb ug/L	81.34	WQBEL
	Coyote Cr.	Cu ug/L	24.71	WQBEL
	Coyote Cr.	Pb ug/L	96.99	WQBEL
	Coyote Cr.	Zn ug/L	144.57	WQBEL
	SG Reach 1 & Coyote Cr.	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL

Table 5-5. Applicable dry weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cu ug/L	23	WQBEL
	LAR Reach 1 (freshwater)	Pb ug/L	12	WQBEL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	126	WQBEL
LCC	All LCC	Cu g/d	67.2	WQBEL
	All LCC	*E-coli* MPN/100mL	126	WQBEL
LSGR	SG Reach 1	Cu ug/L	18	WQBEL
	SG Reach 1	*E-coli* MPN/100mL	126	WQBEL
	San Jose Cr. Reach 1&2	Se ug/L	5	WQBEL
	San Jose Cr. Reach 1&2	*E-coli* MPN/100mL	126	WQBEL
	Coyote Cr.	Cu kg/d	0.941	WQBEL
	Coyote Cr.	*E-coli* MPN/100mL	126	WQBEL

5.3.1. Wet-Weather Required Pollutant Reductions

The wet weather pollutant baseline loading and reduction targets for average and critical conditions are summarized in Table 5-6 and Table 5-7 respetively (all WMP areas) and shown graphically in Figure 5-12 through Figure 5-15 (individual WMP areas). These analyses were used to determine the limiting pollutant. The limiting pollutant is defined as the pollutant requiring the greatest load reduction, and BMPs implemented to achieve the limiting pollutant reductions are protective of other pollutant reductions (e.g., sediment or volume reductions). In Table 5-6. Wet-weather pollutant baseline loading by WMP area with analysis of limiting pollutants

WMP	Year[1]	Organics (kg)				Metals (kg)		Bacteria (Billion #)[1]
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	0.12	0.77	19.80	2,437	2,464	11,153	2.78E+07
	2008	0.09	0.61	15.59	1,935	1,968	8,878	5.46E+07
Los Cerritos Channel (LCC)	2003	0.07	0.45	11.60	1,611	1,719	7,481	2.55E+08
	2008	0.05	0.35	9.13	505	386	2,607	2.40E+08
Lower San Gabriel River (LSGR)	2003	0.06	0.42	10.80	768	544	3,805	2.06E+06
	2008	0.05	0.33	8.50	393	337	2,512	1.98E+06
Coyote Creek (CC)	2003	0.11	0.71	18.20	1,640	1,197	8,373	6.57E+05
	2008	0.09	0.56	14.33	839	736	5,450	6.72E+06

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

1. LLAR, LSGR, CC bacteria loads are for bacteria wet-days and exclude high flow suspension (HFS) days.
   LCC bacteria loads are for bacteria wet-days
2. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
3. Blue Box: Zinc is limiting pollutant for the 90th percentile year
4. Metals loads are for wet-weather days (90th percentile flow and greater)
5. Organics are summarized on an annual basis

Table 5-7, the red color gradient highlights limiting pollutants, with a deeper red generally indicating a more limiting pollutant. Zinc was identified as the limiting pollutant for each WMP area[4]. The determination of limiting pollutant considered implementation actions to control the pollutant – for example, Senate Bill 346 will result in significant reductions of copper loading from brake pads. Because total source control measures are not on the horizon for zinc, it becomes the limiting pollutant instead of copper. The evaluation of copper and organics as limiting pollutants and rationale for their exclusion is described below.

Although DDT and PCBs were estimated to have high load reduction requirements to meet WQBELs, they were not identified as limiting pollutants because the maximum detection limits (MDLs) used for the analysis heavily affected the calculated required reductions. Rather than use LSPC for reduction calculations, monitoring data were used directly and many reported concentrations for DDT, PCBs, and PAHs were below MDLs, so concentrations were assumed in the model to equal half the MDL. The MDL is above the target leading to non-detects requiring reductions. Of course, toxics will be addressed by control measures implemented for zinc. The Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL states that

[4] In LSGR, a higher percent reduction for bacteria was calculated for the average year than the 90th percentile (see Figure 5-14). Although total annual rainfall in 2008 and 2003 were virtually identical over the entire SGR watershed (20.5 and 20.4 inches/year, respectively), 2003 had fewer wet days than 2008, resulting in relatively more intense events on average (about 18 percent higher). As a result, 2003 had more HFS days than 2008—exceedances during HFS days are not considered when computing the required load reduction, lowering the required reduction.

"implementation of other TMDLs in the watershed may contribute to the implementation of this TMDL," and implementation of the effective TMDLs in Los Angeles River and San Gabriel River are integrated within Phase I of the implementation of the toxics TMDL (LARWQCB and USEPA 2011). As a result, DDT, PCBs, and PAHs were not represented in Figure 5-12 through Figure 5-15.

Although copper was calculated to have a higher required reduction than zinc, the effect of Senate Bill 346 is expected to reduce those reductions without any implementation of structural control measures. The Brake Pad Partnership was formed in 1999 as a collaboration of cities, industry, and other entities to address the lack of information and research regarding the impact of brake debris material in the environment. After its formation, the Brake Pad Partnership commissioned several technical studies to better quantify the fate and transport of copper to San Francisco Bay including a detailed source assessment. Overall findings of the study estimated that of the anthropogenic sources of copper, approximately 35 percent are attributed to brake pad releases (BPP 2010). Even if the reduction was only half of this amount, the adjustment to the required copper reduction would still result in zinc being the limiting pollutant in LLAR, LCC, and LSGR.

After excluding organics and total copper for the reasons described previously, total zinc becomes the limiting pollutant in each of the WMP areas during the 90th percentile year. In other words, reductions of zinc during WMP implementation will drive reduction of other pollutants, particularly because the pollutant reduction plan emphasizes sediment control (other pollutants are typically transported with sediment) and retention/infiltration rather than pollutant treatment.

Plots showing the differences between the baseline loads, allowable loads, and exceedance loads are shown in Attachment F.

Table 5-6. Wet-weather pollutant baseline loading by WMP area with analysis of limiting pollutants

WMP	Year[1]	Organics (kg)				Metals (kg)		Bacteria (Billion #)[1]
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	0.12	0.77	19.80	2,437	2,464	11,153	2.78E+07
	2008	0.09	0.61	15.59	1,935	1,968	8,878	5.46E+07
Los Cerritos Channel (LCC)	2003	0.07	0.45	11.60	1,611	1,719	7,481	2.55E+08
	2008	0.05	0.35	9.13	505	386	2,607	2.40E+08
Lower San Gabriel River (LSGR)	2003	0.06	0.42	10.80	768	544	3,805	2.06E+06
	2008	0.05	0.33	8.50	393	337	2,512	1.98E+06
Coyote Creek (CC)	2003	0.11	0.71	18.20	1,640	1,197	8,373	6.57E+05
	2008	0.09	0.56	14.33	839	736	5,450	6.72E+06

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

6. LLAR, LSGR, CC bacteria loads are for bacteria wet-days and exclude high flow suspension (HFS) days.
   LCC bacteria loads are for bacteria wet-days
7. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
8. Blue Box: Zinc is limiting pollutant for the 90th percentile year
9. Metals loads are for wet-weather days (90th percentile flow and greater)
10. Organics are summarized on an annual basis

Table 5-7. Wet-weather pollutant reduction targets by WMP area with analysis of limiting pollutants[5]

WMP	Year	Organics				Metals		Bacteria
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	87.3%	72.0%	0.0%	84.1%	38.6%	67.4%	23.4%
	2008	90.0%	77.9%	0.0%	82.8%	32.9%	64.9%	45.1%
Los Cerritos Channel (LCC)	2003	86.6%	70.3%	0.0%	95.6%	76.7%	90.8%	40.4%
	2008	89.6%	77.1%	0.0%	87.1%	3.6%	75.6%	47.9%
Lower San Gabriel River (LSGR)	2003	79.5%	54.6%	0.0%	40.1%	0.0%	29.3%	22.9%
	2008	91.4%	80.7%	0.0%	18.0%	0.0%	25.0%[4]	53.0%
Coyote Creek (CC)	2003	75.9%	46.8%	0.0%	37.5%	0.0%	28.3%	19.1%
	2008	91.3%	76.8%	0.0%	22.7%	0.0%	30.4%[4]	59.2%

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

1. Average year is 2008 and 90th percentile year is 2003
2. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
3. Blue Box: Zinc is limiting pollutant for the 90th percentile year
4. Bacteria reduction target is lower in 2003 than 2008 because more days were classified as HFS

[5] For the Diamond Bar jurisdiction of the San Gabriel River WMP area, a portion flows to the Santa Ana River. Since this area is open space and therefore not associated with MS4 runoff, no reductions were determined necessary. Loadings for the 90th percentile year from this area are 1.16 kg/year of total Cu, 0.87 kg/year of total Pb, 5.21 kg/year of total Zn, and 4.91×10^{12} #/year of E-coli.

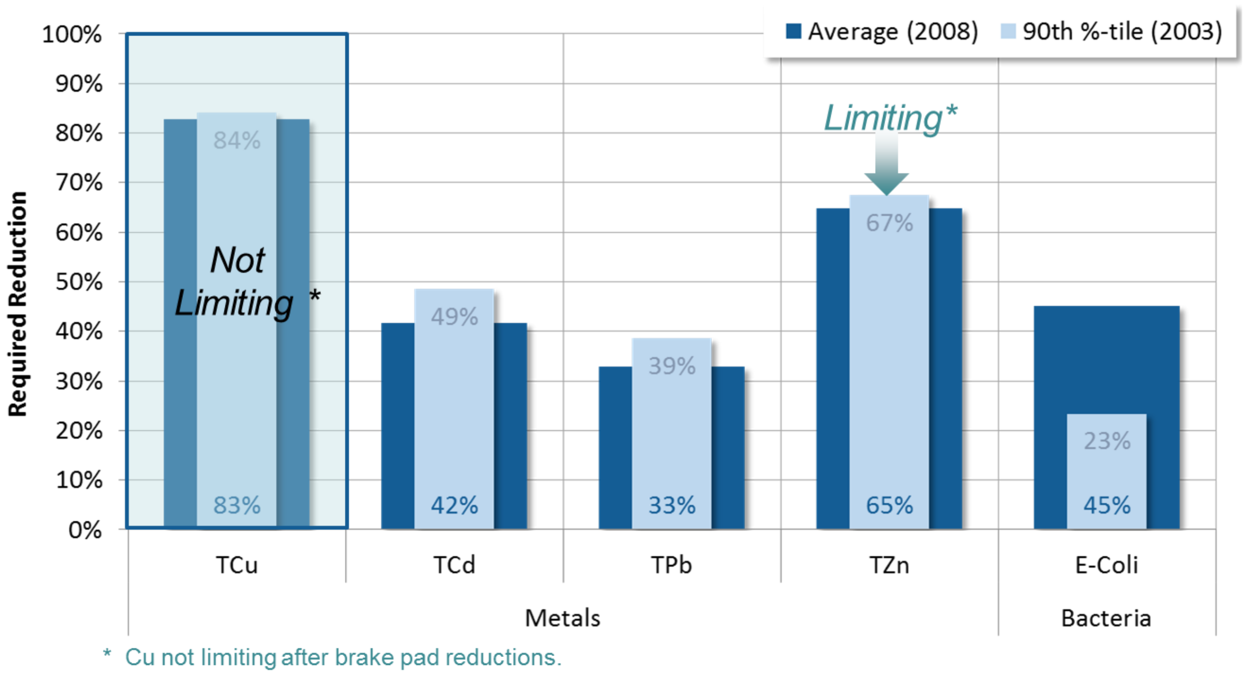

Figure 5-12. Wet-weather pollutant reduction targets and limiting pollutant for Lower Los Angeles River WMP.[6]

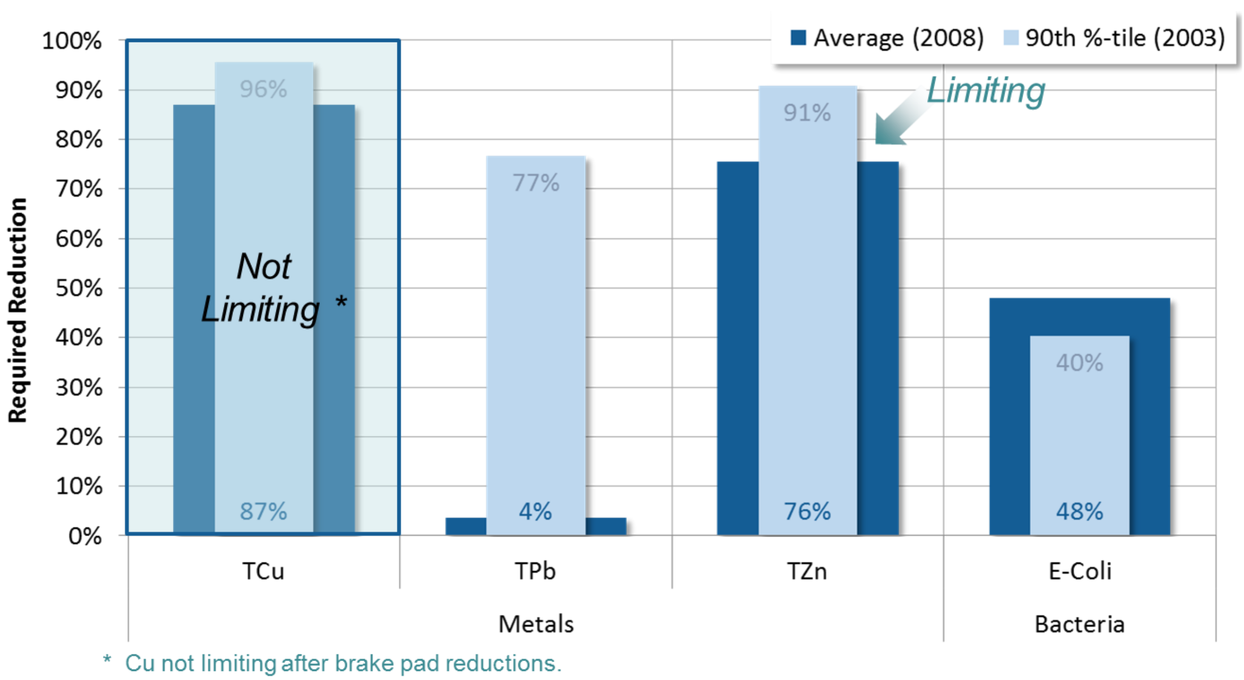

Figure 5-13. Wet-weather pollutant reduction targets and limiting pollutant for Los Cerritos Chanel WMP.

[6] Note that the Los Cerritos Channel TMDLs for Metals requires no reduction of Pb.

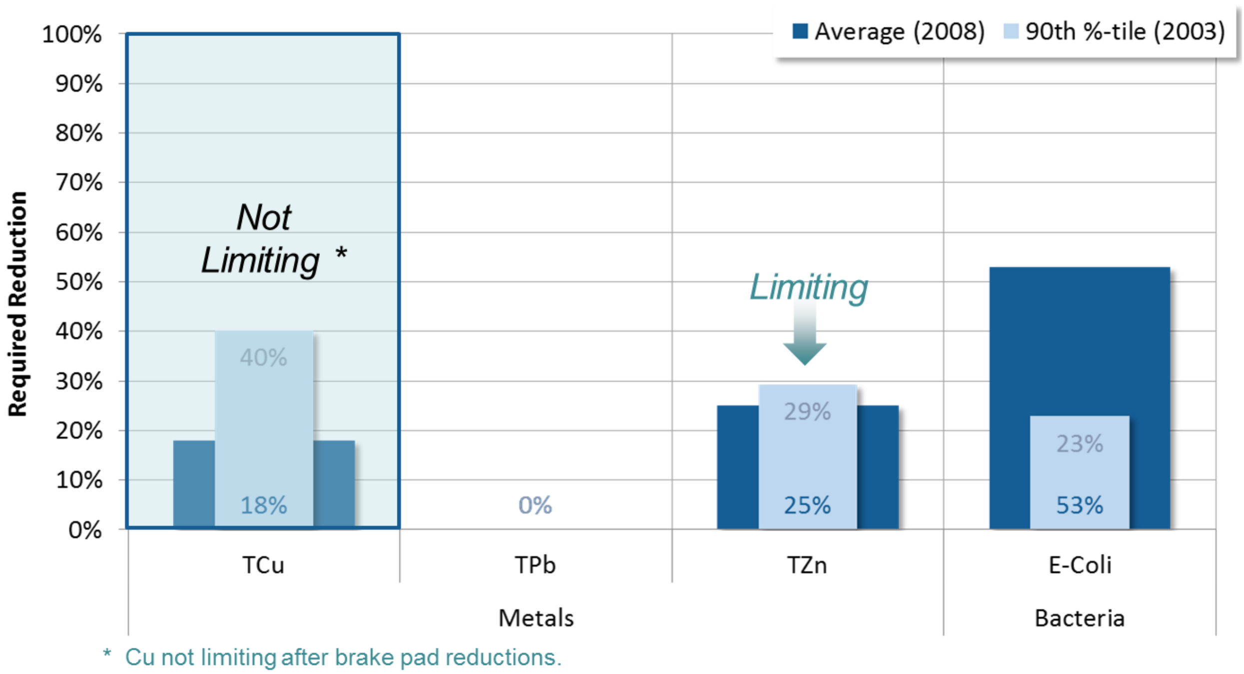

Figure 5-14. Wet-weather pollutant reduction targets and limiting pollutant for Lower San Gabriel River.

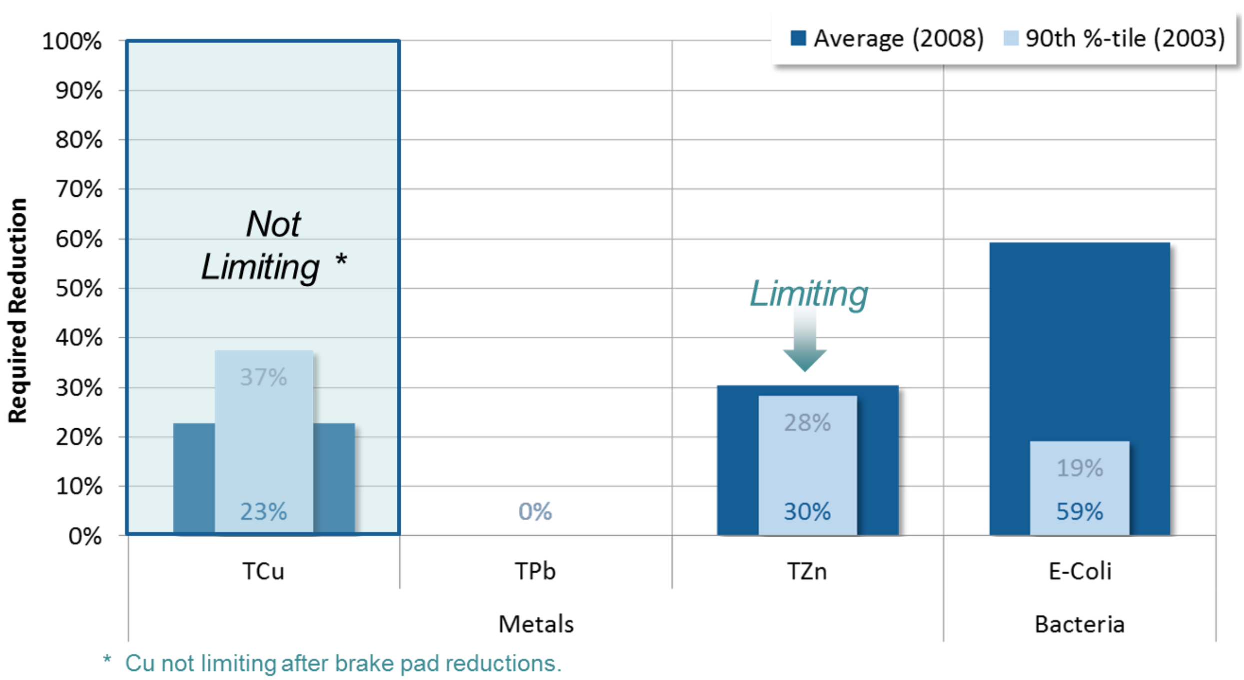

Figure 5-15. Wet-weather pollutant reduction targets and limiting pollutant for Coyote Creek.

5.3.2. Dry-Weather Pollutant Reduction Targets

Using the representative dry-weather period of August 17 through September 30, as defined in Section 5.2.3, modeled instream flow was multiplied by the observed dry weather concentrations to get existing conditions loads, which are shown in Table 5-8. Likewise, target concentrations were also multiplied by modeled instream flow to get allowable load for each waterbody, which is shown in Table 5-9. Finally, Table 5-10 summarizes dry-weather reduction targets for each listed segment for both the average year and the 90th percentile year.

For dry weather, bacteria is the limiting pollutant (not zinc) because the required reductions are much higher than other pollutants. Reductions of bacteria during WMP implementation will drive reductions of other pollutants.

Table 5-8. Modeled existing condition dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Existing Load (kg/day or MPN/day)		
Waterbody	**Pollutant**	**2003**	**2008**	**2003**	**2008**	**Mean**
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	6.28	4.12	5.20
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	0.84	0.55	0.69
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	4.79E+13	3.15E+13	3.97E+13
LCC	Cu ug/L	4.65	2.20	0.29	0.14	0.21
LCC	*E. coli* MPN/100ml	4.65	2.20	1.62E+12	7.64E+11	1.19E+12
SG Reach 1	Cu ug/L	69.04	75.36	5.05	5.51	5.28
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	3.70E+12	4.04E+12	3.87E+12
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.06	0.09	0.07
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	6.72E+11	1.05E+12	8.62E+11
Coyote Cr.	Cu ug/L	19.65	15.69	1.37	1.10	1.23
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	5.53E+12	4.41E+12	4.97E+12

Table 5-9. Allowable TMDL dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Allowable Load (kg/day or MPN/day)		
Waterbody	Pollutant	2003	2008	2003	2008	Mean
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	5.63	3.69	4.66
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	2.94*	1.93*	2.43*
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	3.08E+11	2.02E+11	2.55E+11
LCC	Cu ug/L	4.65	2.20	0.07	0.07	0.07
LCC	*E. coli* MPN/100ml	4.65	2.20	1.43E+10	6.78E+09	1.06E+10
SG Reach 1	Cu ug/L	69.04	75.36	3.04	3.32	3.18
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	2.13E+11	2.32E+11	2.23E+11
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.15*	0.24*	0.20*
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	3.87E+10	6.05E+10	4.96E+10
Coyote Cr.	Cu ug/L	19.65	15.69	0.94	0.94	0.94
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	6.06E+10	4.48E+10	5.45E+10

*Existing dry-weather loads are currently below the allowable loads thus showing compliance for this pollutant.

Table 5-10. Required dry-weather percent reductions by water body

WMP	Waterbody	Pollutant	Required Dry-Weather Percent Reductions		
			2003	2008	Mean
LLAR	LAR Reach 1 (freshwater)	Cu	10%	10%	10%
	LAR Reach 1 (freshwater)	Pb	0%	0%	0%
	LAR Reach 1 (freshwater)	*E. coli*	99.36%	99.36%	99.36%
LCC	LCC	Cu	76.74%	50.85%	68.43%
	LCC	*E. coli*	99.11%	99.11%	99.11%
LSGR	Coyote Cr.	Cu	31.42%	14.11%	23.73%
	Coyote Cr.	*E. coli*	98.90%	98.90%	98.90%
	SG Reach 1	Cu	39.78%	39.78%	39.78%
	SG Reach 1	*E. coli*	94.25%	94.25%	94.25%
	San Jose Cr. Reach 1 & 2	Se	0%	0%	0%
	San Jose Cr. Reach 1 & 2	*E. coli*	94.25%	94.25%	94.25%

Color Ramp shows relative magnitude of reductions—darker means higher reductions

6. Determination of Potential BMP Capacity for RAA

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 6-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

For LLAR, LCC, and LSGR, the 90th percentile WY (2002-03) weather was selected as the critical condition for wet weather.

Details on the analyses performed to determine potential BMP treatment capacity are provided in Attachment A. The attachment describes the approach for incorporating nonstructural BMPs, accounting for the effect of LACFCD infrastructure, and separating the contribution from non-MS4 sources.

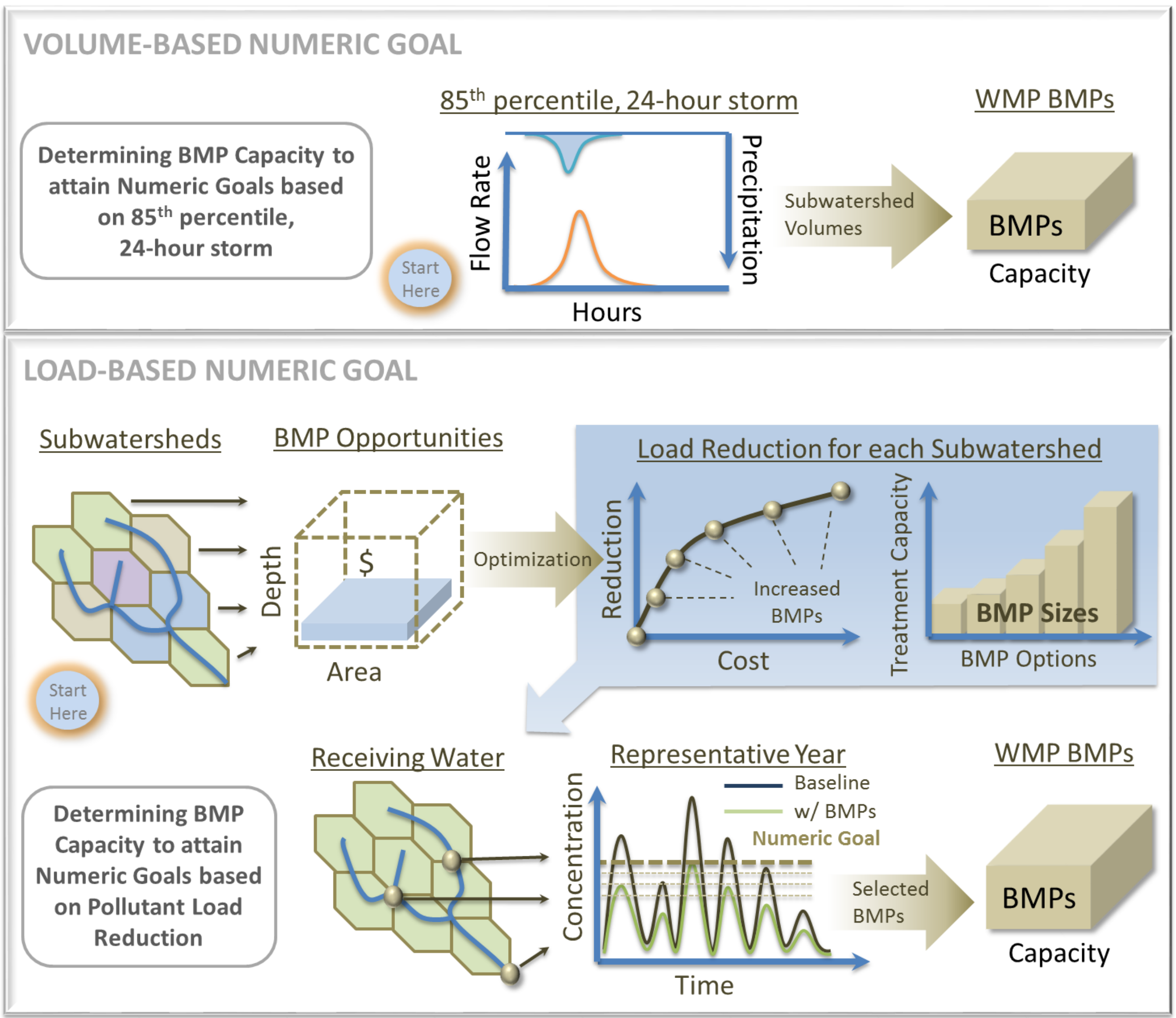

Figure 6-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

7. Cumulative Volume Reduction Goals to Achieve Required Pollutant Reductions

The first output of the RAA is a series of "volume reduction goals" for each subwatershed and jurisdiction in the WMP area. WMMS was used to determine the stormwater retention volumes for each subwatershed that would achieve the required load reductions, as reported in this section. These calculated runoff reduction volumes for each subwatershed are a surrogate compliance metric for the responsible agencies. It should be noted that upon implementation, opportunities may arise where flow-through BMPs may provide similar ultimate pollutant load reduction, and may replace the need to implement volume-based reduction BMPs.

These volumes also form the basis for selection of BMPs to achieve those volume reductions, as described in Section 9 and Attachment A.

7.1. Volume Reductions for Structural BMPs

Structural BMPs were modeled using the assumptions outlined in Attachment A. BMP capacities were optimized across the entire study area to achieve the final milestone pollutant reduction requirements at each of the assessment points. Instead of summarizing optimization results in terms of BMP capacity, which is really specific to the network described in Attachment A, the results were summarized as required *annual* wet-weather retention volume (in acre-feet). This provides a volumetric basis that is (1) closely related to load reduction and (2) readily transferable as a control target for parallel BMP modeling at a finer resolution. Because the volumes were isolated to wet days, it is also not skewed by dry-weather runoff retention. The following subsections provide more details about the wet- and dry-weather analysis components.

7.1.1. Wet Weather

Using the structural BMP routing network in WMMS (described in Attachment A), the required *annual* wet-weather retention volume (in acre-feet) were calculated using the critical year time series. For milestones, the percent reduction was based on average year targets while final limits were based on critical year targets. The reported annual volumes are (1) based on required load reductions and (2) ready for BMP modeling at a finer resolution. A 10 percent load reduction was assumed to result from implementation of all nonstructural control measures outlined in the WMPs, setting the foundation of WMP implementation, and structural control measures provide additional load reduction.

Table 7-1 through Table 7-4 present incremental and cumulative retention volumes required to achieve each load reduction milestone by jurisdiction. The milestones are based on the metals TMDLs as described in Section 2. In order to calculate the incremental volume reductions for each milestone, optimization was performed for each jurisdiction to (1) emphasize BMP implementation in subwatersheds that volume reduction could most cost effectively reduce pollutants and (2) establish a cost-effective sequence of subwatersheds for each jurisdiction to achieve the milestones over time. In other words, WMMS was used to develop an implementation schedule that provides early gains in receiving water quality.

Table 7-1. Annual volume reduction goals to achieve interim and final milestones for Lower Los Angeles River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Downey	31%	143.8	143.8
	50%	221.7	365.5
	Final	360.5	726.0
Lakewood	31%	14.3	14.3
	50%	0.0	14.3
	Final	0.0	14.3
Long Beach	31%	540.7	540.7
	50%	1090.8	1,631.5
	Final	2270.1	3,901.7
Lynwood	31%	303.3	303.3
	50%	185.2	488.6
	Final	619.6	1,108.1
Paramount	31%	181.8	181.8
	50%	227.8	409.6
	Final	579.2	988.8
Pico Rivera	31%	365.3	365.3
	50%	0.0	365.3
	Final	12.0	377.3
Signal Hill	31%	32.8	32.8
	50%	106.6	139.4
	Final	58.4	197.9
South Gate	31%	229.3	229.3
	50%	343.2	572.6
	Final	940.0	1,512.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less

2: Includes full implementation of planned non-structural practices

Table 7-2. Annual volume reduction goals to achieve interim and final milestones for Los Cerritos Channel WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Bellflower	10%	NS	NS
	35%	336.1	336.1
	Final	801.3	1,137.4
Cerritos	10%	NS	NS
	35%	9.7	9.7
	Final	3.2	12.9
Downey	10%	NS	NS
	35%	77.0	77.0
	Final	35.8	112.8
Lakewood	10%	NS	NS
	35%	282.4	282.4
	Final	874.8	1,157.2
Long Beach	10%	NS	NS
	35%	560.9	560.9
	Final	2115.2	2,676.1
Paramount	10%	NS	NS
	35%	278.8	278.8
	Final	353.1	631.9
Signal Hill	10%	NS	NS
	35%	269.9	269.9
	Final	52.7	322.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

Table 7-3. Annual volume reduction goals to achieve interim and final milestones for Lower San Gabriel River WMP

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	1.1	1.1
	Final	0.0	1.1
Bellflower	10%	NS	NS
	35%	1.3	1.3
	Final	61.5	62.8
Cerritos	10%	NS	NS
	35%	6.6	6.6
	Final	52.8	59.4
Diamond Bar	10%	NS	NS
	35%	0.3	0.3
	Final	32.8	33.0
Downey	10%	NS	NS
	35%	4.3	4.3
	Final	259.6	263.9
Lakewood	10%	NS	NS
	35%	7.4	7.4
	Final	2.2	9.6
Long Beach	10%	NS	NS
	35%	26.9	26.9
	Final	2.3	29.2
Norwalk	10%	NS	NS
	35%	0.8	0.8
	Final	136.1	136.9
Pico Rivera	10%	NS	NS
	35%	0.2	0.2
	Final	74.8	75.1
Santa Fe Springs	10%	NS	NS
	35%	0.0	0.0
	Final	106.0	106.0
Whittier	10%	NS	NS
	35%	0.0	0.0
	Final	7.5	7.5

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

Table 7-4. Annual volume reduction goals to achieve interim and final milestones for the Coyote Creek portion of Lower San Gabriel River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	47.9	47.9
	Final	0.0	47.9
Cerritos	10%	NS	NS
	35%	0.1	0.1
	Final	194.2	194.3
Diamond Bar	10%	NS	NS
	35%	1.0	1.0
	Final	73.0	74.0
Hawaiian Gardens	10%	NS	NS
	35%	27.0	27.0
	Final	3.4	30.4
La Mirada	10%	NS	NS
	35%	0.8	0.8
	Final	174.9	175.7
Lakewood	10%	NS	NS
	35%	17.5	17.5
	Final	8.2	25.7
Long Beach	10%	NS	NS
	35%	37.5	37.5
	Final	0.0	37.5
Norwalk	10%	NS	NS
	35%	3.0	3.0
	Final	149.5	152.5
Santa Fe Springs	10%	NS	NS
	35%	0.4	0.4
	Final	260.3	260.7
Whittier	10%	NS	NS
	35%	2.1	2.1
	Final	252.6	254.7

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

7.1.2. Dry Weather

Dry-weather reductions from non-structural BMPs were calculated using flow from representative dry period (Section 5.2) of 8/17/2003 through 9/30/2003 and 90th percentile concentrations calculated from observed data (Section 5.2.1). Similar to wet weather, a 10% load reduction is assumed to result from the cumulative effect of nonstructural BMPs. Also, the effects of a 25% reduction in irrigation of urban grass was explicitly simulated in the model to estimate the resulting associated reduction of dry weather flows at the RAA Assessment Points. Irrigation was modeled as artificial rainfall within the LSPC model as a function of the potential evapotranspiration of urban grass. Once irrigation was reduced 25%, this directly impacted a large portion of the nonstormwater discharges drivin primarily from over irrigation and impacts on dry weather flows were significant. The projected effect of non-structural and irrigation controls on dry weather flow and loads is presented in Table 7-5. Since *E. Coli* is the limiting dry weather pollutant with required reductions in excess of 90%, the remaining volume reduction not controlled by non-structural measures will be treated by the structural BMPs described in the previous section.

Table 7-5. Projected dry weather reductions from non-structural control measures

Watershed	Constituent	Quantity (Volume or Mass)			Percent Reduction Achieved	
		Baseline	NM	NS	NM	NS
Lower Los Angeles River	Flow (M Gal.)	198.3	178.5	86.6	10.0%	56.4%
	Copper (kg)	19.28	17.35	8.42	10.0%	56.4%
	Lead (kg)	2.58	2.32	1.12	10.0%	56.4%
	E. Coli (Billion MPN)	147,166	132,449	64,230	10.0%	56.4%
Los Cerritos Channel	Flow (M Gal.)	133.6	120.2	56.3	10.0%	57.8%
	Copper (kg)	12.84	11.56	5.42	10.0%	57.8%
	E. Coli (Billion MPN)	71,808	64,627	30,277	10.0%	57.8%
Lower San Gabriel River	Flow (M Gal.)	163.3	147.0	71.2	10.0%	56.4%
	Copper (kg)	18.48	16.63	8.06	10.0%	56.4%
	Selenium (kg)	2.95	2.65	1.29	10.0%	56.4%
	E. Coli (Billion MPN)	13,540	12,186	5,903	10.0%	56.4%
Coyote Creek	Flow (M Gal.)	213.4	192.0	88.4	10.0%	58.6%
	Copper (kg)	23.05	20.75	9.55	10.0%	58.6%
	E. Coli (Billion MPN)	92,887	83,599	38,491	10.0%	58.6%

NM: Non-modeled non-structural practices achieve 10% reduction

NS: Non-structural 25% irrigation reduction practices achieve an additional approximately 60% reduction

8. MS4 Volume Reduction Goals to Achieve Required Pollutant Reductions

Each jurisdiction in the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the cumulative volume reduction goal (Section 7) to establish the MS4 responsible targets as described in Attachment A.

8.1. Summary of MS4 Responsible Reduction Goals

Runoff volumes estimated for non-MS4 permitted areas and Caltrans were subtracted from the reduction target to generate the required MS4 treatment capacity shown in Table 8-1 through Table 8-4.

Table 8-1. Lower Los Angeles River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Downey	726.0	654.7	71.2
Lakewood	14.3	14.3	-
Long Beach	3,901.7	3,039.6	862.1
Lynwood	1,108.1	667.9	440.2
Paramount	988.8	606.1	382.7
Pico Rivera	377.3	287.2	90.0
Signal Hill	197.9	188.9	9.0
South Gate	1,512.6	1,174.3	338.2
TOTAL	8,826.5	6,633.1	2,193.5

Table 8-2. Los Cerritos Channel Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Bellflower	1,137.4	990.4	147.0
Cerritos	12.9	12.9	0.0
Downey	112.8	93.0	19.8
Lakewood	1,157.2	1,152.1	5.1
Long Beach	2,676.1	1,629.8	1,046.2
Paramount	631.9	525.5	106.4
Signal Hill	322.6	284.3	38.3
TOTAL	6,050.9	4,688.0	1,364.8

Table 8-3. San Gabriel River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	1.1	1.1	0.0
Bellflower	62.8	57.4	5.4
Cerritos	59.4	4.1	55.3
Diamond Bar	33.0	1.1	32.0
Downey	263.9	87.3	176.7
Lakewood	9.6	2.2	7.4
Long Beach	29.2	29.2	0.0
Norwalk	136.9	4.8	132.1
Pico Rivera	75.1	60.4	14.7
Santa Fe Springs	106.0	30.3	75.8
Whittier	7.5	7.1	0.4
TOTAL	784.6	284.9	499.7

Table 8-4. Coyote Creek Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	47.9	15.9	32.0
Cerritos	194.3	56.7	137.6
Diamond Bar	74.0	36.7	37.4
Hawaiian Gardens	30.4	27.1	3.4
La Mirada	175.7	124.9	50.8
Lakewood	25.7	19.7	6.0
Long Beach	37.5	0.0	37.5
Norwalk	152.5	52.5	99.9
Santa Fe Springs	260.7	12.6	248.1
Whittier	254.7	200.1	54.6
TOTAL	1,253.4	546.1	707.3

9. Pollutant Reduction Plan

The BMPs used to achieve the MS4 volume reduction goals in Section 8 are not, per se, a component of the Permit compliance determination. Instead, over time each agency will report and demonstrate that the *cumulative* effect of projects implemented over time add up to the required reductions for interim milestones and final targets (reported as "MS4 Compliance Target"). However, the initial scenario of BMPs for WMP implementation (referred to as a Pollutant Reduction Plan in the RAA Guidelines) and their costs may be the most beneficial outcome of the WMP. A detailed WMP implementation scenario is presented in Attachment B, broken down by jurisdiction and subwatershed. The volume reductions are separated among right-of-way (ROW) BMPs and Low Impact Development (LID) on public parcels (in combination with nonstructural BMPs).

The Pollutant Reduction Plan is considered an "initial" scenario because over time, through adaptive management, the responsible agencies will likely "shift" among different types of BMPs (e.g., increase implementation of green streets and reduce implementation of regional BMPs) or substitute alterative BMPs altogether (e.g., implement dry wells instead of green streets). These shifts will be supported by analyses to show the substituted BMPs provide an equivalent volume reduction as the replaced BMPs.

9.1. Existing/Planned Regional Control Measures

Existing regional BMPs play an integral part in measuring the current reductions and need for future control measures. The annual volume or load removed from the existing and planned regional control measures were subtracted from the MS4 responsible runoff to determine the remaining treatment volume required. Detailed information for the existing and planned regional control measures is found in Attachment A.

The existing and planned regional control measure information was provided for the Lower Los Angeles River and Lower San Gabriel River. The jurisdictions that were impacted are listed with the associated annual reduction provided by these facilities in Table 9-1 and Table 9-2.

Table 9-1. Lower Los Angeles River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

	COMPLIANCE TARGET		
Jurisdiction	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Lakewood	14.3	6.4	7.9
Long Beach	3,039.6	633.4	2,406.2
Signal Hill	188.9	22.7	166.2

Table 9-2. Lower San Gabriel River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

	COMPLIANCE TARGET		
Jurisdiction	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Downey	87.3	24.0	63.3

9.2. Future Control Measures for Attainment of Interim and Final Limits

The Pollutant Reduction Plans for wet and dry weather illustrate the sequencial BMP implementation strategy to attain all interim and final limits. Within each of the jurisdictions, the subwatershed subareas were individually prioritized and associated with milestones on the basis of cost-effectiveness for zinc removal. The optimization modeling results presented in Section 7 and Figure 9-1, Figure 9-2 and Figure 9-3 shown below identify the prioritization of subwatershed implementation based on the most effective combination of BMPs. The implementation schedule outlined in the Pollutant Reduction Plans for wet and dry weather are based upon this prioritization. The plans are presented in the following subsections.

9.2.1. Wet Weather

The interim and final targets are presented in total acre-feet per year that requires treatement through structural BMPs (less the non-MS4 and existing regional volumes as described in Sections 8 and 9.1). To properly capture the annual volume, BMPs are sized to the minimum volume needed to capture the target annual volume. Thus, the BMPs are presented as a volume (acre-feet) that has the ability to capture the required annual total to meet compliance.

An overall jurisdictional summary table is presented in Table 9-3 that outlines the required BMP volume to achieve compliance in the associated WMP group. The BMP volumes are the sum of existing distributed BMPs, potential green street BMPs, LID on public parcels, and remaining BMP volume that must be implemented as regional (or other) projects as necessary to meet the annual volume reduction target.

Table 9-4 through Table 9-7 outlines the jurisdiction-wide BMP volume targets necessary to meet the annual volume interim and final limits established in Section 8. Each distributed BMP was associated with a jurisdictional subwatershed and the associated implementation schedule, thus summing their impact across different interim goals. The remaining BMP volume after accounting for existing distributed BMPs is spread across right-of-way BMPs, LID on public parcels, and remaining BMP volume including potential regional projects. Priority was given to LID on public parcels, followed by right-of-way BMPs and finally other BMPs. The incremental column shows the total additional BMP volume required for each milestone while the cumulative measures the total BMP volume required by each milestone to hit the final compliance targets. Deatiled discussion on how the BMPs in the right-of-way and LID on public parcels were determined is found in Attachment A. Detailed tables are provided in Attachment B for each jurisdiction and associated subwatersheds. Detailed tables describing the existing distributed BMPs are found in Attachment D.

Table 9-3. Jurisdictional Final Target BMP Volumes by WMP Group

	LLAR	LCC	LSGR - SGR	LSGR - CC	
Jurisdiction	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**TOTAL**
Artesia	-	-	0.1	1.1	**1.2**
Bellflower	-	118.2	5.5	-	**123.7**
Cerritos	-	1.6	0.6	6.4	**8.6**
Diamond Bar	-	-	0.2	8.9	**9.1**
Downey	83.4	10.2	17.5	-	**111.2**
Hawaiian Gardens	-	-	-	2.2	**2.2**
La Mirada	-	-	-	15.2	**15.2**
Lakewood	1.2	169.5	0.4	1.9	**173.0**
Long Beach	319.1	208.7	2.7	0.0	**530.5**
Lynwood	95.5	-	-	-	**95.5**
Norwalk	-	-	0.3	4.7	**5.0**
Paramount	76.6	55.1	-	-	**131.7**
Pico Rivera	41.2	-	10.8	-	**52.0**
Santa Fe Springs	-	-	4.9	2.1	**7.0**
Signal Hill	22.3	28.6	-	-	**50.9**
South Gate	173.0	-	-	-	**173.0**
Whittier	-	-	1.4	39.1	**40.5**
TOTAL	**812.3**	**591.9**	**44.4**	**81.6**	**1,530.2**

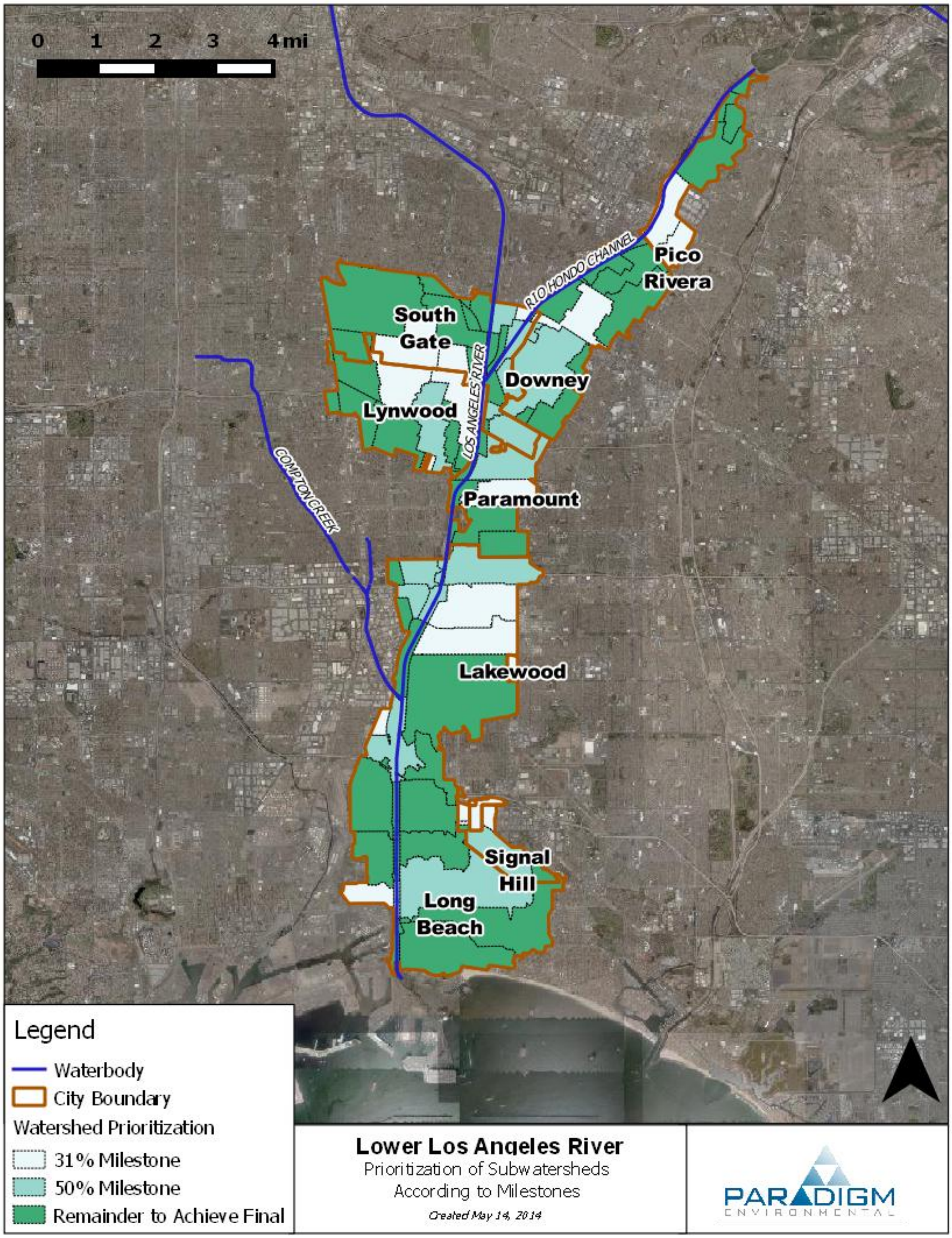

Figure 9-1. LLAR implementation areas associated with Interim and final milestones.

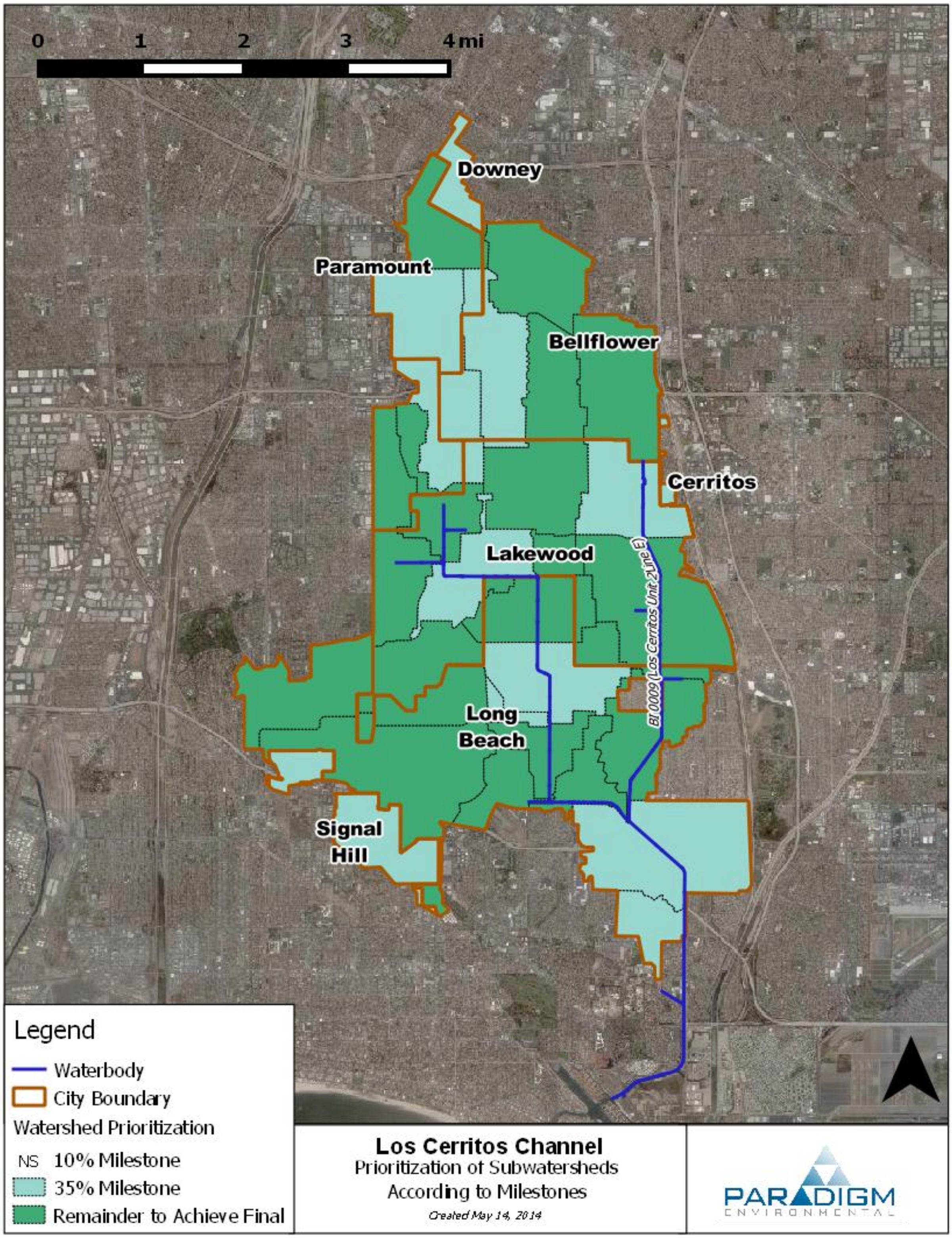

Figure 9-2. LCC implementation areas associated with Interim and final milestones.

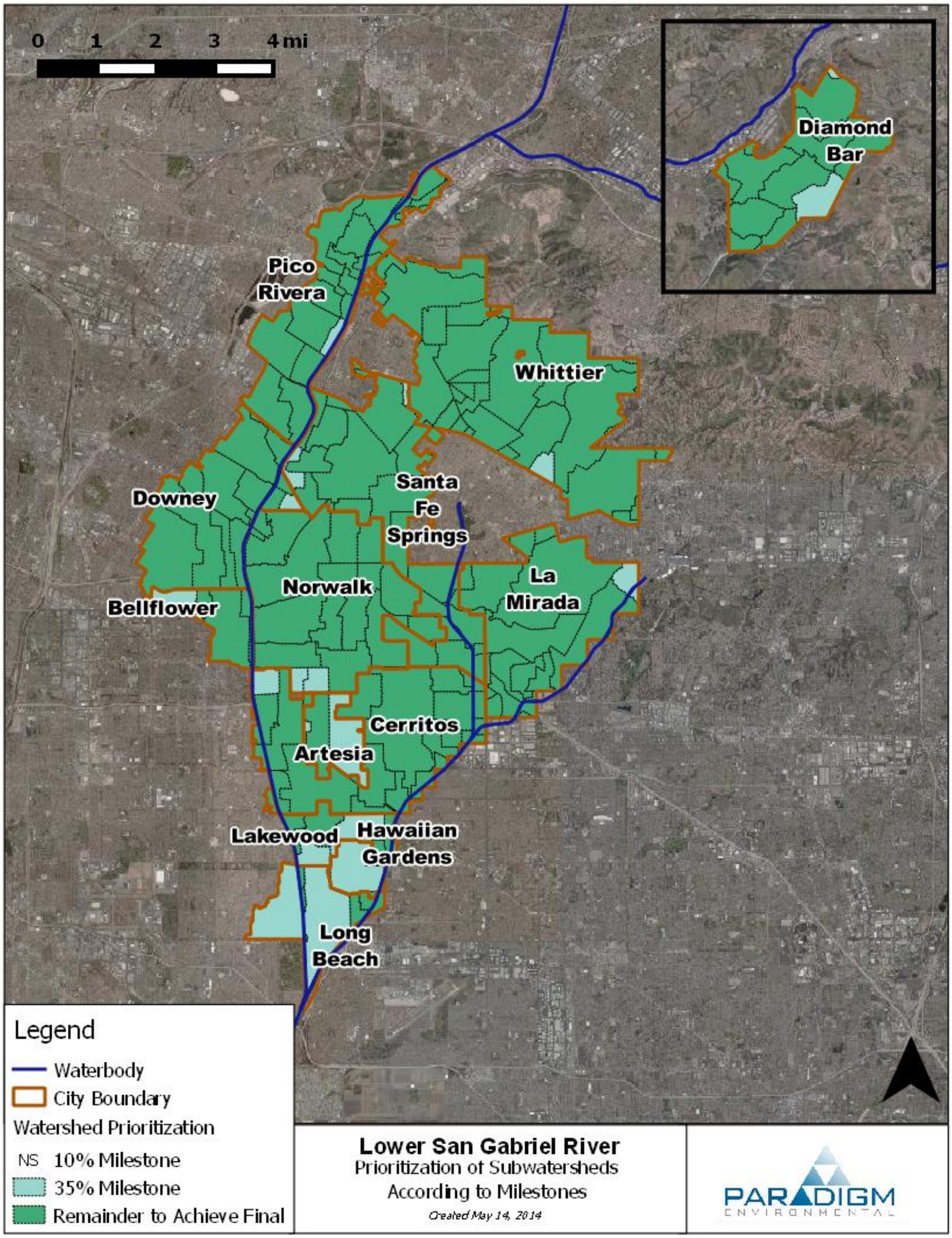

Figure 9-3. LSGR implementation areas associated with Interim and final milestones.

Table 9-4. Lower Los Angeles River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Downey	31%	143.8	143.8	1.1	12.2	12.2	0.7	0.7	7.1	7.1
	50%	187.1	330.9	0.7	2.5	14.7	10.1	10.8	0.6	7.7
	Final	323.9	654.7	2.0	31.2	45.9	4.4	15.3	10.7	18.4
Lakewood	31%	7.9	7.9	NA	1.1	1.1	0.0	0.0	-	-
	50%	-	7.9		-	1.1	-	0.0	-	-
	Final	-	7.9		-	1.1	-	0.0	-	-
Long Beach	31%	6.5	6.5	NA	1.0	1.0	0.0	0.0	-	-
	50%	567.0	573.5		40.3	41.3	7.5	7.5	24.7	24.7
	Final	1,832.7	2,406.2		113.4	154.6	20.8	28.3	111.5	136.2
Lynwood	31%	235.9	235.9	NA	18.4	18.4	2.7	2.7	13.1	13.1
	50%	134.9	370.8		12.8	31.2	3.8	6.5	0.1	13.2
	Final	297.2	667.9		22.7	53.9	4.5	11.1	17.3	30.5
Paramount	31%	163.7	163.7	0.1	9.0	9.0	1.7	1.7	10.2	10.2
	50%	65.7	229.4		7.4	16.4	0.8	2.5	0.3	10.4
	Final	376.6	606.1		14.9	31.2	2.1	4.7	30.2	40.6
Pico Rivera	31%	275.3	275.2	NA	11.5	11.5	0.5	0.5	27.4	27.4
	50%	-	275.2		-	11.5	-	0.5	-	27.4
	Final	12.0	287.2		1.3	12.8	0.0	0.5	0.5	27.9
Signal Hill	31%	8.5	8.5	0.2	0.8	0.8	0.2	0.2	0.2	0.2
	50%	105.8	114.3		7.0	7.8	0.9	1.1	5.9	6.1
	Final	51.9	166.2		2.2	10.0	0.0	1.1	4.9	11.0
South Gate	31%	229.3	229.3	4.7	23.2	23.2	0.9	0.9	6.5	6.5
	50%	198.1	427.4		15.0	38.3	0.8	1.7	12.6	19.1
	Final	746.9	1,174.3		49.3	87.5	5.1	6.8	54.7	73.8

Table 9-5. Los Cerritos Channel Pollutant Reduction Plan for Attainment of Interim and Final Limits

		COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
Jurisdiction	Milestone	Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Bellflower	10%	NS	NS		-	-	-	-	-	-
	35%	244.4	244.4	NA	15.1	15.1	1.2	1.2	16.2	16.2
	Final	746.0	990.4		43.0	58.1	3.2	4.5	39.4	55.6
Cerritos	10%	NS	NS		-	-	-	-	-	-
	35%	9.7	9.7	NA	1.0	1.0	0.0	0.0	0.5	0.5
	Final	3.2	12.9		-	1.0	-	0.0	0.1	0.6
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	57.2	57.2	0.1	5.3	5.3	0.0	0.0	2.7	2.7
	Final	35.8	93.0		-	5.3	-	0.0	2.1	4.8
Lakewood	10%	NS	NS		-	-	-	-	-	-
	35%	282.4	282.4	NA	31.5	31.5	4.7	4.7	6.9	6.9
	Final	869.7	1,152.1		90.0	121.5	7.0	11.8	29.3	36.2
Long Beach	10%	NS	NS		-	-	-	-	-	-
	35%	473.5	473.5	NA	33.8	33.8	12.3	12.3	16.4	16.4
	Final	1,156.3	1,629.8		87.9	121.7	9.5	21.8	48.9	65.3
Paramount	10%	NS	NS		-	-	-	-	-	-
	35%	267.0	267.0	NA	14.3	14.3	3.0	3.0	17.1	17.1
	Final	258.5	525.5		8.5	22.8	3.5	6.4	8.7	25.8
Signal Hill	10%	NS	NS		-	-	-	-	-	-
	35%	231.6	231.6	0.0	11.2	11.2	1.2	1.2	14.2	14.2
	Final	52.7	284.3		-	11.2	-	1.2	2.0	16.2

NS: Non-structural practices achieve 10% milestone
NA: No information/not enough information provided
*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-6. San Gabriel River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN							
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.1	1.1		-	-	0.1	0.1	-	-
	Final	-	1.1		-	-	-	0.1	-	-
Bellflower	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.3	1.3		0.2	0.2	0.0	0.0	-	-
	Final	56.1	57.4		1.5	1.8	3.7	3.7	0.0	0.0
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	4.1	4.1		0.6	0.6	0.0	0.0	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	1.1	1.1		0.2	0.2	-	-	-	-
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	63.3	63.3	7.1	10.0	10.0	0.4	0.4	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	2.2	2.2		0.2	0.2	0.0	0.0	0.1	0.1
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	26.9	26.9		1.1	1.1	1.3	1.3	-	-
	Final	2.3	29.2		0.3	1.4	-	1.3	0.0	0.0

		COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
Jurisdiction	Milestone	Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.8	0.8		-	-	0.1	0.1	-	-
	Final	4.0	4.8		-	-	0.3	0.3	-	-
Pico Rivera	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.2	0.2		0.0	0.0	-	-	-	-
	Final	60.2	60.4		10.7	10.8	-	-	0.0	0.0
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	30.3	30.3		4.6	4.6	-	-	0.3	0.3
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.0	0.0		-	-	-	-	0.0	0.0
	Final	7.1	7.1		1.4	1.4	-	-	-	0.0

NS: Non-structural practices achieve 10% milestone
NA: No information/not enough information provided
*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-7. Coyote Creek Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET: Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		POLLUTANT REDUCTION PLAN: Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	15.9	15.9		-	-	1.1	1.1	-	-
	Final	-	15.9		-	-	-	1.1	-	-
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.1	0.1		0.0	0.0	-	-	-	-
	Final	56.6	56.7		3.0	3.1	3.4	3.4	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.0	1.0		0.3	0.3	-	-	-	-
	Final	35.6	36.7		8.0	8.2	-	-	0.7	0.7
Hawaiian Gardens	10%	NS	NS	NA	-	-	-	-	-	-
	35%	23.6	23.6		0.3	0.3	1.5	1.5	-	-
	Final	3.4	27.1		0.2	0.6	0.1	1.6	0.0	0.0
La Mirada	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	124.9	124.9		9.6	9.6	5.6	5.6	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	17.5	17.5		0.9	0.9	0.7	0.7	-	-
	Final	2.3	19.7		-	0.9	0.3	0.9	-	-
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	0.0	0.0		-	-	0.0	0.0	-	-

Jurisdiction	Milestone	COMPLIANCE TARGET: Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		POLLUTANT REDUCTION PLAN: Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.6	1.6		-	-	0.2	0.2	-	-
	Final	50.9	52.5		1.4	1.4	3.2	3.4	-	-
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	12.6	12.6		1.0	1.0	-	-	1.1	1.1
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	200.1	200.1		39.0	39.0	-	-	0.0	0.0

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

9.2.2. Dry Weather

Dry weather reductions are attained through a combination of non-structural practices and structural BMPs as they are implemented as part of the wet weather attainment of limits. As wet-weather BMPs are implemented, they serve to remove the dry-weather flows thus meeting the compliance set forth to achieve dry-weather reductions. As a summary of the dry weather analysis, Table 9-8 through Table 9-11 outline the jurisdiction-wide attainment of interim and final milestones for dry weather. The reduction from implemented BMPs compares the actual dry-weather reduction versus the compliance target.

Table 9-8. Lower Los Angeles River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Downey	31%	30.8%	65.9%
	50%	49.7%	76.9%
	Final	99.4%	99.4%
Lakewood	31%	30.8%	99.4%
	50%	49.7%	99.4%
	Final	99.4%	99.4%
Long Beach	31%	30.8%	62.1%
	50%	49.7%	74.3%
	Final	99.4%	99.4%
Lynwood	31%	30.8%	71.8%
	50%	49.7%	80.2%
	Final	99.4%	99.4%
Paramount	31%	30.8%	51.0%
	50%	49.7%	72.4%
	Final	99.4%	99.4%
Pico Rivera	31%	30.8%	71.8%
	50%	49.7%	71.8%
	Final	99.4%	99.4%
Signal Hill	31%	30.8%	69.3%
	50%	49.7%	94.9%
	Final	99.4%	99.4%
South Gate	31%	30.8%	62.8%
	50%	49.7%	75.9%
	Final	99.4%	99.4%

Table 9-9. Los Cerritos Channel Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Bellflower	10%	9.9%	58.1%
	35%	34.7%	71.4%
	Final	99.1%	99.1%
Cerritos	10%	9.9%	56.4%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Downey	10%	9.9%	59.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Lakewood	10%	9.9%	55.6%
	35%	34.7%	69.6%
	Final	99.1%	99.1%
Long Beach	10%	9.9%	60.1%
	35%	34.7%	76.9%
	Fin al	99.1%	99.1%
Paramount	10%	9.9%	52.8%
	35%	34.7%	79.8%
	Final	99.1%	99.1%
Signal Hill	10%	9.9%	60.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%

Table 9-10. San Gabriel River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.4%	57.6%
	35%	33.0%	94.3%
	Final	94.25%	94.25%
Bellflower	10%	9.4%	49.9%
	35%	33.0%	57.6%
	Final	94.25%	94.25%
Cerritos	10%	9.4%	43.7%
	35%	33.0%	48.1%
	Final	94.25%	94.25%
Diamond Bar	10%	9.4%	58.2%
	35%	33.0%	58.8%
	Final	94.25%	94.25%
Downey	10%	9.4%	57.4%
	35%	33.0%	58.1%
	Final	94.25%	94.25%
Lakewood	10%	9.4%	43.1%
	35%	33.0%	73.7%
	Final	94.25%	94.25%
Long Beach	10%	9.4%	46.6%
	35%	33.0%	91.6%
	Final	94.25%	94.25%
Norwalk	10%	9.4%	54.8%
	35%	33.0%	55.7%
	Final	94.25%	94.25%
Pico Rivera	10%	9.4%	51.8%
	35%	33.0%	51.9%
	Final	94.25%	94.25%
Santa Fe Springs	10%	9.4%	54.4%
	35%	33.0%	57.9%
	Final	94.25%	94.25%
Whittier	10%	9.4%	57.9%
	35%	33.0%	58.0%
	Final	94.25%	94.25%

Table 9-11. Coyote Creek Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.9%	60.9%
	35%	34.6%	85.1%
	Final	98.9%	98.9%
Cerritos	10%	9.9%	56.3%
	35%	34.6%	56.3%
	Final	98.9%	98.9%
Diamond Bar	10%	9.9%	61.3%
	35%	34.6%	65.9%
	Final	98.9%	98.9%
Hawaiian Gardens	10%	9.9%	59.7%
	35%	34.6%	96.9%
	Final	98.9%	98.9%
La Mirada	10%	9.9%	57.4%
	35%	34.6%	58.7%
	Final	98.9%	98.9%
Lakewood	10%	9.9%	60.7%
	35%	34.6%	76.5%
	Final	98.9%	98.9%
Long Beach	10%	9.9%	54.5%
	35%	34.6%	91.9%
	Final	98.9%	98.9%
Norwalk	10%	9.9%	59.2%
	35%	34.6%	60.8%
	Final	98.9%	98.9%
Santa Fe Springs	10%	9.9%	51.7%
	35%	34.6%	52.0%
	Final	98.9%	98.9%
Whittier	10%	9.9%	60.7%
	35%	34.6%	61.4%
	Final	98.9%	98.9%

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Attachment A: DETERMINATION OF BMP TREATMENT CAPACITY

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
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Tables

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1. Determination of BMP Treatment Capacity

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 1-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

This appendix describes key analyses conducted to determine the potential capacity of different BMPs including non-structural BMPs. In addition, it describes the approach for non-MS4 sources.

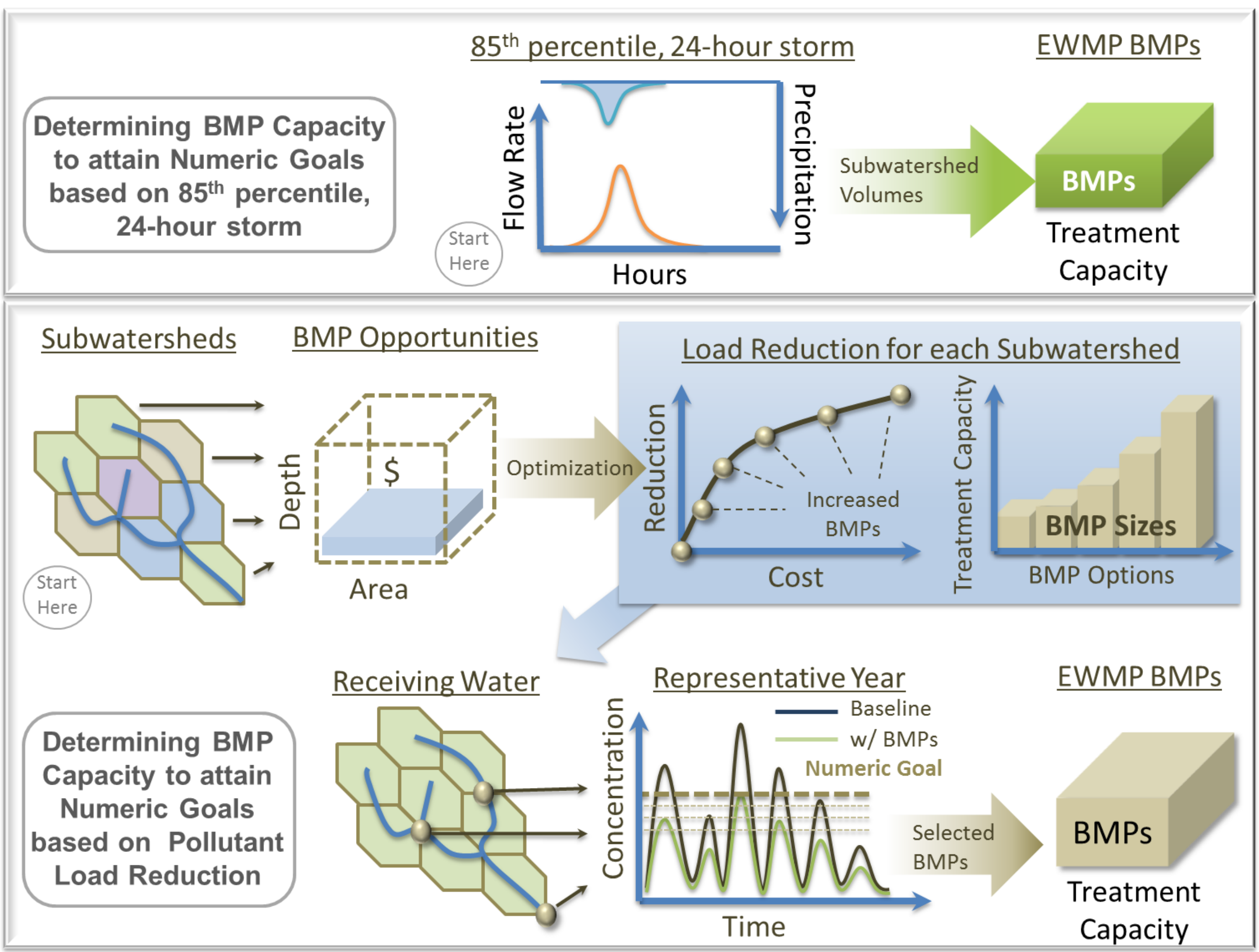

Figure 1-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

1.1. Load Reduction Optimization Modeling Analysis

During development of WMMS, distributed BMPs were modeled at the subwatershed-scale using a generalized BMP treatment train. Depending on the land use type, different types of BMPs were applied. The three generalized BMP pathways were: (1) transportation, (2) residential, and (3) commercial/industrial/institutional. A conceptual schematic of the BMP network and pathways is presented in Figure 1-2 (LACDPW 2011).

For the RAA, subwatershed-scale SUSTAIN models were developed using the WMMS modeling assumptions. Each BMP from the treatment train described in Figure 1-2 was configured consistently with modeling performed during development of the WMMS system and followed the Regional Board RAA guidelines. A summary of key BMP parameters used for RAA modeling are presented in Table 1-1. Background infiltration rates were changed from those used during WMMS development (0.5 inches per hour) to site-specific infiltrations rates provided in the Los Angeles County Hydrology Manual and associated spatial datasets (LACDPW 2006). These rates also deviate somewhat from the values suggested in the RAA Guidelines (0.1 – 0.3 inches per hour); however, the data are locally-derived, published and reliable which provides adequate justification for their use.

First, SUSTAIN models were configured using the existing condition watershed model runoff timeseries and land use distributions as inputs, and benchmarked against the aggregated LSPC model results to establish baseline consistency. Second, using the SUSTAIN configuration with the respective BMP opportunities per pathway (as presented in Figure 1-2) in each subwatershed, optimization runs were formulated to maximize zinc reduction (i.e. the limiting target pollutant) while minimizing total estimated implementation cost. This resulted in a matrix of high-resolution cost-effectiveness curves for each subwatershed. Finally, a Tier-II optimization framework was configured to collectively optimize target load reductions at the downstream assessment point, with an added equitability constraint to ensure that each jurisdiction shared proportionally in the reduction effort. For the Tier-II optimization, instead of the decision variables being individual BMPs within a network like before, they were comprised of individual solutions taken off the cost-effectiveness curves at each subwatershed. The primary objective was to quantify the stormwater retention volume and load reductions provided by the collective actions occurring within each contributing jurisdiction tributary to the assessment point.

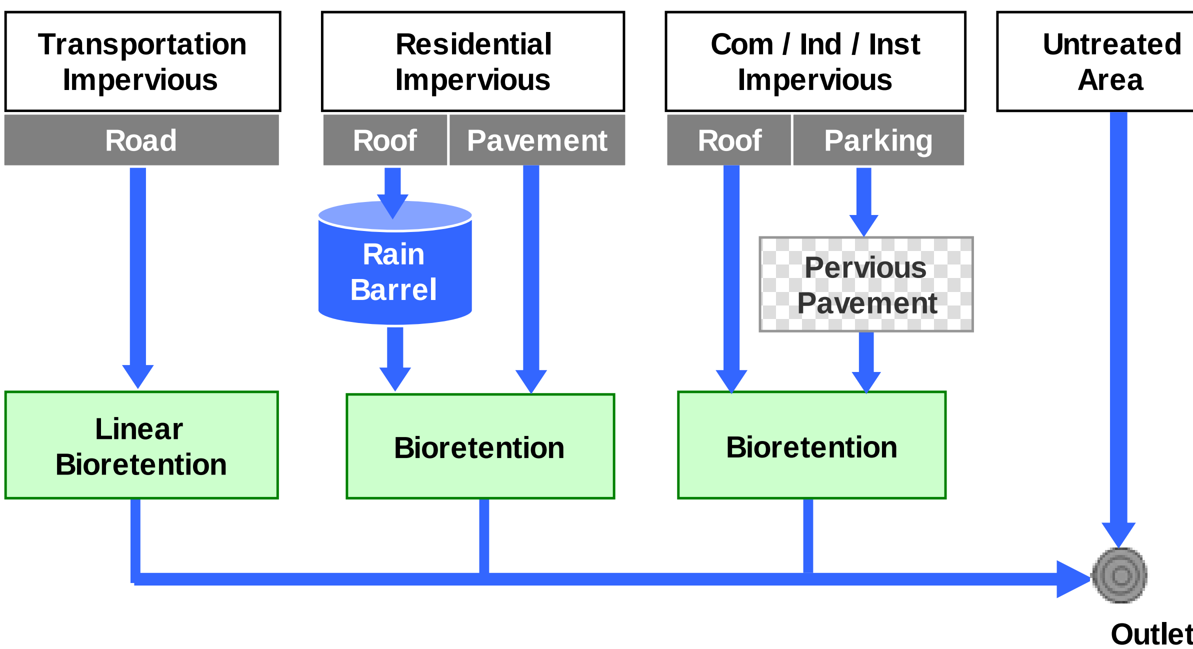

Figure 1-2. Conceptual schematic of the WMMS aggregate BMP treatment train (LACDPW 2011b).

Table 1-1. BMP parameters used in the load reduction modeling analysis

Constituent Group	Rain Barrel	Bioretention	Porous Pavement
Media Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
Substrate Layer Porosity (fraction)	n/a	0.4	0.4
Substrate Layer Field Capacity (fraction)	n/a	0.3	0.055
Substrate Layer Wilting Point (fraction)	n/a	0.1	0.05
Underdrain Gravel Porosity (fraction)	n/a	0.5	0.45
Vegetative Parameter, A (unitless)	n/a	0.6	1.0
Background Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
First Order Decay Rate (1/day)[1]	0.2 – 0.8	0.2 – 0.8	0.2 – 0.8
Underdrain Filtration Rate (%)[1]	n/a	0.5 – 0.9	0.5 – 0.9

1. Rates vary by pollutant and the type of BMP soil media

1.2. BMP Capacity Analysis for the Rights-of-Way

A key consideration for WMP implementation is the potential BMP capacity that could be provided by rights-of-way (ROW). In order to highlight the potential structural BMP implementation approaches to meet the volume targets, a BMP opportunity analysis was conducted. Two broad categories of BMPs – ROW BMPs and LID on public parcels – were used to describe the networks of BMPs needed to meet the target reductions.

This section describes how right-of-ways were evaluated for opportunities to locate BMPs and evaluate the key components that affect the ability of the ROW BMP networks to be effective: space available in the ROW, types of BMPs to site in the ROW, drainage areas that could potentially be treated by ROW BMPs, and estimated BMP infiltration rates.

Stormwater BMPs in the ROW are treatment systems arranged linearly within the street ROW and are designed to reduce runoff volumes and improve runoff water quality from the roadway and adjacent parcels. Implementing BMPs in the ROW provides an opportunity to meet water quality goals by locating BMPs in areas owned or controlled by a municipality to avoid the cost of land acquisition or establishing an easement. Implementing BMPs in the ROW allows for direct control of construction, maintenance, and monitoring activities by the responsible jurisdiction. Bioretention and permeable pavement are typically best suited for implementation in the ROW

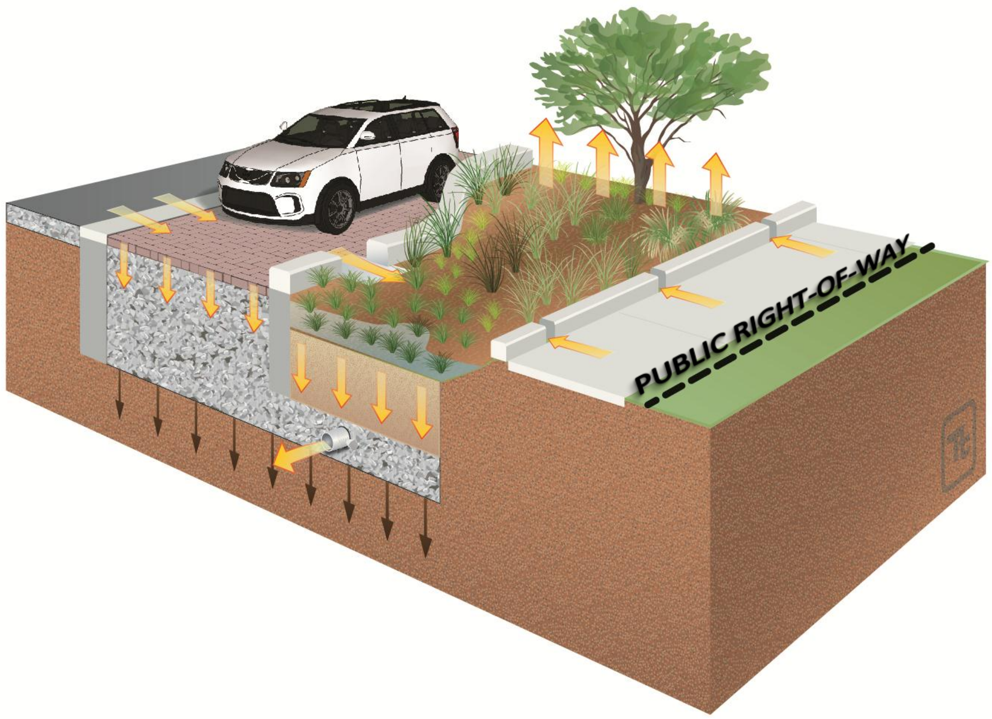

Figure 1-3. Conceptual schematic of ROW BMPs with an underdrain (Arrows indicate water pathways).

Not all roads are suited for ROW BMP retrofits; therefore, screening is required to eliminate roads where ROW BMP retrofits are impractical or infeasible due to physical constraints. While ROW BMP retrofits can be implemented in a variety of settings, the physical characteristics of the road itself such as the road type, local topography, and depth to groundwater can significantly influence the practicality of designing and constructing these features. A screening protocol was established to identify realistic opportunities for retrofits based on the best available GIS data. The opportunities identified during this process provide the foundation for the engineering analysis to determine the volume of stormwater that can be treated by ROW BMP retrofits in the subject watersheds. This section describes the data and the screening process used to identify the best available roads for ROW BMP retrofits.

1.2.1. Data Used

To evaluate BMP opportunities and available implementation areas, several key data sets were processed and formatted. Table 1-2 outlines the data set names, formats, descriptions, and sources.

Table 1-2. Summary of Data

Data Set	Format	Description	Source
Parcels	GIS Shapefile	Outlines property boundaries and sizes	Los Angeles County (LAC) Assessor
Roads	GIS Shapefile	Shows street centerline network & classification by Topologically Integrated Geographic Encoding and Reference (TIGER)	LAC GIS Portal
Land Use	GIS Shapefile	Subdivides the region into predefined land use categories with similar runoff properties. Each individual land use feature identifies the associated percent impervious coverage.	LAC WMMS Model
Subwatersheds	GIS Shapefile	Defines drainage areas to selected outlet points	LAC WMMS Model
Slopes	GIS Shapefile	Classifies regions by the slope category	LAC WMMS Model
Soils	GIS Shapefile	Outlines spatial extents of dominant soil types	LAC GIS Portal
Jurisdictions	GIS Shapefile	Establishes city and county boundaries	LAC GIS Portal
Drainage Network	GIS Shapefile	Identifies stormwater structure layout and conveyance methods	LAC GIS Portal
Groundwater Contours	GIS Shapefile	Illustrates groundwater depth as measured from the surface	LAC BOS
Soil Runoff Coefficient Curves	PDF File	Curves characterize effect of rainfall intensity on runoff coefficient per soil type	Hydrology Manual Appendix C (LADPW 2006)
Aerial Imagery	Layer File	Orthoimage of entire region	ESRI Maps & Data Imagery
Runoff Rates	Time Series	Hourly runoff for land uses for the continuous simulation model	LAC WMMS Model

1.2.2. ROW BMP Screening

High traffic volumes, speed limits, slopes, and groundwater tables, impact the feasibility of ROW BMP implementation. Road classification data contains information typically useful for determining if the street is subject to high traffic volumes and speeds, and Census TIGER road data provides the best available road classification information for the study area. Table 1-3 shows the Master Address File (MAF)/TIGER Feature Classification Codes (MTFCC) deemed appropriate for ROW BMP retrofit opportunities. Only roads with the MTFCCs listed in Table 1-3 can be considered for ROW BMP retrofits in this screening analysis. All other roads are screened out.

Table 1-3. ROW BMP MTFCC

MTFCC	Description
S1400	Local neighborhood road, rural road, city street
S1730	Alley
S1780	Parking lot road

In addition to the screening of road types, opportunities were further screened to remove segments that have steep slopes. BMP implementation on streets with grades greater than 10 percent present engineering challenges that substantially reduce the cost effectiveness of the retrofit opportunity. From the available slope information, roads were considered as retrofit opportunities if the slope was less than 10 percent.

The final screen applied to the roads is the depth to groundwater. Implementing ROW BMPs in areas where the groundwater table is high is not recommended due to the fact that the BMPs are rendered ineffective due to their storage capacity being seriously diminished with groundwater inflow. From the groundwater contours provided, roads were eliminated as opportunities if the depth to groundwater was less than 10 feet. Attachment C highlights the areas identified with groundwater depths of 10 feet or less. The highlighted areas provide a starting point for elimination, however it should be noted that further evaluation may be necessary based on local knowledge of areas with high groundwater tables or daylighting of perched groundwater layers as identified by the jurisdictions.

The results of the ROW BMP screening are presented in Attachment C. Attachment C shows the roads available for retrofit (highlighted in green) versus all of the roads within the study area. An overall watershed map and individual jurisdictional maps for each watershed show all the identified retrofit opportunities. The maps indicate that a majority of the roads within each jurisdiction pass through the screening as potential retrofits. It should be noted that due to the coarse nature of the road classification data, only freeways, highways, and major roads were eliminated in the classification screening process. In practice, retrofitting every street that passed through the screening will likely not be feasible and adaptive management strategies will be necessary in the future to further refine the road classification data layer to more accurately identify road types suitable for ROW BMP retrofits.

The screened opportunities were used as the basis to evaluate the potential runoff volume reduction provided by ROW BMP implementations. In the following section, an engineering assessment is presented that determines the ROW BMP contributing drainage areas and the overall volume reductions achieved through ROW BMP implementation.

1.2.3. ROW BMP Configuration

The three most important assumptions necessary to evaluate BMP volume reduction performance are (1) the physical BMP configuration assumptions, (2) the contributing drainage area characteristics, and (3) the in-situ soil infiltration rates. By understanding the area draining to the BMPs and the volume capacity and function of the BMPs, an assessment can be performed to evaluate the potential of ROW retrofit BMPs to capture the required runoff volume in each subwatershed. This section summarizes the information and processes used to establish BMP configuration assumptions to be used for the runoff analysis presented in the following section.

1.2.4. BMP Assumptions Based on Green Streets

ROW BMPs consists of multiple types and combinations of stormwater treatment options. A well-established and often utilized ROW BMP is green streets. Green streets provide multiple benefits for pollutant and volume reduction and have been implemented in locations throughout the nation. In the future and as updates are made to the WMP, other ROW BMPs may be incorporated to achieve the required volume reductions.

Green streets typically consist of bioretention areas between the curb and sidewalk (herein referred to as the parkway) and/or permeable pavement within the parking lane. Prior to evaluating green street BMP treatment capacity, it is imperative to establish a configuration that can be assumed for typical implementation watershed-wide. This establishes the parkway space needed for the BMPs (plan view) and also determines the hydraulic function and storage capacity of the subsurface systems.

Bioretention systems are surface and subsurface water filtration systems, which use vegetation and underlying soils to store, filter, and reduce runoff volume while removing pollutants. Figure 1-4 represents a typical bioretention system incorporated into a green street design. Bioretention systems consist of a ponding depth and engineered soil media depth to treat runoff. Table 1-4 outlines typical widths, depths, and soil parameters associated with green street bioretention cells. Green streets were assumed to have no underdrains because the

WMP emphasizes low impact development and stormwater volume reduction to achieve pollutant load reductions.

Driveways and utilities limit the road length that can be converted into a green street. From past experience and aerial imagery review in the local watersheds, it was determined that 30 percent of the road length could be considered as the maximum possibility for conversion into bioretention area. This factor was used to limit the total length of potential green street bioretention areas. The parameters outlined above and in the table below were assumed to be the typical green street BMP implementation configuration for the screening analysis and the BMP treatment capacity evaluation described in the next section.

Table 1-4. BMP Design and Modeling Parameters for Subsequent Analyses

Component	Design Parameter	Value
Ponding Area	Depth	0.8 feet
	Width	4.0 feet
Media Layer	Depth	3.0 feet
	Porosity	0.4
Overall Profile	Effective Depth[1]	2.0 feet

[1] Effective depth is the maximum equivalent depth of water stored within the bioretention area less the depth displaced by soil media (vertical summation of surface ponding depth and void storage depth)

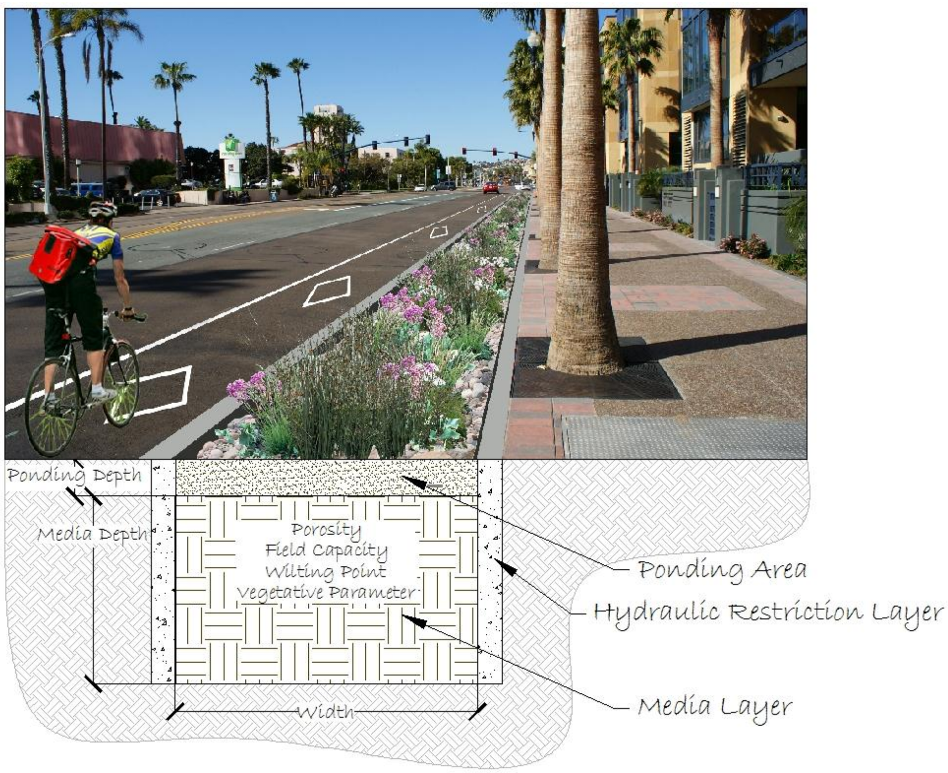

Figure 1-4. Typical bioretention section view (City of San Diego 2011).

Contributing Drainage Area Analysis

The purpose of this analysis was to realistically represent the area, type, and impervious coverage of land draining to potential green streets throughout the entire watershed. This is a critical step in WMP development because it predicts what volume of runoff can be assumed treated by green streets and what remaining (untreated) runoff must be routed to regional BMPs or addressed in other ways. The following engineering analyses were performed at a subwatershed-scale within the limits of available data and resources to estimate the maximum potential green street treatment capacity; given more detailed street-by-street drainage area data, the assumptions and results presented herein could be refined in future efforts to optimize green street treatment capacity. Figure 1-5 illustrates a simplified routing schematic used to represent the available runoff flow pathways to green street and regional BMPs throughout the watershed. The following subsections explain how each representative drainage area illustrated in Figure 1-5 was characterized.

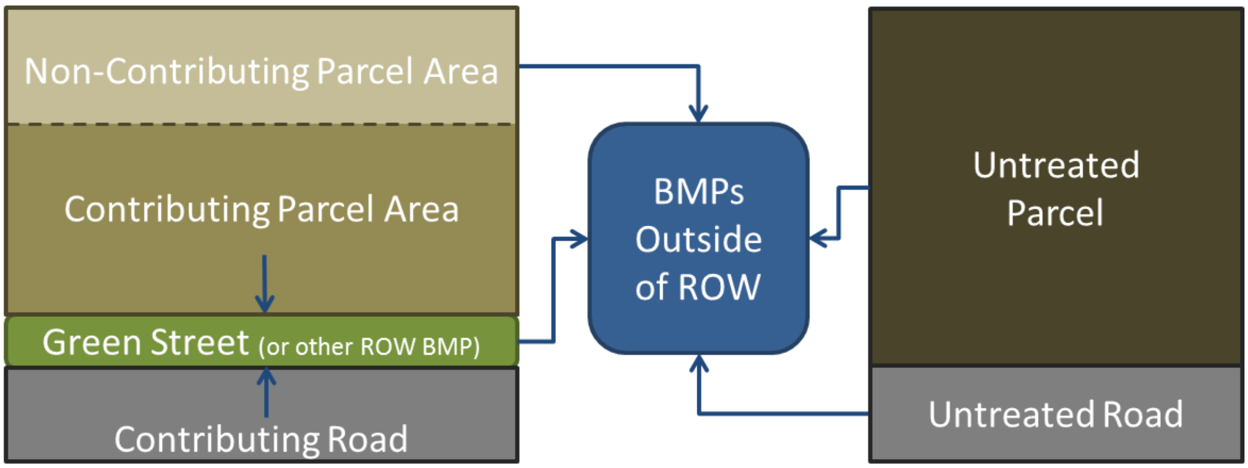

Figure 1-5. Green streets model schematic (arrows denote direction of runoff routing; figure not to scale).

Typical Parcel Size & Street Frontage Analysis

The nature of the green street analysis requires an understanding of typical parcel sizes and how much of the parcel drains to the ROW. Much of the runoff from parcels and the road drains to the ROW and is conveyed downstream through curb, gutter, and pipes. By identifying the typical parcel size, frontage length, and associated road area that drains to a candidate right-of-way area (Figure 1-6) the total area draining to potential green street retrofit opportunities was extrapolated throughout the watershed. For purposes of this study, only the high-density residential, multifamily residential, commercial, institutional, and industrial land uses were considered as contributing substantial runoff to the ROW (all other land uses contain minimal impervious area and thus contribute insubstantial runoff to the ROW).

The typical parcel size for each land use was determined by identifying all parcels for each land use. Once all the parcels were selected, the median parcel size for each land use was calculated and tabulated. This method evaluated thousands of parcels throughout the entire watershed and provided the most accurate depiction of the typical parcel size for each land use based on available data. Results are shown in Table 1-5.

Each parcel is adjacent to a portion of the ROW where the green street would be implemented. A subset of parcels approximate to the median parcel size for each land use was selected to determine the average frontage length. The portion of the selected parcels that was in contact with the ROW was measured using desktop analysis tools and averaged between all parcels of the same land use. Results are shown in Table 1-5.

Road area draining to green streets constitutes a substantial component of the total impervious drainage area. To establish road drainage areas, typical road widths were defined by sampling representative road segments located in each land use. Widths were measured from curb-to-curb using aerial orthoimagery and reported to the nearest even integer. The median sampled road width for each land use was calculated and compared with the City of Los Angeles Standard Street Dimensions (City of Los Angeles Bureau of Engineering 1999) for validation. To predict the resulting contributing road areas, the previously measured frontage length was multiplied by half the road width. Roads were assumed to be crowned; therefore, only half of the width would drain to one side of the road. Results are shown in Table 1-5.

As discussed in Section 1.2.4, only 30 percent of the frontage length could be converted into bioretention area. This factor was multiplied by the frontage length and used in limiting the total length of bioretention available within the model, as presented in Table 1-5.

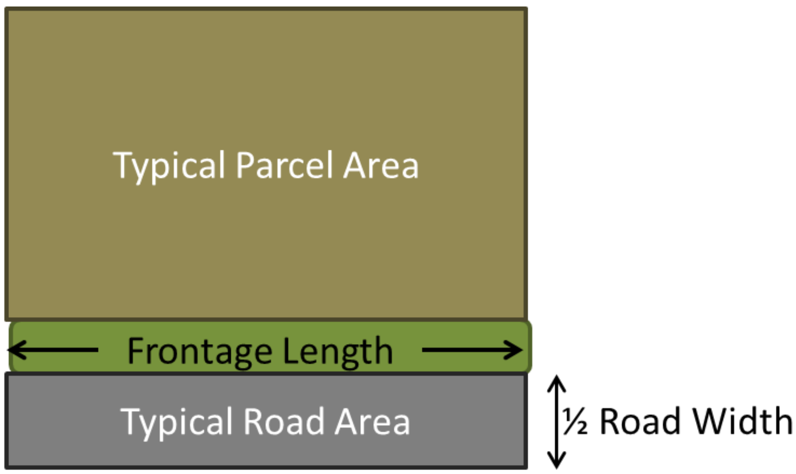

Figure 1-6. Typical parcel area, road width, road area, and frontage length schematic (figure not to scale)

Table 1-5. Typical parcel area, road area, and frontage length

Land Use	Typical Parcel Area (ft²)	Frontage Length (ft)	Typical Road Width (ft)	Typical Road Area (ft²)	BMP Length (ft)
High-density Residential	6,528	57	38	1,083	17
Multifamily Residential	13,526	60	30	900	18
Commercial	12,429	100	63	3,150	30
Institutional	38,215	143	37	2,646	43
Industrial	26,467	117	46	2,691	35
Other Land Use (Open Space, Vacant, etc.)	n/a[1]	100	40	2,000	30

[1] assumed not draining to ROW

Contributing Parcel Area Analysis

Many parcels will not always entirely drain to the ROW because portions can be retained on-site or flow onto an adjacent property. The actual volume of water that can be treated by a green street BMP was determined by identifying the typical proportion of the parcel that drains to the ROW (as shown in context of the model schematic in Figure 1-7). This step also determines the area, and associated runoff, that is *not* expected to drain to green streets and is routed directly to downstream regional facilities or other practices (herein referred to as non-contributing parcel area).

The contributing areas to the green street BMPs were found using random sampling and identifying the surrounding parcel drainage patterns. Parcels were selected using a random number generator and drainage areas were determined on a desktop analysis using topography, aerial imagery, and drainage infrastructure features. The average contributing percentage was identified by evaluating multiple sites. Table 1-6 shows the percent contributing areas by land use that were determined from this analysis.

The impervious coverage of contributing parcel areas was also characterized during this step so that runoff could be simulated and routed to green streets in each land use. This was performed by tabulating the imperviousness data from the WMMS Model for each individual land use feature. The area-weighted mean impervious coverage was then calculated for each land use type. Results are tabulated for each land use in Table 1-6.

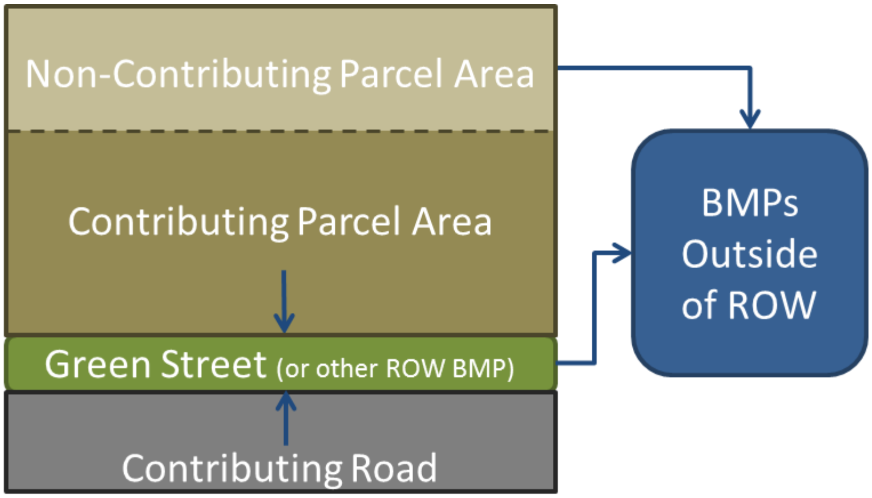

Figure 1-7. Parcel contributing area to ROW (impervious varies by land use; arrows denote direction of runoff routing; figure not to scale).

Table 1-6. Contributing area percentage by land use

Land Use	Contributing to ROW	Non-contributing to ROW	Percent Impervious
High-density Residential	80%	20%	36%
Multifamily Residential	80%	20%	60%
Commercial	80%	20%	90%
Institutional	80%	20%	72%
Industrial	35%	65%	66%
Other Land Use (Open Space, Vacant, etc.)	0%	100%	n/a

Untreated Roads Tabulation

Untreated roads consist of roadways with steep slopes, classifications not suited for green street implementation, or adjacent to open space or vacant parcels. Untreated road and associated adjacent parcel area that will ultimately drain to other BMPs was tabulated using available GIS data and screening results from Section 1.2.2 (conceptually illustrated in Figure 1-8).

Because green streets are implemented in the linear environment of the transportation corridor, it was assumed that the percentage of parcel area draining to green streets would be proportional to the percentage of suitable roads for green streets (as identified in Section 1.2.2) in each subwatershed. In other words, parcels associated with unsuitable roads were assumed to bypass green street treatment and routed directly to other facilities (these areas are defined herein as *untreated parcels*). The total treated and untreated parcel areas were reconciled with the total areas of each land use (per subwatershed) in the WMMS Model for validation and consistency.

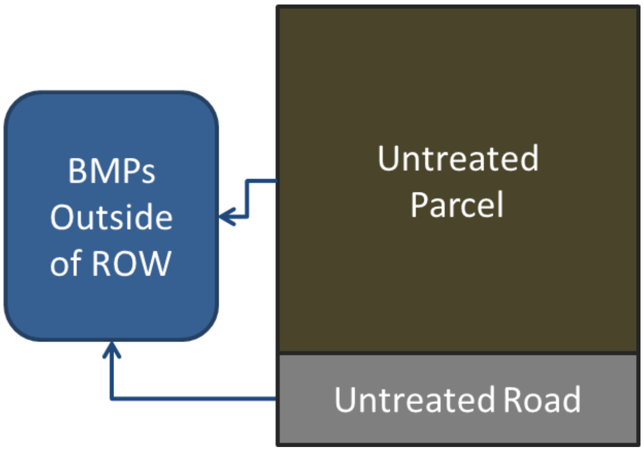

Figure 1-8. Schematic depicting untreated parcel and untreated road runoff routing (arrows denote direction of runoff routing; figure not to scale).

Summary of Contributing Drainage Areas

Results of the preceding analyses are presented in Figure 1-9. Areas that were assumed *un*treated by green streets include unsuitable roads and adjacent parcels, portions of suitable parcels that do not drain to the ROW, and predominantly pervious parcels (Open Space, Vacant, etc.), as discussed in preceding subsections; runoff from these untreated areas is assumed routed directly to regional facilities. Note that contributing areas are not necessarily proportional to contributing runoff due to variation in impervious coverage; runoff routing resulting from the preceding analyses is presented in the following section.

Given more detailed street-by-street engineering analyses, the potential area treated by green streets could be optimized, but the results below represent realistic estimates based on sound engineering judgment and currently available data and resources. Adaptive management strategies could target specific land uses that tend to bypass green street treatment (e.g. runoff, and associated treatment capacity, generated by industrial areas could be addressed through relevant industrial permits or onsite BMPs). Additional discussion on adaptive management strategies is provided in Section 8 of the main report.

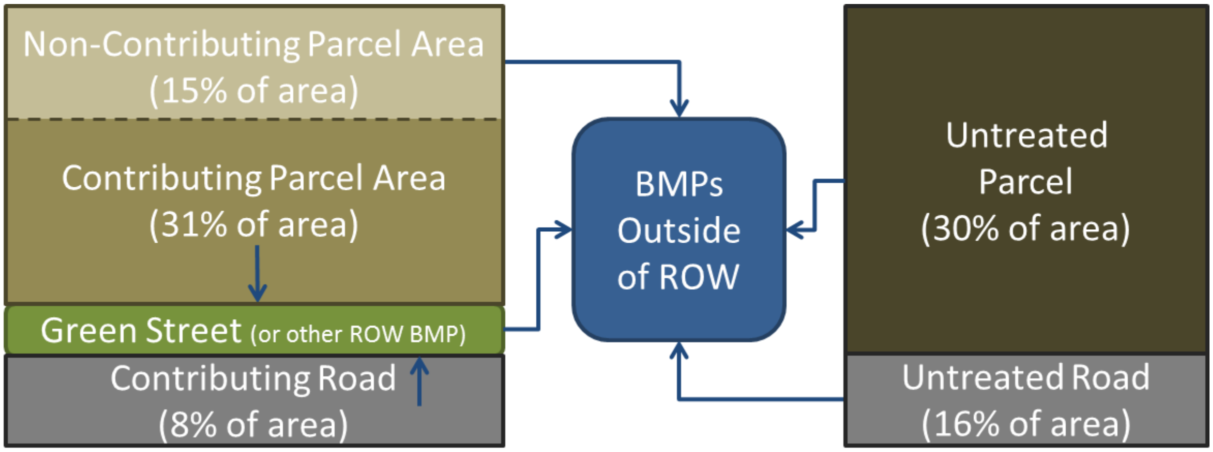

Figure 1-9. Schematic characterizing approximate distribution of routing to BMPs in the ROW for all WMP areas (arrows denote direction of runoff routing; figure not to scale).

BMP Infiltration Rates by Subwatershed

The purpose of performing the subwatershed infiltration rate analysis was to assign an average green street BMP infiltration rate to each subwatershed using soils data. Infiltration rates were assigned at the subwatershed level, which is the finest resolution at which the model performs hydrologic and water quality computations.

Soil data coverage provided through the LACDPW categorized soil unit areas into soil types. Runoff coefficient curves reported in the Hydrology Manual were developed by LACDPW for each soil type using double ring infiltrometer tests performed on areas of homogeneous runoff characteristics (LACDPW 2006). LADPW employed a sprinkling-type infiltrometer to perform the tests in each homogeneous area.

Runoff coefficient curves represent the response of the runoff coefficient (defined as the ratio of runoff to rainfall from a land area) to varying rainfall intensities. Each curve displays an inflection point representing the rainfall intensity at which substantial runoff initiates. According to LADPW (2006), each curve was assigned a minimum runoff coefficient of 0.1, "indicating that there is some runoff even at the smallest rainfall intensities." If it is assumed that substantial runoff initiates when the intensity of rainfall is greater than the soil's inherent infiltration rate, then the infiltration rate can be assumed equal to the rainfall intensity at the inflection point (less the assumed minimum runoff).

As demonstrated conceptually in Figure 1-10, the inflection point, and subsequently calculated infiltration rate, for each unique soil type in the WMP areas were identified using the runoff coefficient curves in Appendix C of the *Hydrology Manual* (LADPW 2006). Subwatershed areas were then intersected with the soil type coverage to calculate an area-weighted infiltration rate. Attachment C shows the distribution of the infiltration rates.

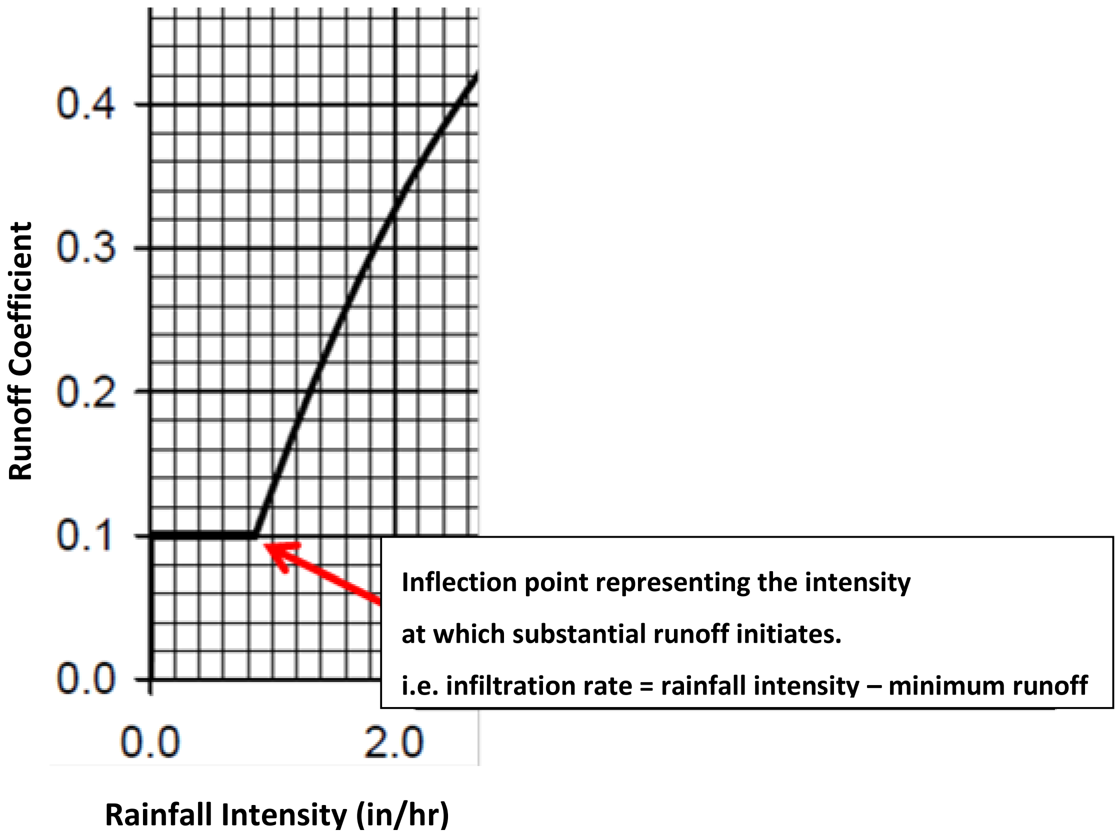

Figure 1-10. Example determination of runoff coefficient inflection point for an arbitrary soil type in Appendix C of LACDPW (2006).

1.3. LID on Public Parcels Assessment

Retrofitting public parcels with LID can be an efficient strategy for reducing stormwater runoff. This method allows municipalities the flexibility to prioritize and schedule stormwater projects to coincide with improvements that are already on the books (such as scheduled parking lot resurfacing, utility work, and public park improvements). Implementing LID on public parcels also allows municipalities the freedom to construct, inspect, and maintain BMPs without the need to purchase private property or to create stormwater easements.

The spatial extent of public parcels in each subwatershed was identified by selecting all parcels labeled as public by their assessors identification number (AIN). A total of 7,052 acres of public land was identified during this process (7% of the total WMP area). Each public parcel was assumed to implement BMPs that would treat the 85th percentile, 24-hour storm. The BMP volume was assumed to equal the 85th percentile, 24-hour storm depth times the impervious area.

LID retrofits are not feasible in all locations due to steep slopes, soil contamination hazards, and other constrains. The total runoff to be retained on public parcels was therefore discounted by 30% in order to provide a more realistic goal; this estimate was made in the lack of more detailed data, based on past LID screening exercises performed in Los Angeles County. The discount factor should be refined as actual public project sites are screened and prioritized.

1.4. Existing, Planned, and Potential BMPs

Existing and planned BMPs throughout the WMP areas were identified by the jurisdictions. These BMPs will provide capacity to reduce the annual storm runoff volume and demonstrate progress towards achieving the target runoff volume reduction.

1.4.1. Modeled Existing/Planned Subwatershed-Scale Regional BMPs

Regional BMPs that treat large portions of, or entire, subwatersheds (i.e. those with drainage areas larger than 50 acres) were modeled to quantify the impact to the upstream jurisdictions. The modeling approach and predicted performance for these specific sites is detailed in the following subsections. It is important to note that modeling was performed at a planning level coincident with the resolution of the subwatershed-scale WMMS model. Limited data were available to represent the sites, so conservative engineering assumptions were applied where appropriate. The calculated equivalent volume reductions from the BMPs can be refined during the adaptive management process once detailed design and monitoring data become available for the sites.

DeForest Wetlands Project

The DeForest Wetlands Project is located along the east bank of the Los Angeles River in the City of Long Beach and is comprised of approximately 34 acres of restored terrestrial and freshwater habitat and recreational amenities. The Project provides both groundwater recharge and surface water quality improvement. Site and modeling details are listed in Table 1-7.

Table 1-7. DeForest Wetlands Project details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**248.7**	**ac-ft/yr**	Subwatershed 486066
	247.6	**ac-ft/yr**	Subwatershed 486068
Given Details			
Drainage Area	1490	ac	Delineated in GIS using WMMS subwatershed boundaries
Average Annual Infiltration Volume	15-35	ac-ft/yr	Per Section 3 of the WMP
Average Annual Treated Volume	800-1000	ac-ft/yr	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge; assumed treated volume is in addition to infiltration volume
Annual Runoff Volume Entering Wetland[1]	1589	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	1808	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Estimated Annual Zinc Load Reduced by Infiltration[1]	17.1	lb Zn/yr	Assumed loading associated with minimum average infiltrated runoff; assumed load sequestered in sediments and/or sorbed to underlying soils
Estimated Annual Zinc Load Reduced by Wetland Functions[1]	535	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Estimated Zinc Load Reduction	30.5%		

Relative to Annual Runoff[1]			
Estimated Zinc Load Reduction Relative to Compliance Target[1]	97.7%		
Estimated Equivalent Annual Volume Reduction[1]	**243.1**	**ac-ft/yr**	Subwatershed 486066
	242.0	**ac-ft/yr**	Subwatershed 486068

[1] Indicated annual volumes are referenced to the critical year

Dominguez Gap Wetlands Project

The Dominguez Gap Wetlands Project consists of two treatment wetlands situated on the east and west banks of the Los Angeles River that features habitat and recreational amenities. The East Basin is a 37-ac facility that is dewatered manually by a pump. The West Basin primarily functions as an infiltration basin and is approximately 15 acres. Table 1-8 and Table 1-10 characterize the site and modeling details of the East and West Basins, respectively.

Table 1-8. Dominguez Gap East Wetlands Project – East Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**346.9**	**ac-ft/yr**	Subwatershed 486014
	14.3	**ac-ft/yr**	Subwatershed 446014
Given Details			
Drainage Area	2075	ac	Delineated in GIS using WMMS subwatershed boundaries
Maximum Volume Treated per Storm Event	71	ac-ft	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge
Maximum Annual Volume Treated[1]	526	ac-ft/yr	Based on storm events recorded for critical year; assumed all storm event runoff volume treated up to 71 ac-ft
Annual Runoff Volume Entering Wetland[1]	913	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	934	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Annual Zinc Load Reduced by Infiltration[1]	unknown	lb Zn/yr	Site soil information or monitored data required
Annual Zinc Load Reduced by Wetland Functions[1]	202	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Zinc Load Reduction Relative to Annual Runoff[1]	22%		
Zinc Load Reduction Relative to Compliance Target[1]	55%		
Equivalent Annual Volume Reduction[1]	**191.7**	**ac-ft/yr**	Subwatershed 486014
	6.4	**ac-ft/yr**	Subwatershed 446014

[1] Indicated annual volumes are referenced to the critical year

Table 1-9. Dominguez Gap Wetlands Project – West Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (41% contributes to West Basin)
	7.4	**ac-ft/yr**	Subwatershed 486015
Given Details			
Drainage Area	299	ac	Delineated in GIS using WMMS subwatershed boundaries
Annual Runoff Volume Infiltrated	All	ac-ft/yr	Per Section 3 of the WMP, no connection to Los Angeles River
Modeling Results			
Subwatershed 486013 Annual Runoff Volume Infiltrated[1]	47%		41% of subwatershed area contributes 47% of runoff volume to the basin
Subwatershed 446015Annual Runoff Volume Infiltrated	100%		100% of subwatershed area contributing
Equivalent Annual Volume Reduction[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (compliance target is 43% annual reduction, so meets target)
	7.4	**ac-ft/yr**	Subwatershed 446015

[1] Indicated annual volumes are referenced to the critical year

Willow Springs Park

The Willow Springs Park project will convert a public parcel to a 47-acre park. The park will contain bioswales and a water feature integrated into a recreational spaces. Table 1-10 Characterizes the site and modeling details.

Table 1-10. Willow Springs Park details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 486012
Given Details			
Drainage Area	211	ac	Delineated in GIS using WMMS subwatershed boundaries
Total BMP Footprint	11	Ac	Per Section 3 of the WMP; natural channels/bioswales with very high infiltration rates
Underlying soil infiltration rates	0.9	In/hr	WMMS
Subwatershed area contributing	95%		
Modeling Results			
Maximum infiltration rate over footprint of BMP	0.83	ac-ft/hr	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park – meets compliance target via infiltration
Equivalent Annual Volume Reduction[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 446012

[1] Indicated annual volumes are referenced to the critical year

Discovery Park Infiltration Basin

An existing infiltration basin located at 12400 Columbia Way in the City of Downey treats runoff from approximately 51 acres (5% of the subwatershed in which the site is located). Field observations indicate that the facility has capacity to infiltration runoff at a rate of 2 in/hr (equivalent to approximately 4 ac-ft/day) in addition to detention storage. Table 1-11 reports the simplified modeling assumptions for this BMP – upon further evaluation of as-built conditions, the associated volume reduction can be refined during the adaptive management process.

Table 1-11. Discovery Park Infiltration Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower San Gabriel River		
Location	City of Downey		
Status	Complete		
Compliance Targets for Treated Subwatersheds[1]	**80.6**	**ac-ft/yr**	Subwatershed 245115
Given Details			
Drainage Area	51	ac	
Observed Infiltration Rate	4	ac-ft/day	Per Gerald Green, personal communication, 2014, February 2
Percentage of Subwatershed Contributing to BMP	5%		
Approximate Runoff Volume Draining to BMP[1]	44	ac-ft/yr	WMMS
Modeling Results			
Equivalent Annual Volume Reduction[1]	**24**	**ac-ft/yr**	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park

[1] Indicated annual volumes are referenced to the critical year

Parque Dos Rios

Parque Dos Rios is located at the confluence of the Los Angeles River and Rio Hondo River. An approximately 30-ac area between the freeway and the Los Angeles River will be converted to an infiltration basin to treat additional upstream area. Currently, the site is self-retaining open space and is characterized in the baseline model as such. No further runoff volume reductions were calculated for this site; as design details are finalized for the infiltration basin improvements, associated volume reductions can be applied towards upstream jurisdictional compliance targets.

1.4.2. Identified Parcel-Scale Regional and Distributed BMPs

The jurisdictions within the WMP areas compiled detailed lists of BMPs intended to treat areas smaller than 50 acres. As with the preceding regional BMPs, these strategies represent progress towards achieving the compliance target in each respective jurisdiction. The distributed BMPs are listed in Attachment D and can be applied towards meeting the compliance targets in each jurisdiction.

The WMP groups have identified additional potential regional BMPs and these are listed in Section 3 for LCC and Section 4 for LLAR and LSGR of the respective WMP.

1.5. Non-MS4 Facility Runoff

Each jurisdiction is the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the treatment target as described below.

1.5.1. Non-MS4 Permitted Areas

Non-MS4 permitted areas were identified based on the address list of permittees on the State Water Resources Control Board (SWRCB) website. Using the address information, corresponding parcel areas were selected using the LA County Assessor Parcel Viewer and the associated GIS Shapefile. The percentage of permitted land use area relative to the total land use area was calculated and the associated non-MS4 permitted area runoff as extracted from the WMMS runoff response output.

1.5.2. Caltrans

The design storm runoff generated by Caltrans facilities was estimated using WMMS land use data. Areas labeled as Transportation consist of freeways and other extensive transportation facilities that tend to fall under Caltrans jurisdiction (versus areas labeled as Secondary Roads, which are managed by local transportation departments); these areas were assumed to be Caltrans facilities. Runoff from Transportation land uses, less runoff from any overlapping non-MS4 permitted areas identified above, was extracted from the WMMS model output for each subwatershed.

1.6. Institutional BMPs and Minimum Control Measures

It is challenging to accurately quantify most institutional BMP and minimum control measure (MCM) benefits in terms of pollutant load reductions because they generally require extensive survey and monitoring information to quantify. In addition, nonstructural BMPs may target pollutants, land uses, or populations, resulting in different load reductions depending on the implementation technique. A number of MCMs are outlined in each WMP, representing an array of practices to most effectively address pollutants at their source or affect their transport. For the purposes of the RAA, a 10% reduction was assumed to represent the cumulative impact of these practices during both wet and dry conditions. Another explicitly modeled nonstructural BMP was a goal to reduce 25% of irrigation of urban vegetation, a goal that can result from a myriad of practices ranging from public education, enforcement, incentive programs, creative water rate structures, etc. The 25% reduction in irrigation was modeled directly in LSPC and is the primary driver for dry weather flow reductions. Pollutant load reductions from these nonstructural BMPs were subtracted from loads simulated in the baseline model to quantify progress towards meeting the watershed numeric goals. Results of both the 10% reduction for collective MCMs, in addition to irrigation reduction, are presented in Section 7 of the main RAA report for both wet and dry conditions.

Attachment B: Detailed Jurisdictional Compliance Tables

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

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9444 Balboa Ave., Suite 215
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January 15, 2015

Contents

B1. Lower Los Angeles River WMP – MS4 vs Non-MS4

B1.1. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6076	17.1	17.0	0.1
6077	123.0	123.0	-
6079	210.3	176.4	33.9
6082	0.3	0.3	-
6100	11.4	10.7	0.7
6102	143.8	143.8	-
6103	0.0	-	0.0
6104	37.1	37.1	-
6106	100.2	76.4	23.9
6111	82.1	69.5	12.6
6113	0.6	0.6	0.0
Grand Total	726.0	654.7	71.2

B1.2. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6014	14.3	14.3	-
Grand Total	14.3	14.3	-

B1.3. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6001	17.7	0.0	17.7
6002	387.5	378.7	8.8
6003	430.0	429.9	0.1
6004	3.4	2.4	1.0
6005	29.9	6.6	23.3
6006	55.9	35.9	20.0
6007	110.5	67.0	43.5
6008	172.5	144.0	28.5
6009	160.5	159.5	1.1
6010	128.3	100.8	27.5
6011	202.2	184.8	17.4
6012	7.2	0.0	7.2
6013	152.0	12.3	139.6
6014	346.9	346.9	-
6015	7.4	4.3	3.1
6016	3.0	0.0	3.0
6017	1.9	1.1	0.9
6018	49.3	45.8	3.5
6065	89.8	36.7	53.2
6066	248.7	202.6	46.1
6067	83.9	25.3	58.6
6068	247.6	222.5	25.1
6069	102.2	42.6	59.6
6070	83.4	22.2	61.2
6071	276.3	94.4	181.9
6072	0.3	0.3	-
7016	503.6	473.3	30.3
Grand Total	3,901.7	3,039.6	862.1

B1.4. City of Lynwood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6023	40.3	26.3	13.9
6024	16.1	10.6	5.4
6028	11.2	11.2	-
6030	168.8	45.2	123.6
6031	145.5	133.0	12.5
6032	115.7	60.5	55.2
6033	130.0	113.3	16.6
6074	185.2	134.9	50.4
6078	59.8	0.0	59.8
6080	146.6	91.7	54.9
6081	76.8	41.3	35.5
6082	12.2	0.0	12.2
Grand Total	1,108.1	667.9	440.2

B1.5. City of Paramount

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6069	0.0	0.0	-
6071	157.1	120.7	36.4
6072	183.8	172.9	10.9
6073	124.1	61.4	62.6
6075	181.8	163.7	18.1
6076	227.8	65.7	162.1
6078	112.3	21.7	90.6
6080	1.9	0.0	1.9
Grand Total	988.8	606.1	382.7

B1.6. City of Pico Rivera

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6106	86.5	44.3	42.2
6111	0.0	0.0	0.0
6112	5.9	1.4	4.5
6113	272.8	229.5	43.3
6114	0.0	0.0	-
6115	0.0	0.0	-
6116	0.0	0.0	-
6117	0.0	0.0	-
6126	12.0	12.0	-
6129	0.0	0.0	-
Grand Total	377.3	287.2	90.0

B1.7. City of Signal Hill

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6002	106.6	105.8	0.8
6003	43.7	43.7	-
6007	6.4	0.0	6.4
6009	8.3	8.2	0.1
6011	6.3	6.0	0.3
6012	26.6	25.2	1.4
Grand Total	197.9	188.9	9.0

B1.8. City of South Gate

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6031	148.6	148.6	-
6033	70.0	61.9	8.1
6034	422.9	416.7	6.3
6076	125.9	92.5	33.4
6078	0.0	0.0	-
6079	68.9	54.4	14.6
6080	48.7	48.7	-
6082	137.6	82.8	54.7
6083	36.2	11.5	24.7
6084	159.7	137.8	21.9
6085	67.8	0.0	67.8
6089	35.7	18.3	17.4
6090	43.8	3.4	40.4
6096	0.6	0.6	-
6098	0.1	0.1	-
6100	80.6	51.2	29.4
6101	25.0	25.0	-
6102	6.3	6.3	-
6104	7.4	7.4	-
6350	18.6	0.0	18.6
6351	8.2	7.1	1.0
Grand Total	1,512.6	1,174.3	338.2

B2. Lower Los Angeles River WMP – Compliance Tables

B2.1. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6076	Final	17.0	-	-	1.2	-	1.2
6077	Final	123.0	0.3	11.8	1.2	6.4	19.6
6079	50%	176.4	0.7	1.7	10.1	-	12.5
6082	Final	0.3	-	-	0.0	0.0	0.0
6100	50%	10.7	0.0	0.8	0.0	0.6	1.4
6102	31%	143.8	1.1	12.2	0.7	7.1	21.1
6103	Final	-	0.7	-	-	-	0.7
6104	Final	37.1	0.3	3.2	0.0	0.9	4.5
6106	Final	76.4	0.4	9.1	1.6	-	11.1
6111	Final	69.5	0.3	7.1	0.5	3.3	11.2
6113	Final	0.6	-	0.0	-	0.1	0.1
Grand Total		654.7	3.8	45.9	15.3	18.4	83.4

B2.2. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6014	31%	7.9	-	1.1	0.0	-	1.2
Grand Total		7.9	-	1.1	0.0	-	1.2

B2.3. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6001	Final	-	-	-	-	-	-
6002	50%	378.7	-	23.8	5.2	19.3	48.3
6003	Final	429.9	-	22.4	1.4	32.8	56.5
6004	50%	2.4	-	0.1	-	0.3	0.3
6005	31%	6.6	-	1.0	0.0	-	1.0
6006	Final	35.9	-	0.3	0.1	4.1	4.5
6007	Final	67.0	-	6.4	0.1	4.0	10.6
6008	Final	144.0	-	13.9	2.0	3.5	19.4
6009	Final	159.5	-	11.5	0.7	9.2	21.4
6010	Final	100.8	-	8.2	0.9	4.8	13.9
6011	Final	184.8	-	14.4	0.9	9.6	24.9
6012	31%	-	-	-	-	-	-
6013	50%	-	-	-	-	-	-
6014	Final	155.2	-	15.0	7.9	-	22.9
6015	31%	-	-	-	-	-	-
6016	Final	-	-	-	-	-	-
6017	50%	1.1	-	-	-	0.1	0.1
6018	Final	45.8	-	4.3	-	2.6	6.9
6065	Final	36.7	-	0.4	0.0	4.6	5.0
6066	31%	-	-	-	-	-	-
6067	50%	25.3	-	2.6	0.3	0.5	3.3
6068	31%	-	-	-	-	-	-
6069	50%	42.6	-	0.6	0.0	3.5	4.1
6070	50%	22.2	-	2.7	0.4	-	3.1
6071	50%	94.4	-	10.5	1.6	1.0	13.1
6072	50%	0.3	-	0.0	-	0.0	0.0
7016	Final	473.3	-	16.5	6.9	36.3	59.7
Grand Total		2,406.2	-	154.6	28.3	136.2	319.1

B2.4. City of Lynwood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6023	Final	26.3	-	1.0	0.7	1.6	3.3
6024	Final	10.6	-	0.4	-	1.1	1.4
6028	31%	11.2	-	0.8	-	0.9	1.7
6030	Final	45.2	-	4.0	2.4	-	6.4
6031	31%	133.0	-	9.9	2.0	7.5	19.4
6032	Final	60.5	-	6.0	0.4	3.4	9.8
6033	Final	113.3	-	7.4	0.2	10.7	18.2
6074	50%	134.9	-	12.8	3.8	0.1	16.8
6078	Final	-	-	-	-	-	-
6080	31%	91.7	-	7.7	0.7	4.7	13.2
6081	Final	41.3	-	4.0	0.8	0.5	5.3
6082	Final	-	-	-	-	-	-
Grand Total		667.9	-	53.9	11.1	30.5	95.5

B2.5. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6069	31%	0.0	-	-	-	-	-
6071	Final	120.7	0.0	4.9	0.9	9.9	15.6
6072	Final	172.9	0.0	7.6	1.1	13.9	22.6
6073	Final	61.4	-	1.9	0.2	4.6	6.6
6075	31%	163.7	-	9.0	1.7	10.2	20.9
6076	50%	65.7	-	7.4	0.8	0.3	8.6
6078	Final	21.7	-	0.5	0.0	1.8	2.3
6080	Final	-	-	-	-	-	-
Grand Total		606.1	0.1	31.2	4.7	40.6	76.6

B2.6. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6106	31%	44.3	-	5.9	0.5	0.2	6.5
6111	Final	-	-	-	-	-	-
6112	31%	1.4	-	0.0	-	0.1	0.2
6113	31%	229.5	-	5.6	0.0	27.0	32.7
6114	Final	-	-	-	-	-	-
6115	Final	0.0	-	-	-	0.0	0.0
6116	Final	-	-	-	-	-	-
6117	Final	-	-	-	-	-	-
6126	Final	12.0	-	1.3	0.0	0.5	1.8
6129	Final	-	-	-	-	-	-
Grand Total		287.2	-	12.8	0.5	27.9	41.2

B2.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6002	50%	105.8	-	7.0	0.9	5.9	13.9
6003	Final	43.7	-	1.9	0.0	4.2	6.0
6007	Final	-	-	-	-	-	-
6009	Final	8.2	0.1	0.3	-	0.7	1.1
6011	31%	6.0	0.1	0.8	-	0.2	1.1
6012	31%	2.5	-	0.0	0.2	-	0.2
Grand Total		166.2	0.2	10.0	1.1	11.0	22.3

B2.8. City of South Gate

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6031	31%	148.6	-	16.9	0.8	5.3	22.9
6033	Final	61.9	-	4.5	0.3	4.8	9.5
6034	Final	416.7	-	30.0	3.8	25.3	59.0
6076	50%	92.5	-	7.5	0.7	5.1	13.2
6078	Final	-	-	-	-	-	-
6079	50%	54.4	-	4.9	0.1	3.4	8.4
6080	31%	48.7	-	5.8	-	2.5	8.3
6082	Final	82.8	0.0	4.3	0.1	9.4	13.8
6083	Final	11.5	-	0.7	-	0.9	1.6
6084	Final	137.8	4.7	8.3	0.8	5.9	19.8
6085	50%	-	-	-	-	-	-
6089	Final	18.3	-	0.8	0.2	1.8	2.7
6090	Final	3.4	-	0.6	-	-	0.6
6096	31%	0.6	-	0.0	0.0	0.0	0.1
6098	31%	0.1	-	-	0.0	-	0.0
6100	50%	51.2	-	2.6	0.0	4.2	6.8
6101	31%	25.0	-	0.5	0.1	2.6	3.3
6102	31%	6.3	-	-	-	0.8	0.8
6104	Final	7.4	-	0.0	0.0	0.9	1.0
6350	Final	-	-	-	-	-	-
6351	Final	7.1	-	0.0	0.0	1.1	1.1
Grand Total		1,174.3	4.7	87.5	6.8	73.8	173.0

B3. Los Cerritos Channel WMP – MS4 vs Non-MS4

B3.1. City of Bellflower

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5507	305.0	268.1	36.9
5517	154.4	137.7	16.7
5518	235.2	233.5	1.7
5519	289.1	235.8	53.2
5523	138.8	100.4	38.5
5524	14.8	14.8	-
Grand Total	1,137.4	990.4	147.0

B3.2. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5506	0.0	0.0	-
5507	12.9	12.9	0.0
Grand Total	12.9	12.9	0.0

B3.3. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5524	112.8	93.0	19.8
Grand Total	112.8	93.0	19.8

B3.4. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5506	226.6	226.5	0.0
5507	176.3	176.3	-
5510	20.7	19.9	0.8
5512	143.1	138.8	4.3
5514	35.3	35.3	-
5515	26.6	26.6	-
5516	31.9	31.9	-
5517	134.4	134.4	-
5519	9.5	9.5	-
5520	164.5	164.5	-
5521	95.2	95.2	-
5522	71.9	71.9	-
5523	21.4	21.4	-
Grand Total	1,157.2	1,152.1	5.1

B3.5. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5501	0.3	0.3	0.0
5502	0.5	0.2	0.2
5503	78.2	77.8	0.4
5504	349.2	300.9	48.2
5505	133.3	130.5	2.8
5506	8.6	8.6	0.0
5508	74.6	65.6	9.0
5509	129.3	25.6	103.7
5510	807.6	152.2	655.3
5511	50.5	48.5	2.0
5512	454.0	329.5	124.5
5513	32.5	30.5	2.0
5514	153.5	152.8	0.7
5515	91.0	91.0	-
5520	7.4	7.4	-
5521	108.7	49.2	59.5
5522	50.8	48.6	2.2
5523	146.4	110.7	35.7
Grand Total	2,676.1	1,629.8	1,046.2

B3.6. City of Paramount

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5519	36.5	35.4	1.2
5523	343.3	332.6	10.7
5524	252.1	157.5	94.6
Grand Total	631.9	525.5	106.4

B3.7. City of Signal Hill

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5510	322.6	284.3	38.3
Grand Total	322.6	284.3	38.3

B4. Los Cerritos Channel WMP - Compliance Tables

B4.1. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5507	Final	268.1	-	16.7	1.2	13.2	31.1
5517	Final	137.7	-	9.3	0.8	9.3	19.4
5518	Final	233.5	-	16.8	1.2	10.2	28.2
5519	35%	176.3	-	11.4	0.9	12.1	24.4
	Final	59.5	-	-	-	3.6	3.6
5523	35%	68.0	-	3.7	0.4	4.1	8.2
	Final	32.3	-	-	-	2.0	2.0
5524	Final	14.8	-	0.2	-	1.2	1.4
Grand Total		990.4	-	58.1	4.5	55.6	118.2

B4.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	0.0	-	-	-	0.0	0.0
5507	35%	9.7	-	1.0	0.0	0.5	1.4
	Final	3.2	-	-	-	0.1	0.1
Grand Total		12.9	-	1.0	0.0	0.6	1.6

B4.3. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5524	35%	57.2	0.1	5.3	0.0	2.7	8.1
	Final	35.8	-	-	-	2.1	2.1
Grand Total		93.0	0.1	5.3	0.0	4.8	10.2

B4.4. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	226.5	-	31.4	2.1	5.1	38.5
5507	35%	131.0	-	15.4	2.6	1.5	19.5
	Final	45.2	-	-	-	3.6	3.6
5510	Final	19.9	-	0.4	-	1.5	1.9
5512	Final	138.8	-	7.7	0.2	7.0	14.9
5514	Final	35.3	-	3.7	1.3	0.4	5.4
5515	Final	26.6	-	3.9	0.2	0.5	4.6
5516	Final	31.9	-	4.0	0.4	0.8	5.3
5517	Final	134.4	-	18.6	1.4	2.8	22.9
5519	35%	3.1	-	0.2	-	0.2	0.4
	Final	6.4	-	-	-	0.1	0.1
5520	35%	130.9	-	14.0	2.1	4.4	20.6
	Final	33.5	-	-	-	3.3	3.3
5521	Final	95.2	-	11.6	0.6	2.2	14.3
5522	Final	71.9	-	8.7	0.8	1.6	11.1
5523	35%	17.4	-	1.9	-	0.7	2.6
	Final	4.0	-	-	-	0.3	0.3
Grand Total		1,152.1	-	121.5	11.8	36.2	169.5

B4.5. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5501	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.1	-	-	-	0.0	0.0
5502	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.2	-	-	-	0.0	0.0
5503	35%	57.7	-	4.2	2.3	2.0	8.5
	Final	20.1	-	-	-	1.7	1.7
5504	35%	196.6	-	10.2	3.3	8.7	22.2
	Final	104.4	-	-	-	5.5	5.5
5505	Final	130.5	-	15.9	1.6	3.2	20.7
5506	Final	8.6	-	0.1	0.2	0.4	0.7
5508	Final	65.6	-	7.7	0.9	1.7	10.3
5509	Final	25.6	-	-	2.2	-	2.2
5510	Final	152.2	-	9.8	0.9	6.1	16.8
5511	Final	48.5	-	6.7	0.2	1.3	8.1
5512	Final	329.5	-	22.2	1.7	16.8	40.7
5513	35%	23.9	-	1.5	0.1	2.1	3.7
	Final	6.6	-	-	-	0.4	0.4
5514	35%	106.0	-	10.9	5.9	-	16.7
	Final	46.8	-	3.7	-	2.8	6.5
5515	Final	91.0	-	10.8	1.7	2.3	14.9
5520	Final	7.4	-	0.8	-	0.3	1.2
5521	Final	49.2	-	6.0	0.1	1.8	7.9
5522	Final	48.6	-	4.2	0.0	3.1	7.3
5523	35%	89.3	-	7.0	0.8	3.5	11.3
	Final	21.4	-	-	-	1.6	1.6
Grand Total		1,629.8	-	121.7	21.8	65.3	208.7

B4.6. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5519	35%	24.0	-	1.9	0.2	1.4	3.5
	Final	11.4	-	-	-	0.6	0.6
5523	35%	243.0	-	12.4	2.8	15.7	30.9
	Final	89.6	-	-	-	4.1	4.1
5524	Final	157.5	-	8.5	3.5	4.0	16.0
Grand Total		525.5	-	22.8	6.4	25.9	55.1

B4.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5510	35%	231.6	0.0	11.2	1.2	14.2	26.6
	Final	52.7	-	-	-	2.0	2.0
Grand Total		284.3	0.0	11.2	1.2	16.2	28.6

B5. Lower San Gabriel River (San Gabriel River) WMP – MS4 vs Non-MS4

B5.1. City of Artesia

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5109	1.1	1.1	-
Grand Total	1.1	1.1	-

B5.2. City of Bellflower

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5110	0.0	0.0	-
5112	0.7	0.6	0.2
5113	56.8	51.5	5.3
5114	0.0	0.0	-
5115	1.3	1.3	-
5116	0.1	0.1	-
5118	3.9	3.9	-
Grand Total	62.8	57.4	5.4

B5.3. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5107	0.0	0.0	-
5108	0.0	0.0	-
5109	40.7	0.0	40.7
5110	2.9	2.9	-
5111	6.8	0.0	6.8
5112	2.3	1.2	1.2
5113	0.0	0.0	-
5516	6.6	0.0	6.6
Grand Total	59.4	4.1	55.3

B5.4. City of Diamond Bar

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5197	0.0	0.0	-
5198	0.0	0.0	-
5203	12.6	0.0	12.6
5204	3.8	0.0	3.8
5205	1.0	1.0	-
5212	15.3	0.0	15.3
5213	0.3	0.0	0.3
Grand Total	33.0	1.1	32.0

B5.5. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5113	0.0	0.0	-
5114	78.3	22.4	55.9
5115	80.6	0.0	80.6
5118	0.0	0.0	0.0
5119	52.5	52.5	-
5122	4.3	0.0	4.3
5124	0.0	0.0	0.0
5125	38.4	2.5	35.8
5126	9.8	9.8	-
5127	0.0	0.0	-
5128	0.0	0.0	-
Grand Total	263.9	87.3	176.7

B5.6. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5105	0.8	0.8	-
5106	7.4	0.0	7.4
5107	0.0	0.0	-
5108	1.4	1.4	-
5110	0.0	0.0	-
Grand Total	9.6	2.2	7.4

B5.7. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5102	0.0	0.0	-
5103	26.9	26.9	-
5104	2.3	2.3	-
5105	0.0	0.0	-
5106	0.0	0.0	-
Grand Total	29.2	29.2	-

B5.8. City of Norwalk

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5109	0.8	0.8	-
5116	0.5	0.0	0.5
5117	14.5	0.0	14.5
5118	3.7	0.1	3.5
5120	39.1	0.0	39.1
5121	41.5	3.9	37.6
5122	34.7	0.0	34.7
5124	2.2	0.0	2.2
Grand Total	136.9	4.8	132.1

B5.9. City of Pico Rivera

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5127	0.0	0.0	-
5128	10.9	6.4	4.5
5130	6.2	6.1	0.1
5131	17.2	11.7	5.5
5132	0.0	0.0	-
5135	4.3	4.3	-
5136	7.2	7.2	-
5137	0.2	0.2	-
5139	7.8	7.8	-
5140	0.0	0.0	-
5141	4.9	4.9	-
5142	0.0	0.0	-
5143	8.9	8.9	-
5144	3.8	0.0	3.8
5145	1.7	1.7	-
5147	0.0	0.0	-
5148	0.2	0.2	0.0
5149	0.0	0.0	-
5150	0.3	0.0	0.3
5151	0.3	0.0	0.3
5153	1.0	1.0	-
5154	0.0	0.0	-
Grand Total	75.1	60.4	14.7

B5.10. City of Santa Fe Springs

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5120	3.1	3.1	0.0
5122	11.0	0.0	11.0
5123	80.0	23.9	56.2
5127	0.0	0.0	0.0
5129	4.5	0.0	4.5
5130	1.7	0.0	1.7
5132	0.0	0.0	-
5133	0.1	0.0	0.1
5134	5.6	3.3	2.3
5135	0.0	0.0	-
Grand Total	106.0	30.3	75.8

B5.11. City of Whittier

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5138	7.1	7.1	-
5142	0.0	0.0	0.0
5146	0.4	0.0	0.4
5147	0.0	0.0	-
5148	0.0	0.0	-
5153	0.0	0.0	-
5173	0.0	0.0	-
Grand Total	7.5	7.1	0.4

B6. Lower San Gabriel River (San Gabriel River) WMP – Compliance Tables

B6.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	1.1	-	-	0.1	-	0.1
Grand Total		1.1	-	-	0.1	-	0.1

B6.2. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5110	Final	0.0	-	-	-	0.0	0.0
5112	Final	0.6	-	0.1	0.0	-	0.1
5113	Final	51.5	-	0.9	3.4	-	4.3
5114	Final	-	-	-	-	-	-
5115	35%	1.3	-	0.2	0.0	-	0.2
5116	Final	0.1	-	-	-	0.0	0.0
5118	Final	3.9	-	0.6	0.3	-	0.9
Grand Total		57.4	-	1.8	3.7	0.0	5.5

B6.3. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5107	Final	-	-	-	-	-	-
5108	Final	-	-	-	-	-	-
5109	Final	-	-	-	-	-	-
5110	Final	2.9	-	0.4	0.0	-	0.4
5111	Final	-	-	-	-	-	-
5112	Final	1.2	-	0.2	0.0	-	0.2
5113	Final	-	-	-	-	-	-
5116	35%	-	-	-	-	-	-
Grand Total		4.1	-	0.6	0.0	-	0.6

B6.4. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5197	Final	0.0	-	0.0	-	-	0.0
5198	Final	-	-	-	-	-	-
5203	Final	-	-	-	-	-	-
5204	Final	-	-	-	-	-	-
5205	Final	1.0	-	0.2	-	-	0.2
5212	Final	-	-	-	-	-	-
5213	35%	-	-	-	-	-	-
Grand Total		1.1	-	0.2	-	-	0.2

B6.5. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5113	Final	-	1.0	-	-	-	1.0
5114	Final	22.4	0.8	2.1	0.4	-	3.3
5115	Final	-	0.6	-	-	-	0.6
5118	Final	-	0.6	-	-	-	0.6
5119	Final	52.5	3.3	6.4	-	-	9.7
5122	35%	-	0.0	-	-	-	0.0
5124	Final	-	0.0	-	-	-	0.0
5125	Final	2.5	0.4	0.1	-	-	0.5
5126	Final	9.8	0.3	1.4	-	-	1.7
5127	Final	-	0.1	-	-	-	0.1
5128	Final	-	0.0	-	-	-	0.0
Grand Total		87.3	7.1	10.0	0.4	-	17.5

B6.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5105	Final	0.8	-	-	0.0	0.1	0.1
5106	35%	-	-	-	-	-	-
5107	Final	-	-	-	-	-	-
5108	Final	1.4	-	0.2	0.0	-	0.2
5110	Final	-	-	-	-	-	-
Grand Total		2.2	-	0.2	0.0	0.1	0.4

B6.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5102	Final	-	-	-	-	-	-
5103	35%	26.9	-	1.1	1.3	-	2.4
5104	Final	2.3	-	0.3	-	-	0.3
5105	Final	-	-	-	-	-	-
5106	Final	0.0	-	-	-	0.0	0.0
Grand Total		29.2	-	1.4	1.3	0.0	2.7

B6.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	0.8	-	-	0.1	-	0.1
5116	Final	-	-	-	-	-	-
5117	Final	-	-	-	-	-	-
5118	Final	0.1	-	-	0.0	-	0.0
5120	Final	-	-	-	-	-	-
5121	Final	3.9	-	-	0.3	-	0.3
5122	Final	-	-	-	-	-	-
5124	Final	-	-	-	-	-	-
Grand Total		4.8	-	-	0.3	-	0.3

B6.9. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5127	Final	0.0	-	-	-	0.0	0.0
5128	Final	6.4	-	1.2	-	-	1.2
5130	Final	6.1	-	1.1	-	-	1.1
5131	Final	11.7	-	2.0	-	-	2.0
5132	Final	0.0	-	-	-	0.0	0.0
5135	Final	4.3	-	0.8	-	-	0.8
5136	Final	7.2	-	1.3	-	-	1.3
5137	35%	0.2	-	0.0	-	-	0.0
5139	Final	7.8	-	1.4	-	-	1.4
5140	Final	-	-	-	-	-	-
5141	Final	4.9	-	0.8	-	-	0.8
5142	Final	-	-	-	-	-	-
5143	Final	8.9	-	1.6	-	-	1.6
5144	Final	-	-	-	-	-	-
5145	Final	1.7	-	0.3	-	-	0.3
5147	Final	-	-	-	-	-	-
5148	Final	0.2	-	0.0	-	-	0.0
5149	Final	0.0	-	-	-	-	-
5150	Final	-	-	-	-	-	-
5151	Final	-	-	-	-	-	-
5153	Final	1.0	-	0.2	-	-	0.2
5154	Final	-	-	-	-	-	-
Grand Total		60.4	-	10.8	-	0.0	10.8

B6.10. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5120	Final	3.1	-	0.2	-	0.3	0.5
5122	Final	-	-	-	-	-	-
5123	Final	23.9	-	3.8	-	-	3.8
5127	35%	-	-	-	-	-	-
5129	Final	-	-	-	-	-	-
5130	Final	-	-	-	-	-	-
5132	Final	-	-	-	-	-	-
5133	Final	-	-	-	-	-	-
5134	Final	3.3	-	0.6	-	-	0.6
5135	Final	0.0	-	0.0	-	0.0	0.0
Grand Total		30.3	-	4.6	-	0.3	4.9

B6.11. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5138	Final	7.1	-	1.4	-	-	1.4
5142	Final	-	-	-	-	-	-
5146	Final	-	-	-	-	-	-
5147	Final	-	-	-	-	-	-
5148	Final	-	-	-	-	-	-
5153	35%	0.0	-	-	-	0.0	0.0
5173	Final	-	-	-	-	-	-
Grand Total		7.1	-	1.4	-	0.0	1.4

B7. Lower San Gabriel River WMP (Coyote Creek) – MS4 vs Non-MS4

B7.1. City of Artesia

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	0.0	0.0	-
5018	47.9	15.9	32.0
Grand Total	47.9	15.9	32.0

B7.2. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	41.7	7.7	34.0
5016	0.0	0.0	-
5017	4.3	4.3	-
5018	49.7	14.9	34.8
5023	0.0	0.0	-
5024	48.7	0.0	48.7
5026	5.8	5.8	0.1
5028	12.2	0.0	12.2
5029	4.9	4.9	-
5030	0.1	0.1	0.0
5035	3.8	0.0	3.8
5036	2.2	1.2	1.0
5038	0.0	0.0	-
5059	16.0	15.1	0.8
5060	0.0	0.0	-
5061	4.9	2.6	2.3
Grand Total	194.3	56.7	137.6

B7.3. City of Diamond Bar

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5053	0.0	0.0	-
5054	1.0	1.0	-
5055	8.4	8.4	-
5056	10.6	0.0	10.6
5057	26.8	0.0	26.8
5058	27.2	27.2	-
Grand Total	74.0	36.7	37.4

B7.4. City of Hawaiian Gardens

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5004	0.0	0.0	-
5007	27.0	23.6	3.4
5009	0.1	0.1	-
5013	1.3	1.3	-
5014	2.1	2.1	-
Grand Total	30.4	27.1	3.4

B7.5. City of La Mirada

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5037	0.0	0.0	-
5038	1.1	0.0	1.1
5039	7.5	0.0	7.5
5040	2.1	0.0	2.1
5041	2.0	0.0	2.0
5042	0.0	0.0	0.0
5043	34.8	19.1	15.7
5044	0.8	0.0	0.8
5045	0.8	0.0	0.8
5059	1.4	1.4	-
5060	0.9	0.0	0.9
5062	40.4	20.5	19.9
5063	37.0	37.0	-
5064	0.0	0.0	-
5067	0.0	0.0	-
5069	40.3	40.3	-
5070	0.0	0.0	-
5073	5.7	5.7	-
5074	0.8	0.8	-
5080	0.0	0.0	-
Grand Total	175.7	124.9	50.8

B7.6. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5004	0.0	0.0	-
5007	17.5	17.5	0.0
5008	8.2	2.3	5.9
5014	0.0	0.0	-
5015	0.0	0.0	-
5016	0.0	0.0	-
5017	0.0	0.0	-
Grand Total	25.7	19.7	6.0

B7.7. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5003	0.0	0.0	0.0
5004	37.5	0.0	37.5
5005	0.0	0.0	-
5007	0.0	0.0	-
5009	0.0	0.0	-
5013	0.0	0.0	-
Grand Total	37.5	0.0	37.5

B7.8. City of Norwalk

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	3.0	1.6	1.3
5018	36.0	2.0	34.0
5019	41.5	24.3	17.2
5020	0.0	0.0	-
5021	43.4	16.9	26.5
5022	28.7	7.7	21.0
5024	0.0	0.0	-
5025	0.0	0.0	-
5060	0.0	0.0	-
5068	0.0	0.0	-
5071	0.0	0.0	-
5073	0.0	0.0	-
Grand Total	152.5	52.5	99.9

B7.9. City of Santa Fe Springs

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5019	0.0	0.0	-
5020	27.7	0.0	27.7
5022	13.5	0.0	13.5
5024	0.0	0.0	-
5025	31.2	0.0	31.2
5060	28.9	0.0	28.9
5061	0.0	0.0	-
5062	2.6	0.0	2.6
5067	19.4	0.0	19.4
5068	6.1	0.0	6.1
5069	2.3	0.0	2.3
5071	50.5	0.0	50.5
5072	2.6	2.6	-
5073	23.5	0.0	23.5
5084	1.4	1.4	-
5089	19.8	0.0	19.8
5092	1.1	1.1	-
5093	22.1	0.0	22.1
5094	7.4	7.4	-
5095	0.4	0.0	0.4
Grand Total	260.7	12.6	248.1

B7.10. City of Whittier

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5045	0.0	0.0	-
5064	0.0	0.0	-
5065	3.7	3.7	-
5070	0.0	0.0	-
5079	18.5	11.7	6.8
5080	52.6	26.0	26.5
5081	2.1	0.0	2.1
5082	6.8	0.2	6.6
5083	0.0	0.0	-
5086	1.7	0.0	1.7
5087	21.0	20.8	0.2
5088	25.0	24.7	0.3
5089	0.6	0.5	0.1
5090	0.8	0.8	-
5091	6.6	5.7	0.9
5092	13.8	8.9	4.9
5093	0.0	0.0	-
5094	0.6	0.6	-
5095	24.2	21.1	3.1
5096	3.8	3.8	-
5097	5.2	5.2	-
5098	48.7	47.9	0.7
5099	11.3	10.6	0.7
5100	7.3	7.3	-
5101	0.6	0.6	-
Grand Total	254.7	200.1	54.6

B8. Lower San Gabriel River WMP (Coyote Creek) – Compliance Tables

B8.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	-	-	-	-	-	-
5018	35%	15.9	-	-	1.1	-	1.1
Grand Total		15.9	-	-	1.1	-	1.1

B8.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	7.7	-	-	0.9	-	0.9
5016	Final	-	-	-	-	-	-
5017	Final	4.3	-	-	0.5	-	0.5
5018	Final	14.9	-	-	1.1	-	1.1
5023	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5026	Final	5.8	-	1.0	0.0	-	1.0
5028	Final	-	-	-	-	-	-
5029	Final	4.9	-	0.3	0.2	-	0.6
5030	35%	0.1	-	0.0	-	-	0.0
5035	Final	-	-	-	-	-	-
5036	Final	1.2	-	0.2	0.0	-	0.2
5038	Final	-	-	-	-	-	-
5059	Final	15.1	-	1.6	0.5	-	2.0
5060	Final	-	-	-	-	-	-
5061	Final	2.6	-	-	0.2	-	0.2
Grand Total		56.7	-	3.1	3.4	-	6.4

B8.3. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5053	Final	-	-	-	-	-	-
5054	35%	1.0	-	0.3	-	-	0.3
5055	Final	8.4	-	1.2	-	0.7	1.9
5056	Final	-	-	-	-	-	-
5057	Final	-	-	-	-	-	-
5058	Final	27.2	-	6.7	-	-	6.7
Grand Total		36.7	-	8.2	-	0.7	8.9

B8.4. City of Hawaiian Gardens

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	23.6	-	0.3	1.5	-	1.8
5009	Final	0.1	-	-	-	0.0	0.0
5013	Final	1.3	-	-	0.1	-	0.1
5014	Final	2.1	-	0.2	0.0	-	0.3
Grand Total		27.1	-	0.6	1.6	0.0	2.2

B8.5. City of La Mirada

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5037	Final	-	-	-	-	-	-
5038	Final	-	-	-	-	-	-
5039	Final	-	-	-	-	-	-
5040	Final	-	-	-	-	-	-
5041	Final	-	-	-	-	-	-
5042	Final	-	-	-	-	-	-
5043	Final	19.1	-	1.9	0.6	-	2.5
5044	Final	-	-	-	-	-	-
5045	35%	-	-	-	-	-	-
5059	Final	1.4	-	0.3	-	-	0.3
5060	Final	-	-	-	-	-	-
5062	Final	20.5	-	1.0	1.1	-	2.1
5063	Final	37.0	-	-	3.0	-	3.0
5064	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5069	Final	40.3	-	5.3	0.9	-	6.2
5070	Final	-	-	-	-	-	-
5073	Final	5.7	-	1.0	-	-	1.0
5074	Final	0.8	-	0.1	-	-	0.1
5080	Final	-	-	-	-	-	-
Grand Total		124.9	-	9.6	5.6	-	15.2

B8.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	17.5	-	0.9	0.7	-	1.6
5008	Final	2.3	-	-	0.3	-	0.3
5014	Final	-	-	-	-	-	-
5015	Final	-	-	-	-	-	-
5016	Final	-	-	-	-	-	-
5017	Final	-	-	-	-	-	-
Grand Total		19.7	-	0.9	0.9	-	1.9

B8.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5003	Final	-	-	-	-	-	-
5004	35%	-	-	-	-	-	-
5005	Final	-	-	-	-	-	-
5007	Final	-	-	-	-	-	-
5009	Final	-	-	-	-	-	-
5013	Final	0.0	-	-	0.0	-	0.0
Grand Total		0.0	-	-	0.0	-	0.0

B8.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	35%	1.6	-	-	0.2	-	0.2
5018	Final	2.0	-	-	0.2	-	0.2
5019	Final	24.3	-	-	1.8	-	1.8
5020	Final	-	-	-	-	-	-
5021	Final	16.9	-	-	1.3	-	1.3
5022	Final	7.7	-	1.4	-	-	1.4
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5073	Final	-	-	-	-	-	-
Grand Total		52.5	-	1.4	3.4	-	4.7

B8.9. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5019	Final	0.0	-	-	-	0.0	0.0
5020	Final	-	-	-	-	-	-
5022	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5061	Final	-	-	-	-	-	-
5062	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5069	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5072	Final	2.6	-	0.3	-	0.1	0.4
5073	Final	-	-	-	-	-	-
5084	Final	1.4	-	0.2	-	-	0.2
5089	Final	-	-	-	-	-	-
5092	Final	1.1	-	0.1	-	0.2	0.2
5093	Final	-	-	-	-	-	-
5094	Final	7.4	-	0.4	-	0.9	1.2
5095	35%	-	-	-	-	-	-
Grand Total		12.6	-	1.0	-	1.1	2.1

B8.10. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5045	Final	0.0	-	-	-	0.0	0.0
5064	Final	-	-	-	-	-	-
5065	Final	3.7	-	0.8	-	-	0.8
5070	Final	0.0	-	-	-	0.0	0.0
5079	Final	11.7	-	2.5	-	-	2.5
5080	Final	26.0	-	5.5	-	-	5.5
5081	35%	-	-	-	-	-	-
5082	Final	0.2	-	0.0	-	-	0.0
5083	Final	-	-	-	-	-	-
5086	Final	-	-	-	-	-	-
5087	Final	20.8	-	4.1	-	-	4.1
5088	Final	24.7	-	5.4	-	-	5.4
5089	Final	0.5	-	0.1	-	-	0.1
5090	Final	0.8	-	0.2	-	-	0.2
5091	Final	5.7	-	1.1	-	-	1.1
5092	Final	8.9	-	1.7	-	-	1.7
5093	Final	0.0	-	-	-	0.0	0.0
5094	Final	0.6	-	0.1	-	0.0	0.1
5095	Final	21.1	-	3.9	-	-	3.9
5096	Final	3.8	-	0.7	-	-	0.7
5097	Final	5.2	-	1.0	-	-	1.0
5098	Final	47.9	-	8.7	-	-	8.7
5099	Final	10.6	-	1.9	-	-	1.9
5100	Final	7.3	-	1.4	-	-	1.4
5101	Final	0.6	-	0.1	-	-	0.1
Grand Total		200.1	-	39.0	-	0.0	39.1

Attachment C: Supporting Figures for Watershed Control Measures

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

June 6, 2014

Figure 1. LLAR Downey Subwatershed IDs

Figure 2. LLAR Lakewood Subwatershed IDs

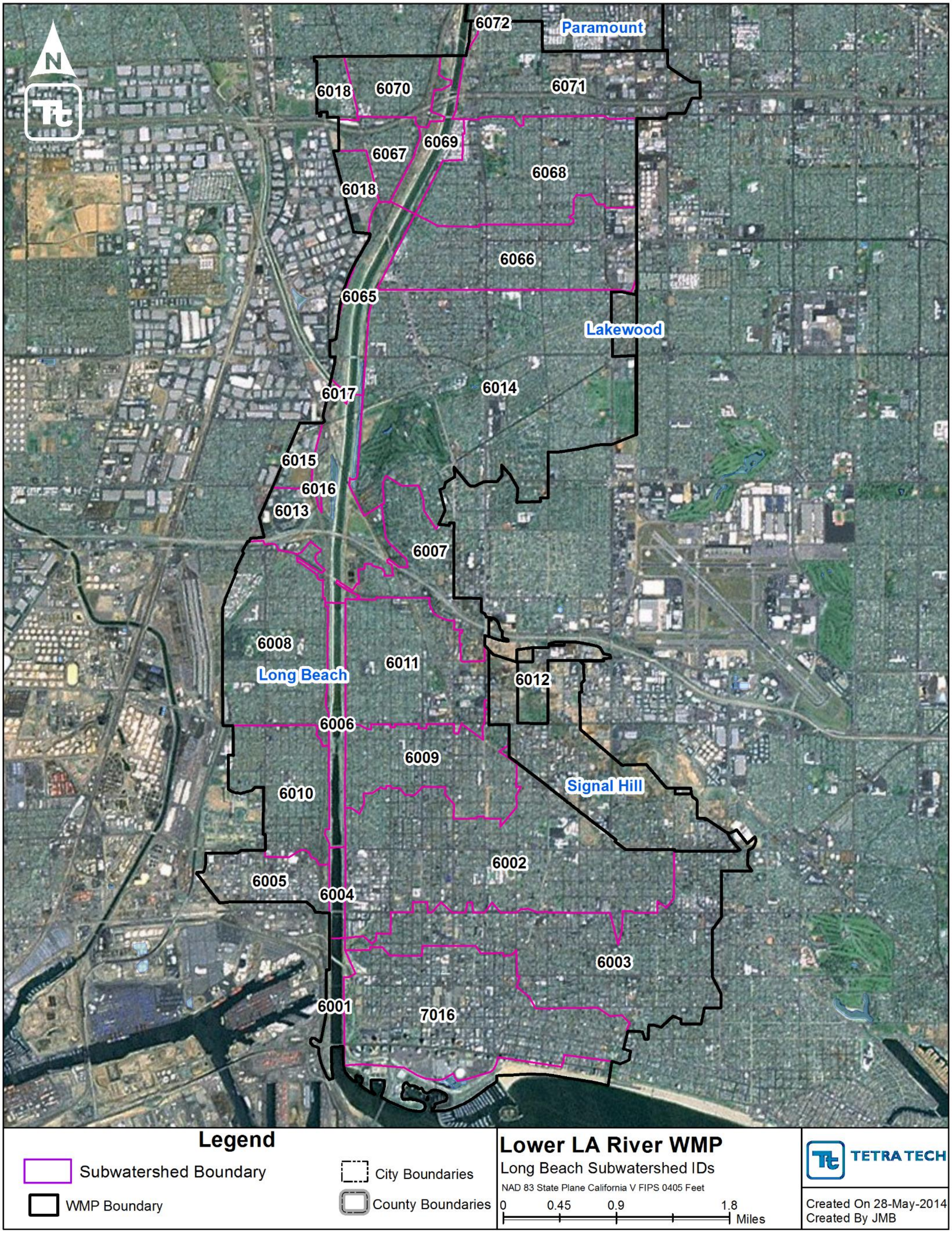

Figure 3. LLAR Long Beach Subwatershed IDs

Figure 4. LLAR Lynwood Subwatershed IDs

Figure 5. LLAR Paramount Subwatershed IDs

Figure 6. LLAR Pico Rivera Subwatershed IDs

Figure 7. LLAR Signal Hill Subwatershed IDs

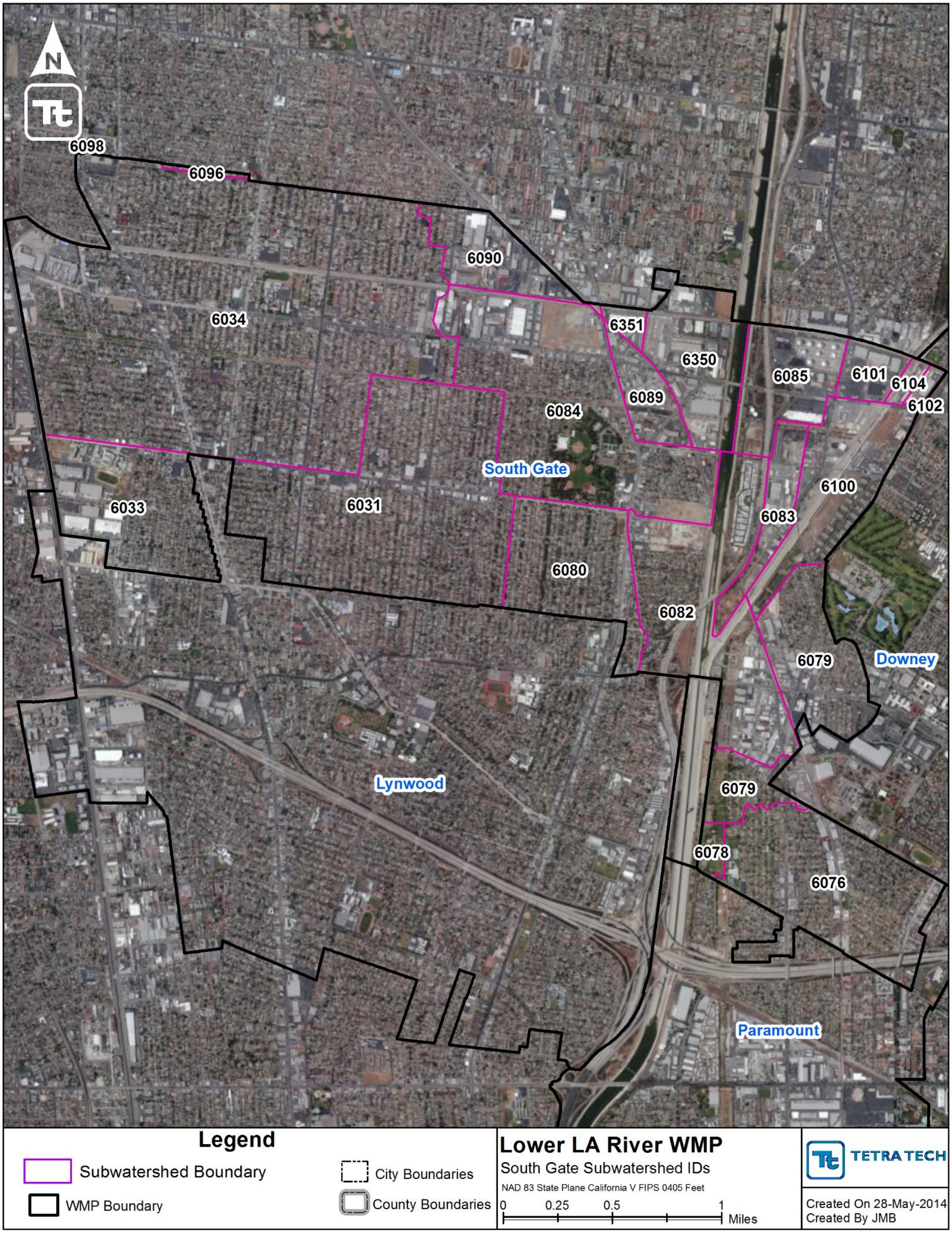

Figure 8. LLAR South Gate Subwatershed IDs

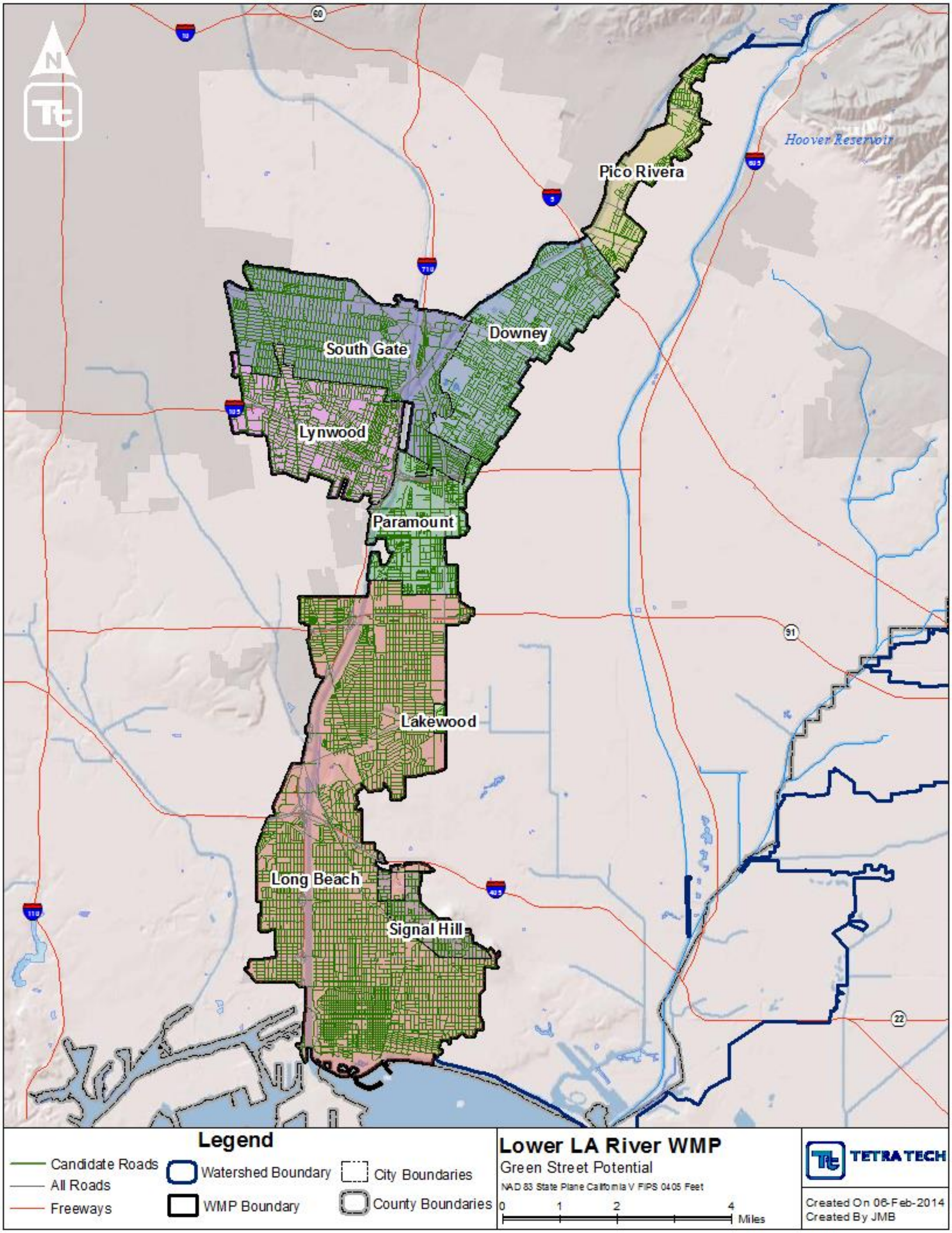

Figure 9. LLAR ROW BMP Potential Opportunities

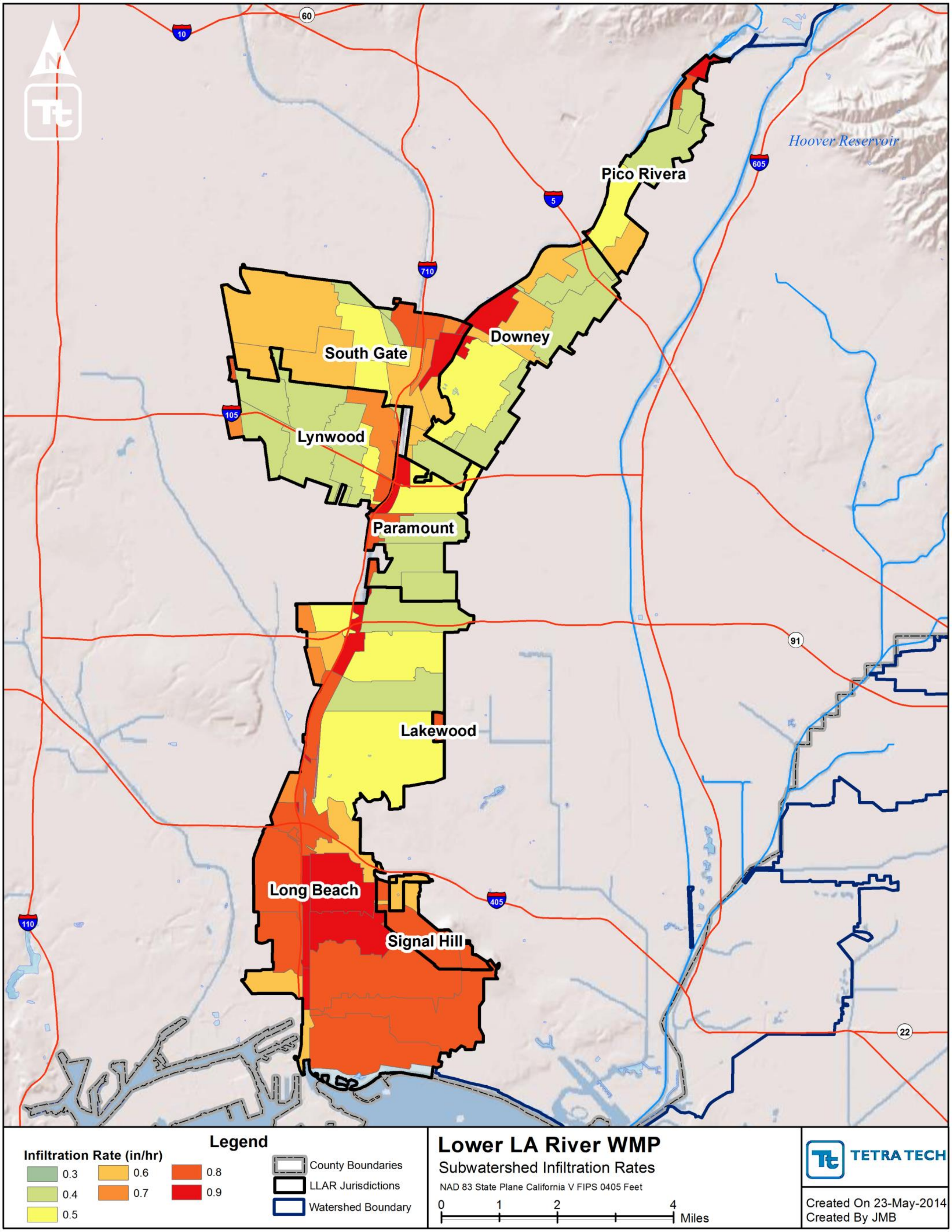

Figure 10. LLAR Subwatershed Infiltration Rates

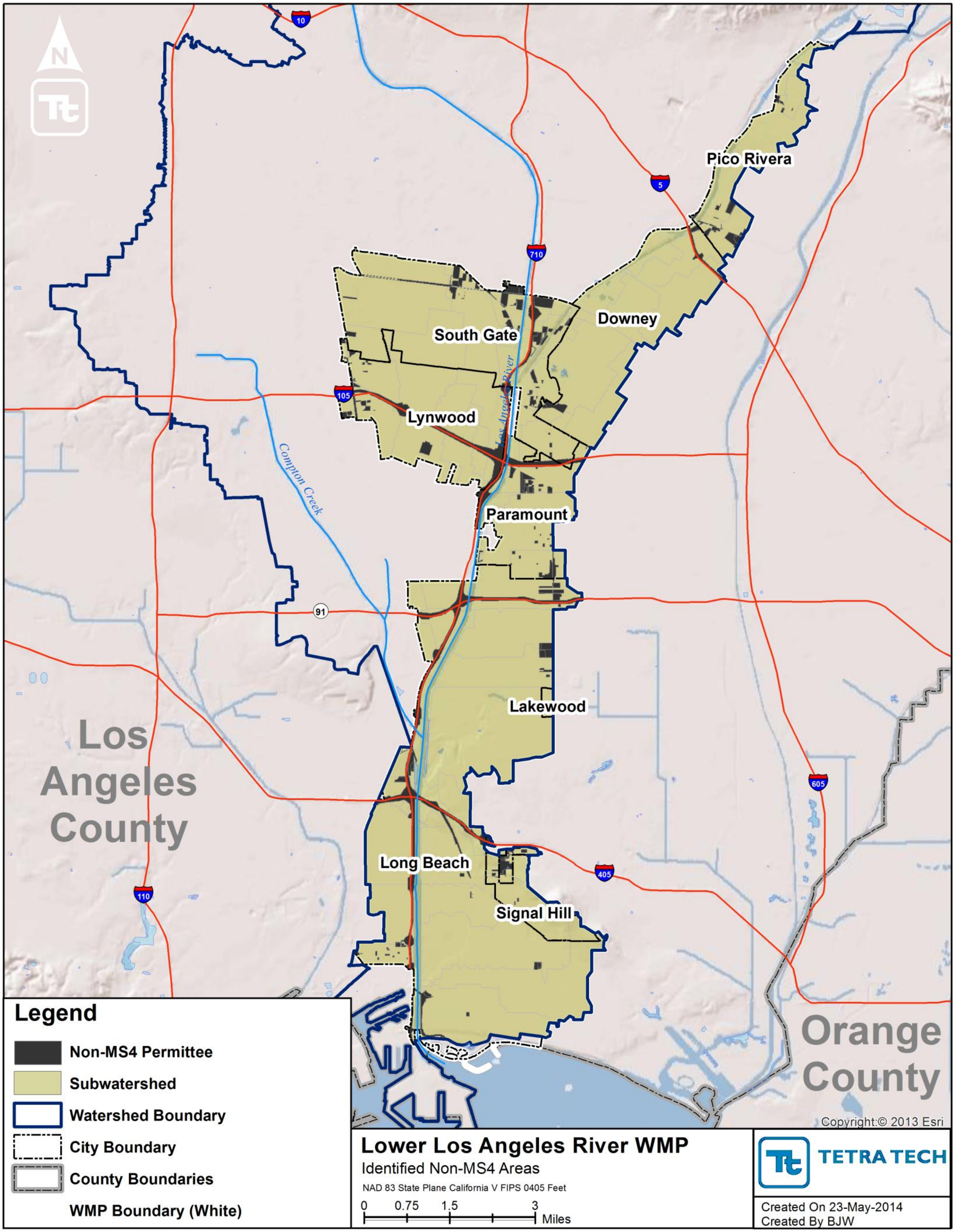

Figure 11. LLAR Non-MS4 Permittees

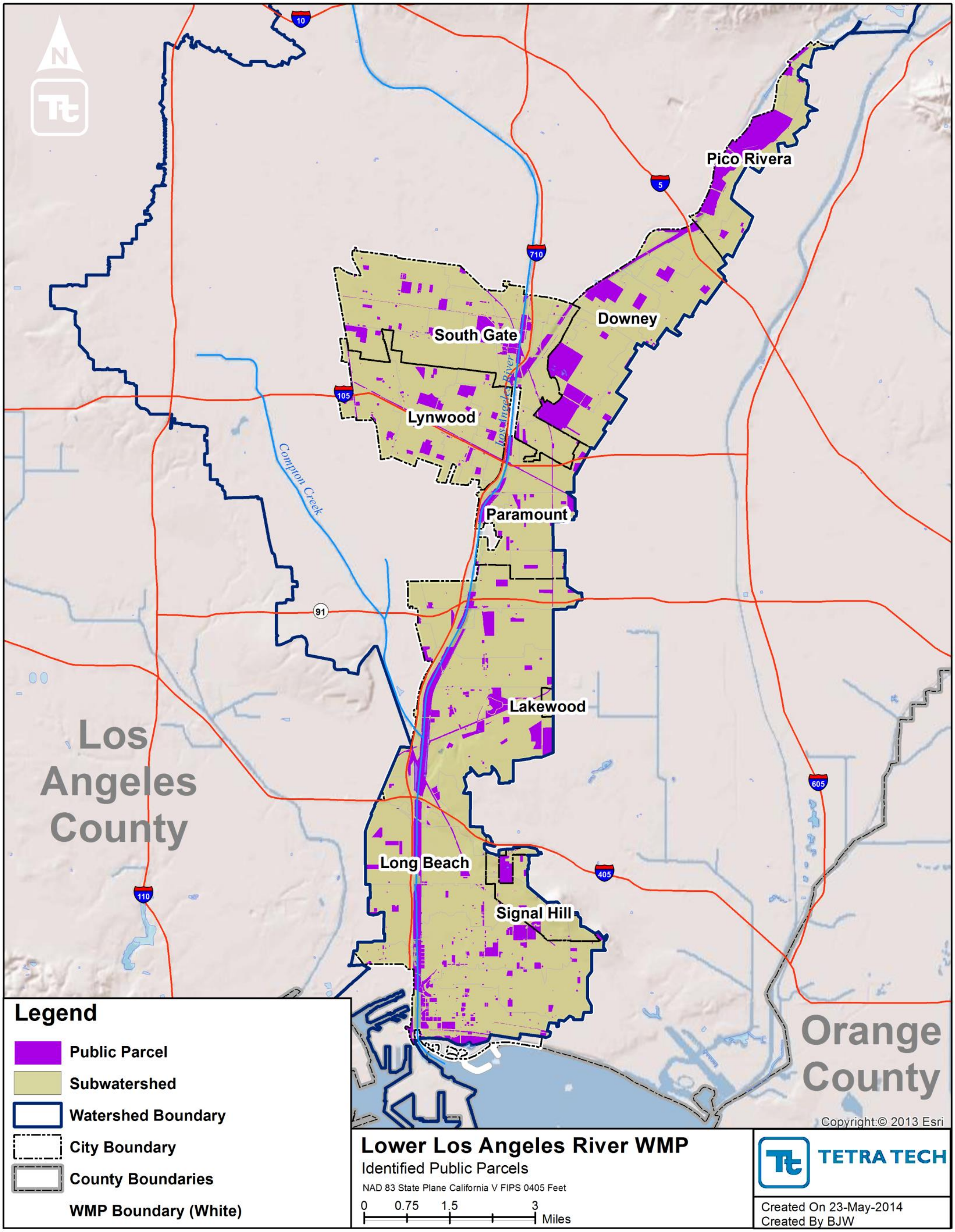

Figure 12. LLAR identified public parcels

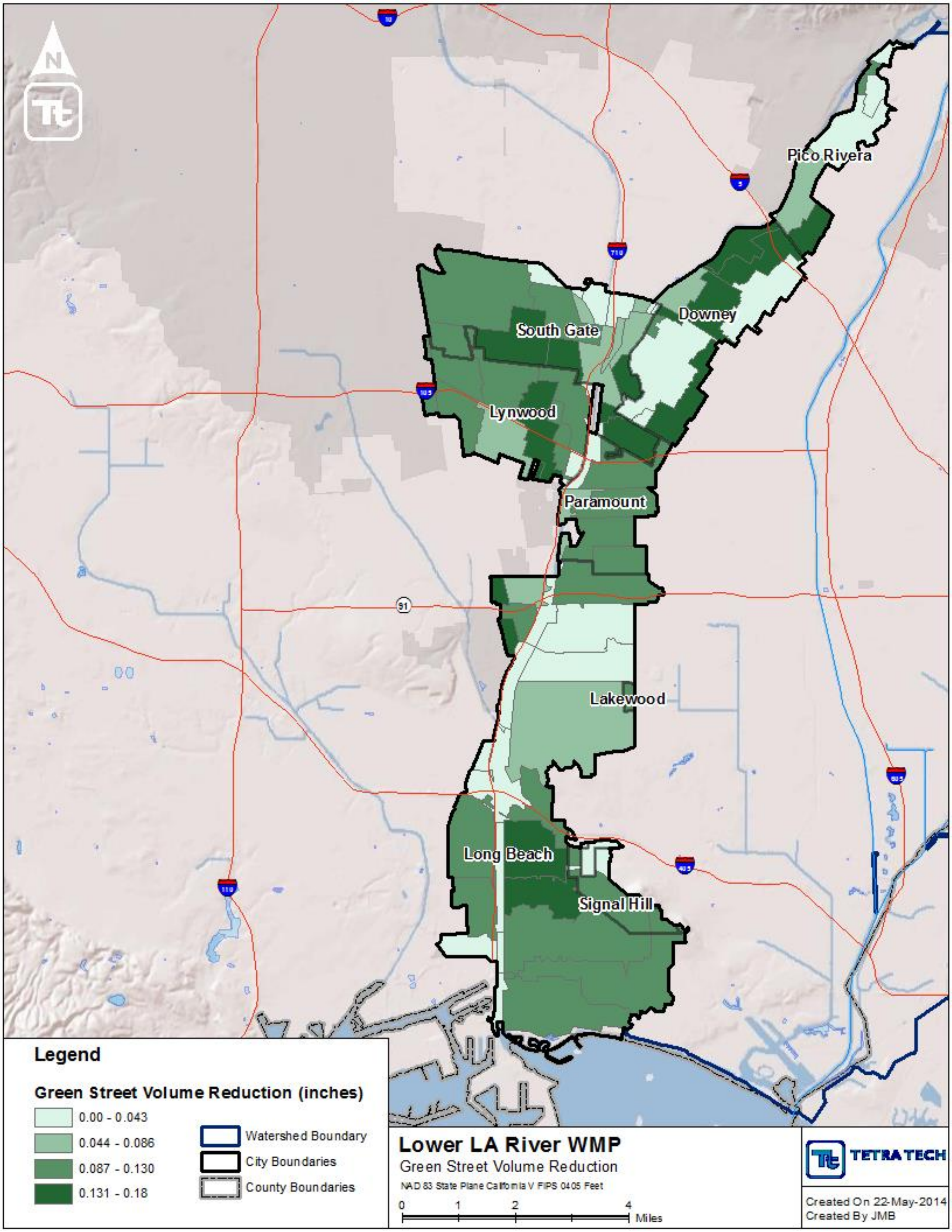

Figure 13. LLAR ROW BMP Volume Reduction

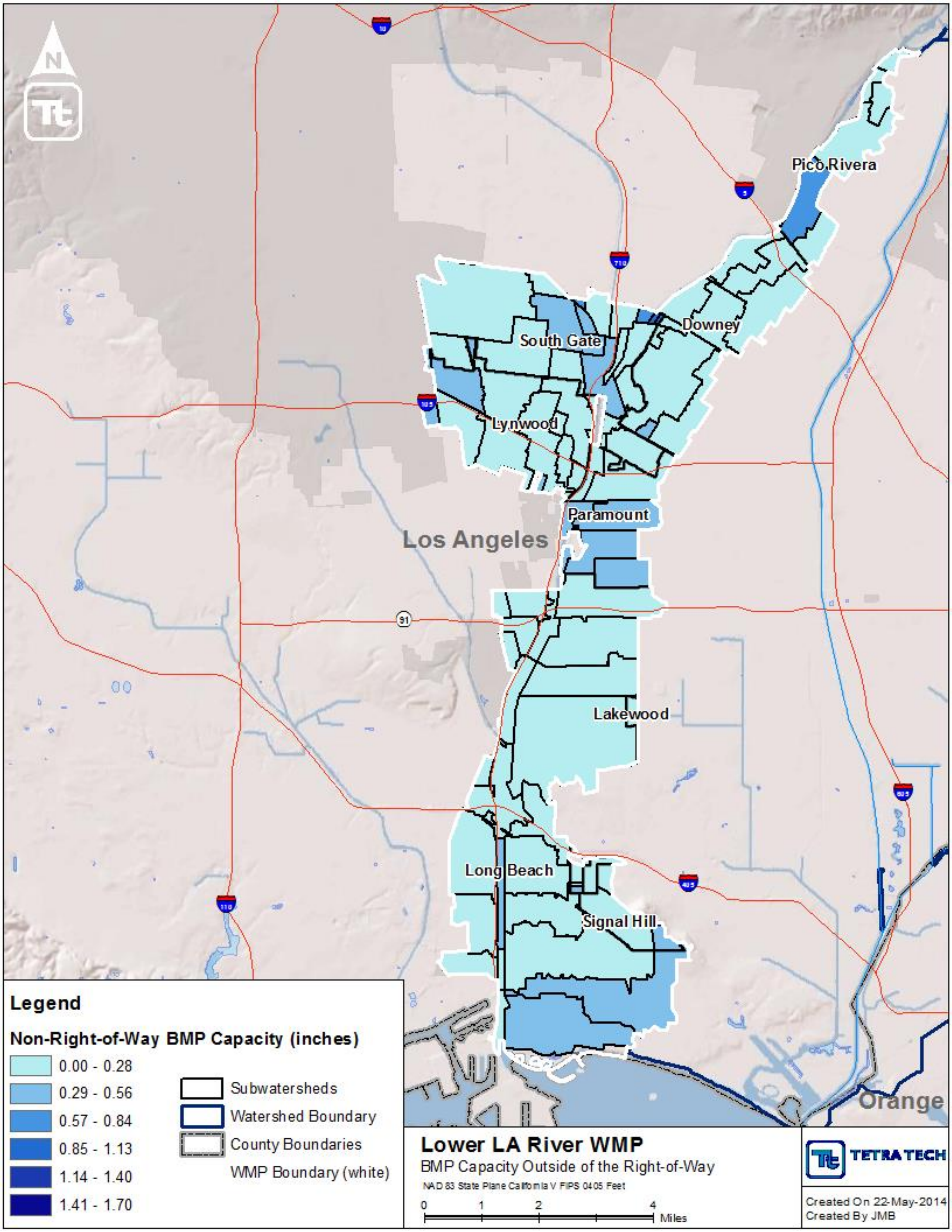

Figure 14. LLAR BMP capacity outside of the right-of-way

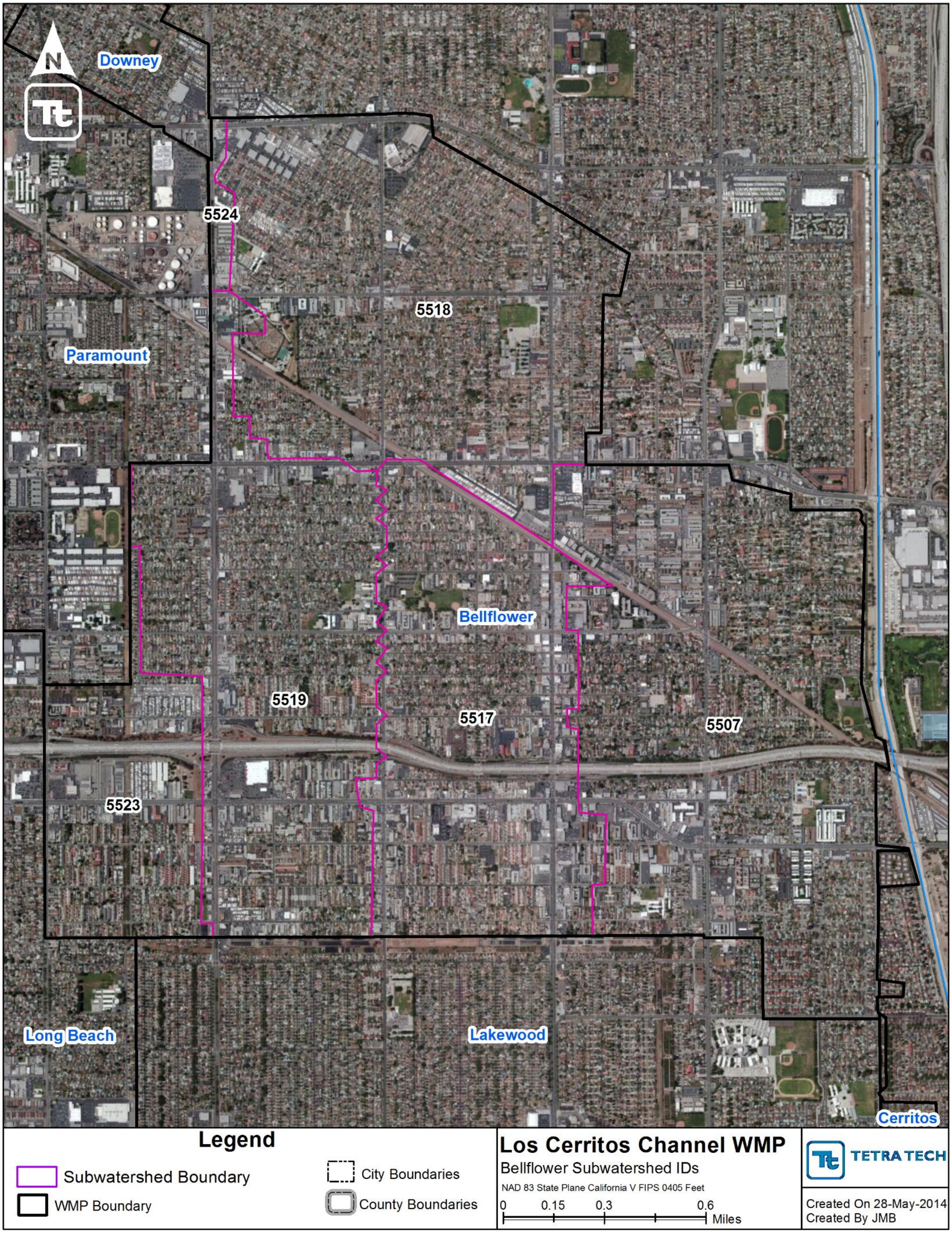

Figure 15. LCC Bellflower Subwatershed IDs

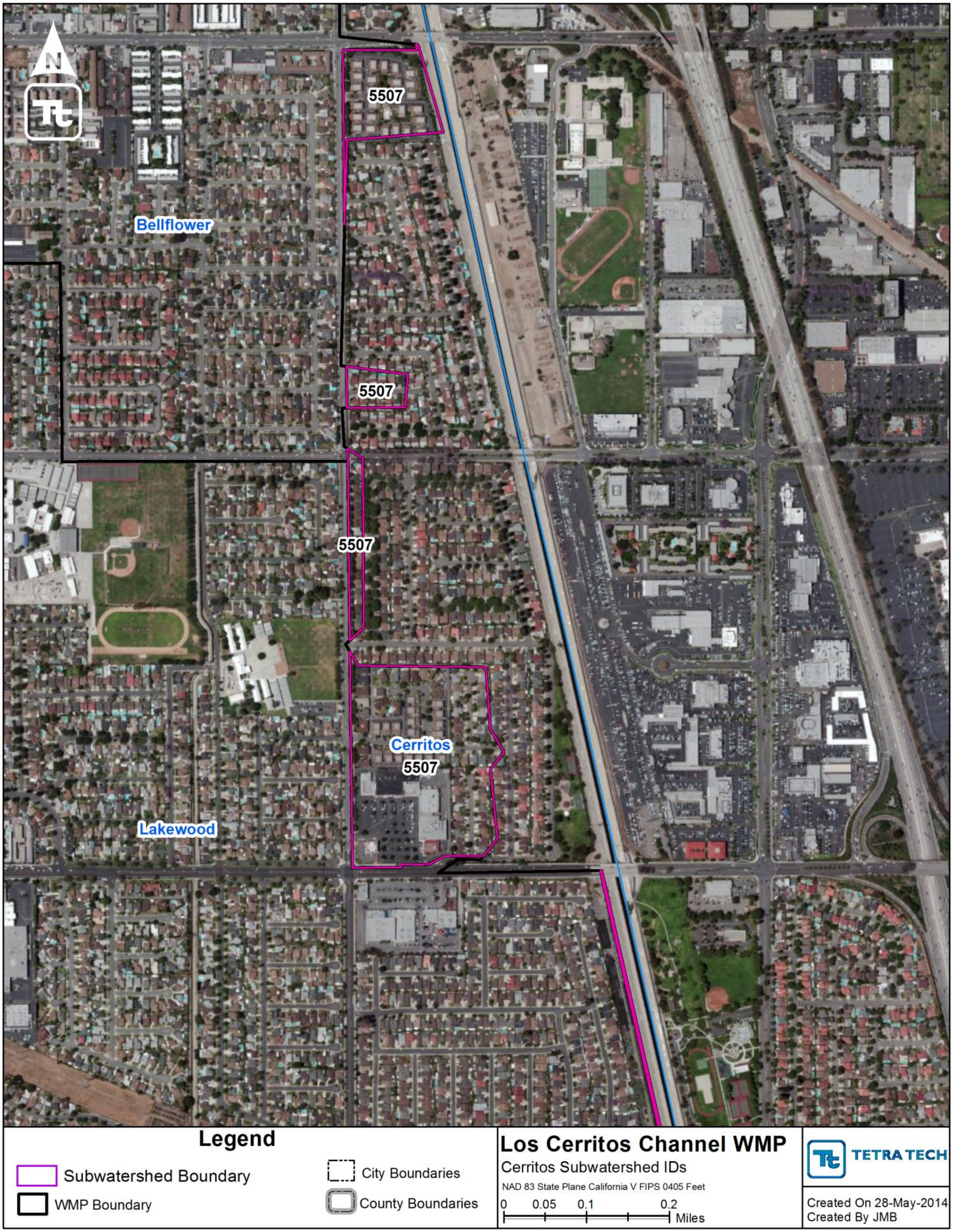

Figure 16. LCC Cerritos Subwatershed IDs

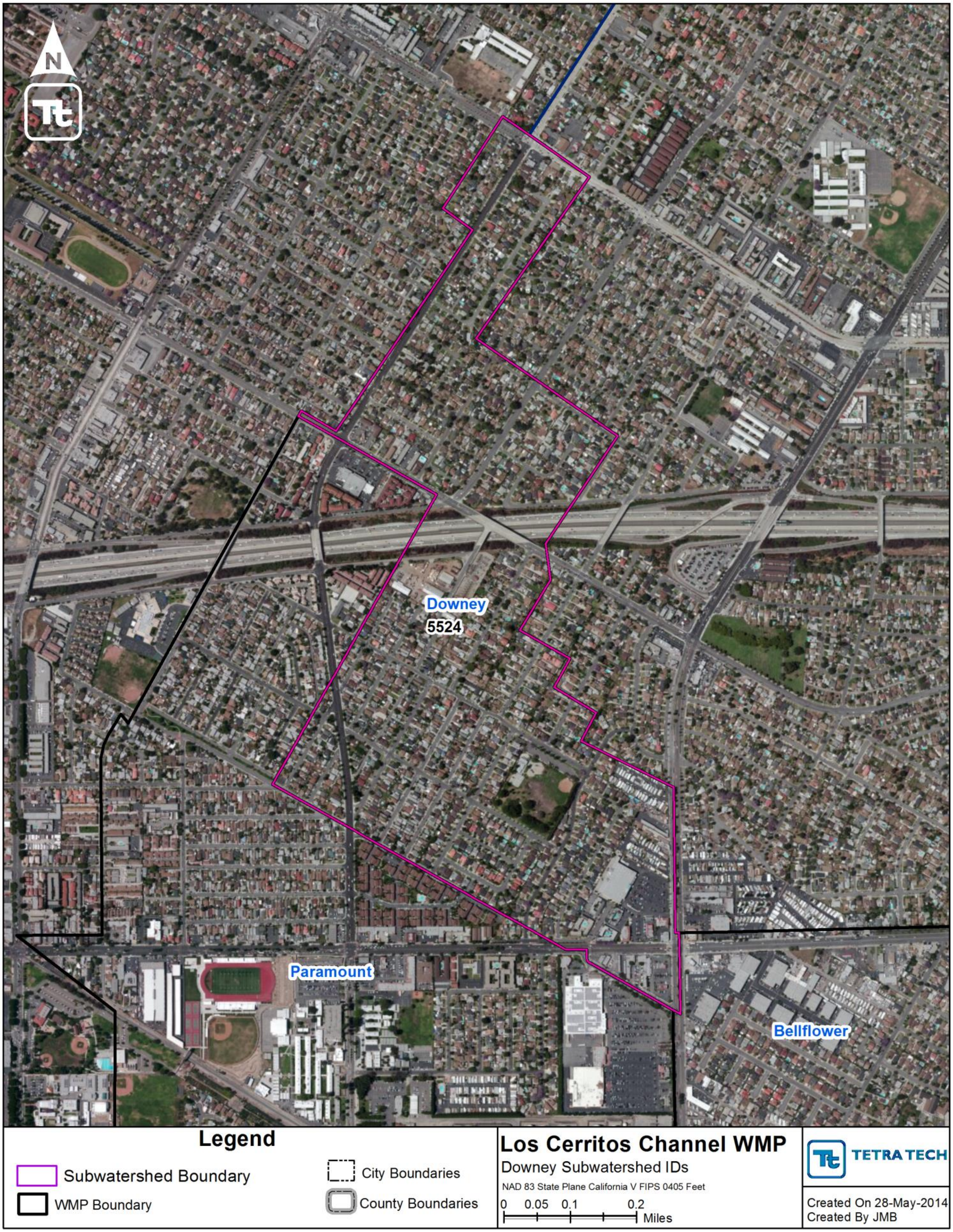

Figure 17. LCC Downey Subwatershed IDs

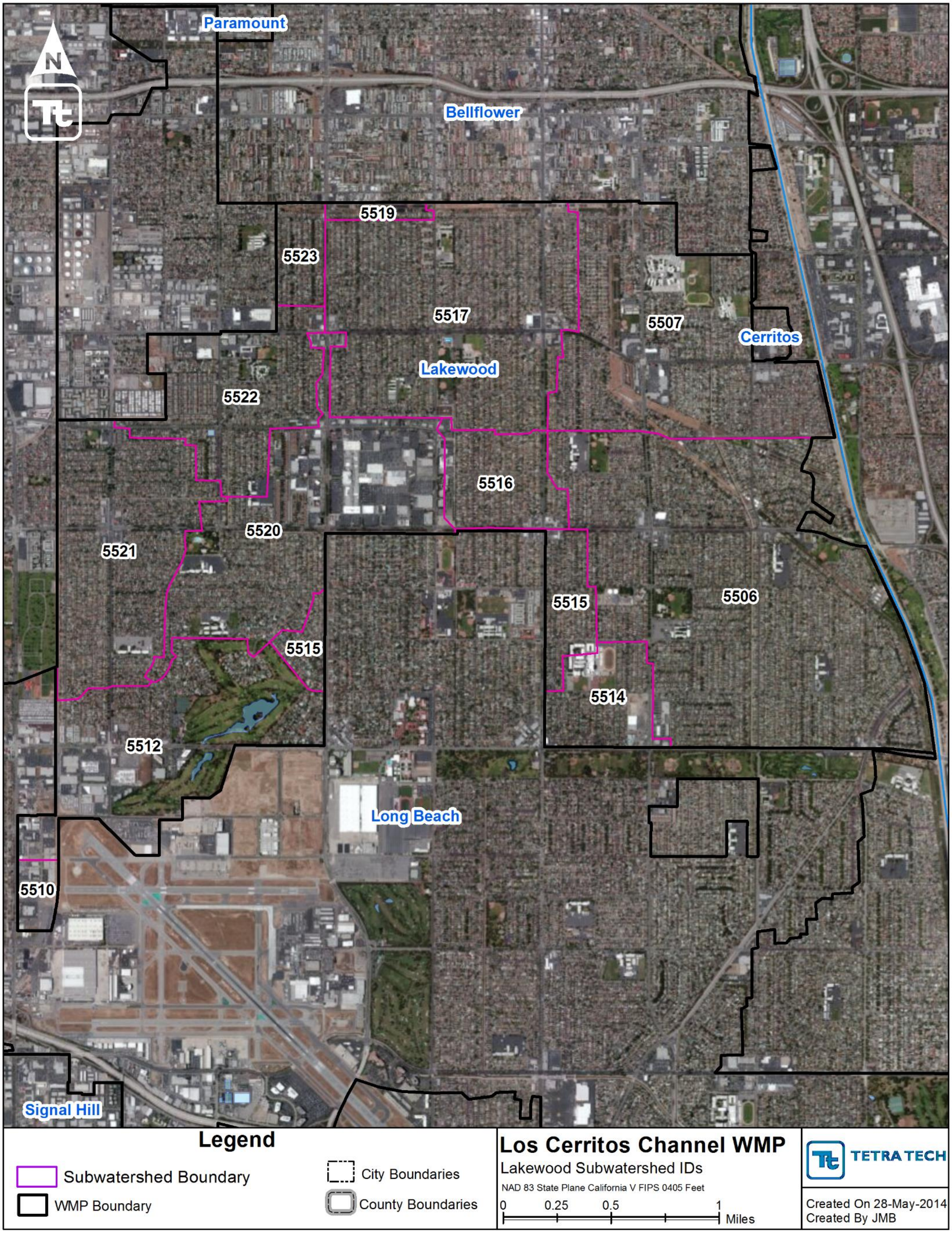

Figure 18. LCC Lakewood Subwatershed IDs

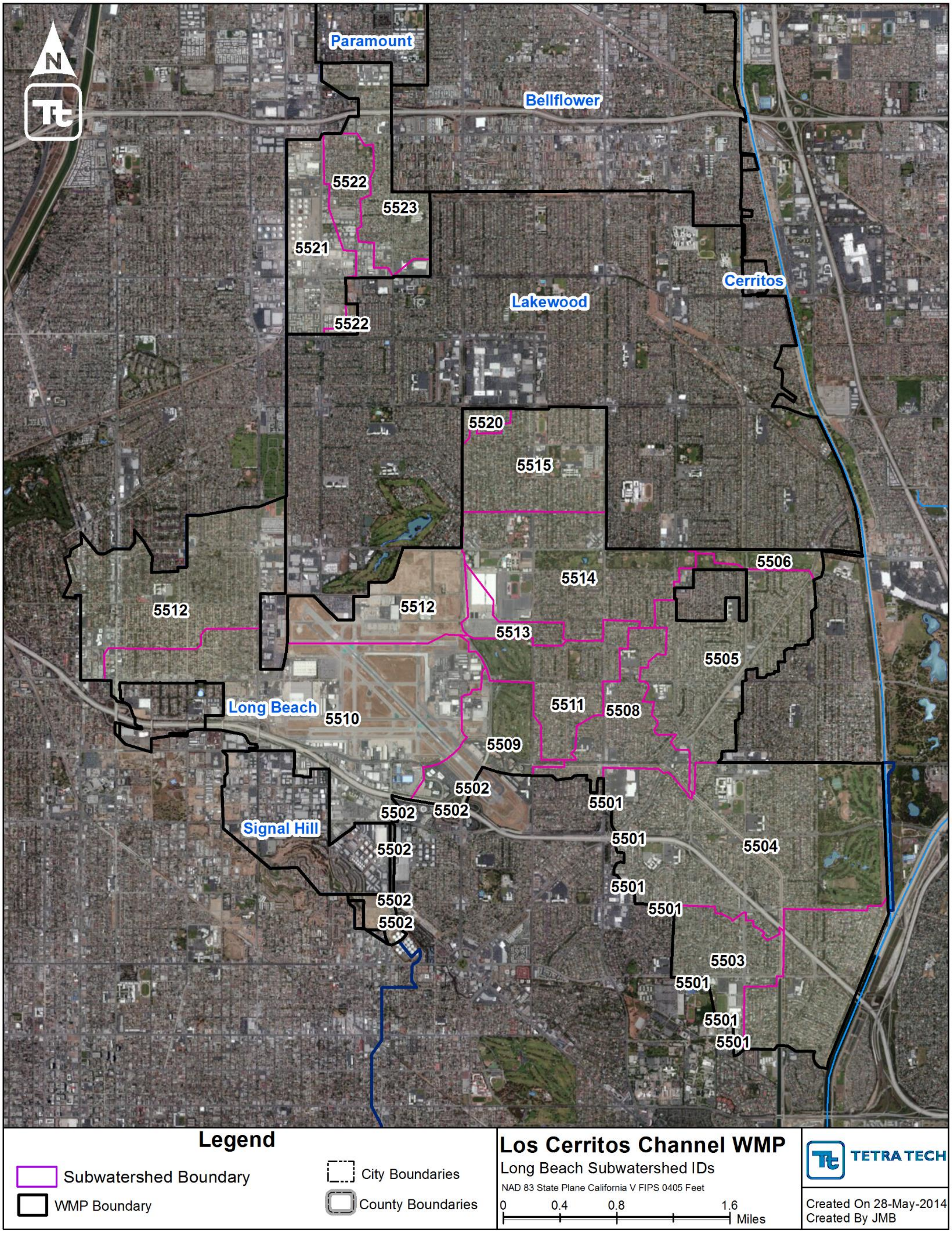

Figure 19. LCC Long Beach Subwatershed IDs

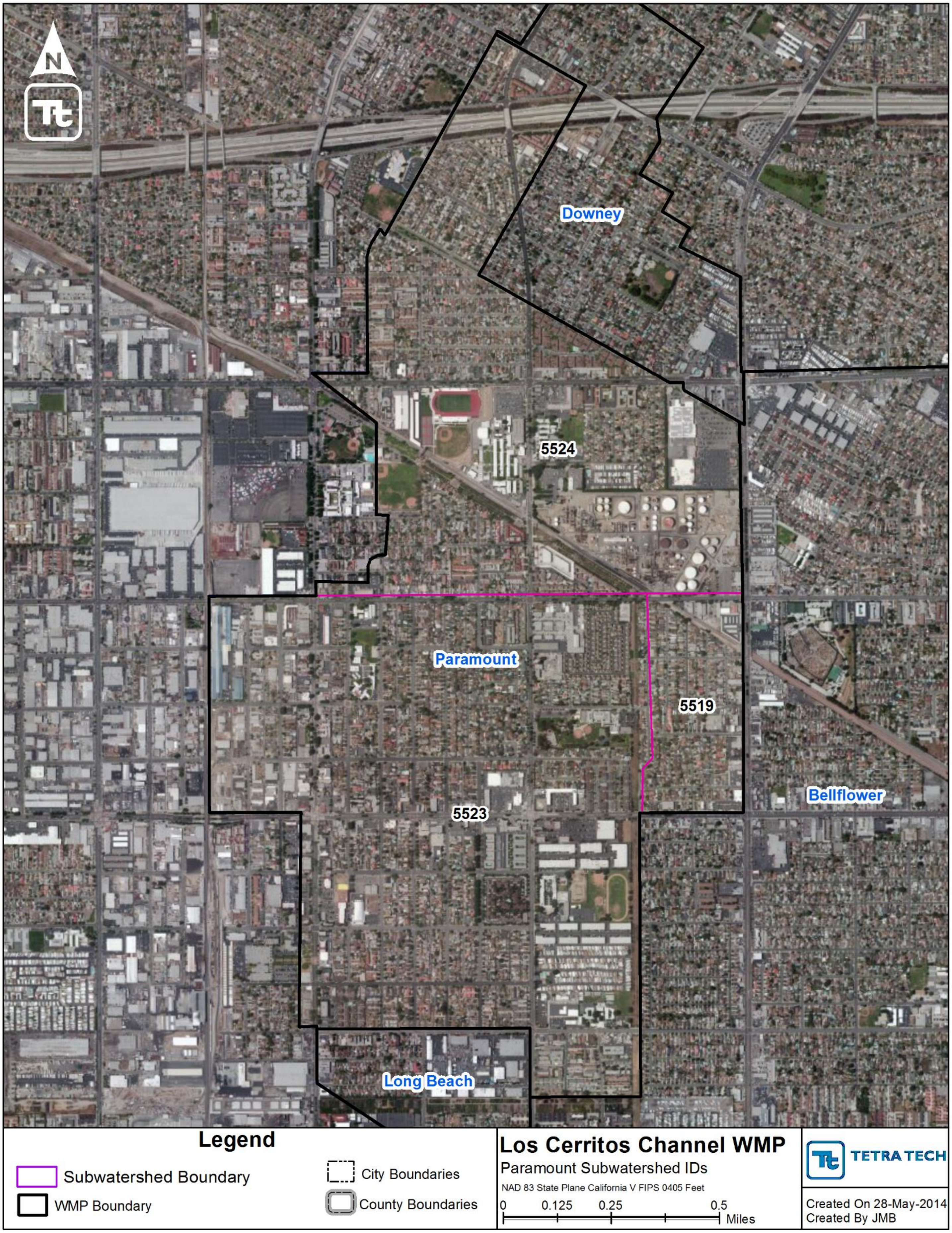

Figure 20. LCC Paramount Subwatershed IDs

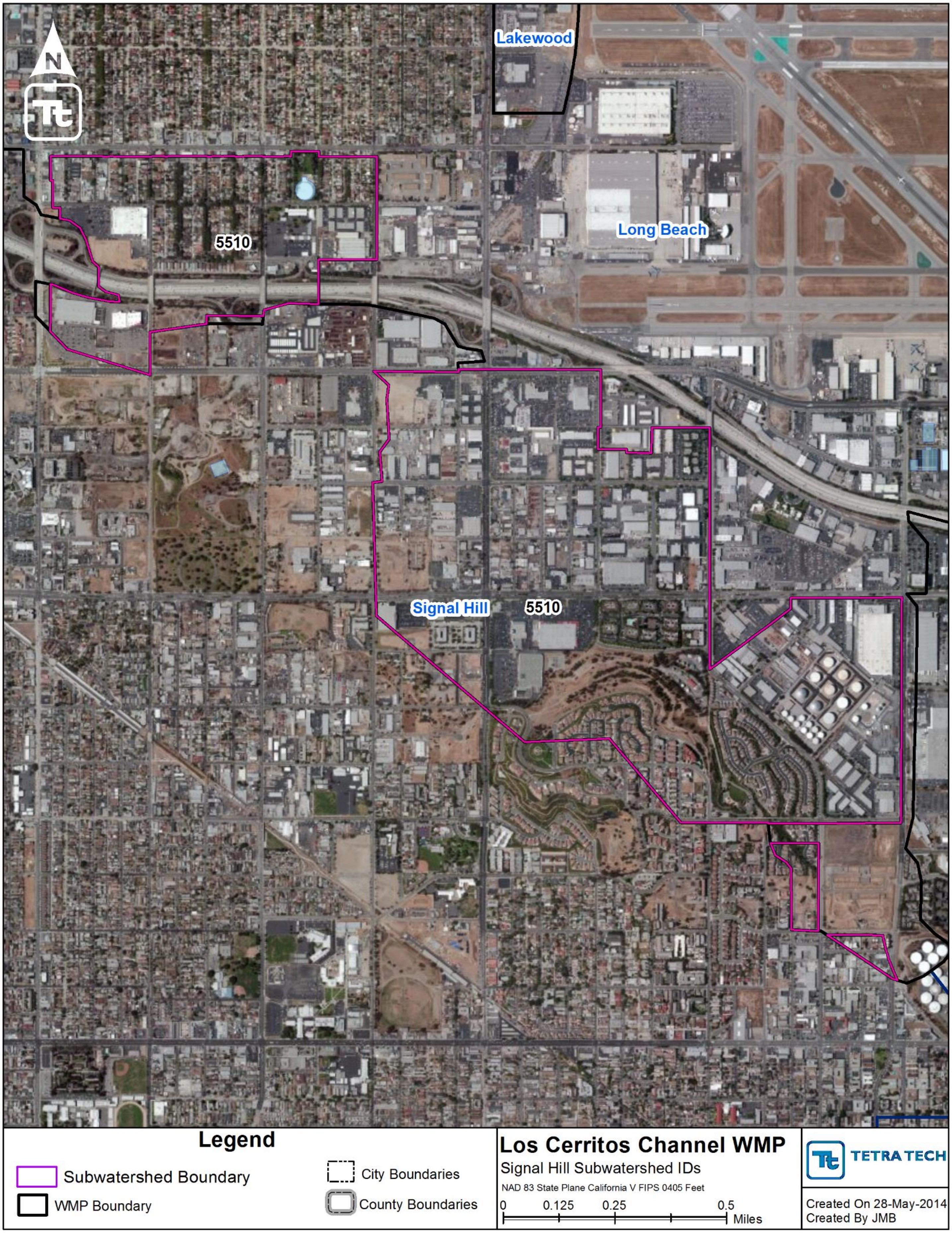

Figure 21. LCC Signal Hill Subwatershed IDs

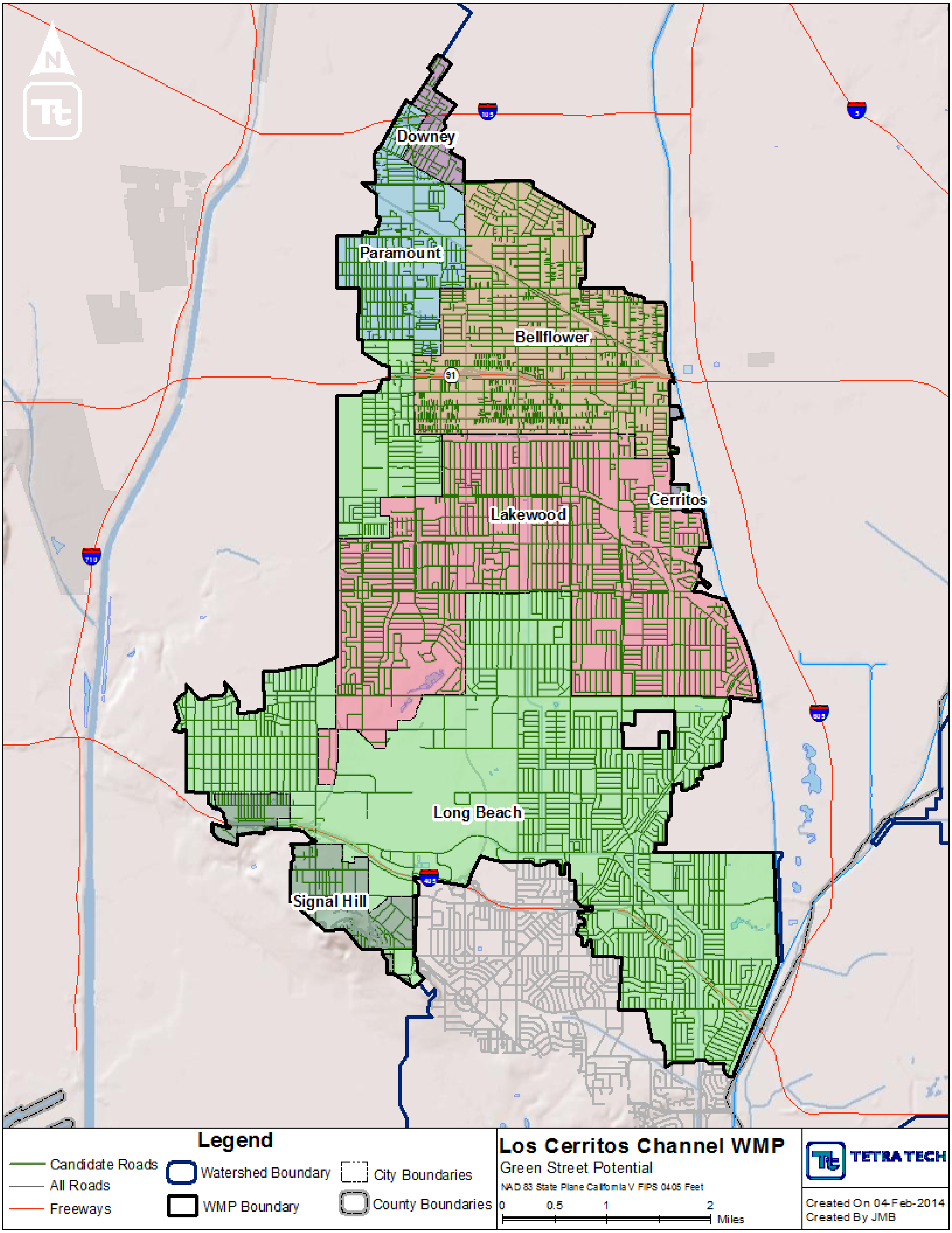

Figure 22. LCC ROW BMP Potential Opportunities

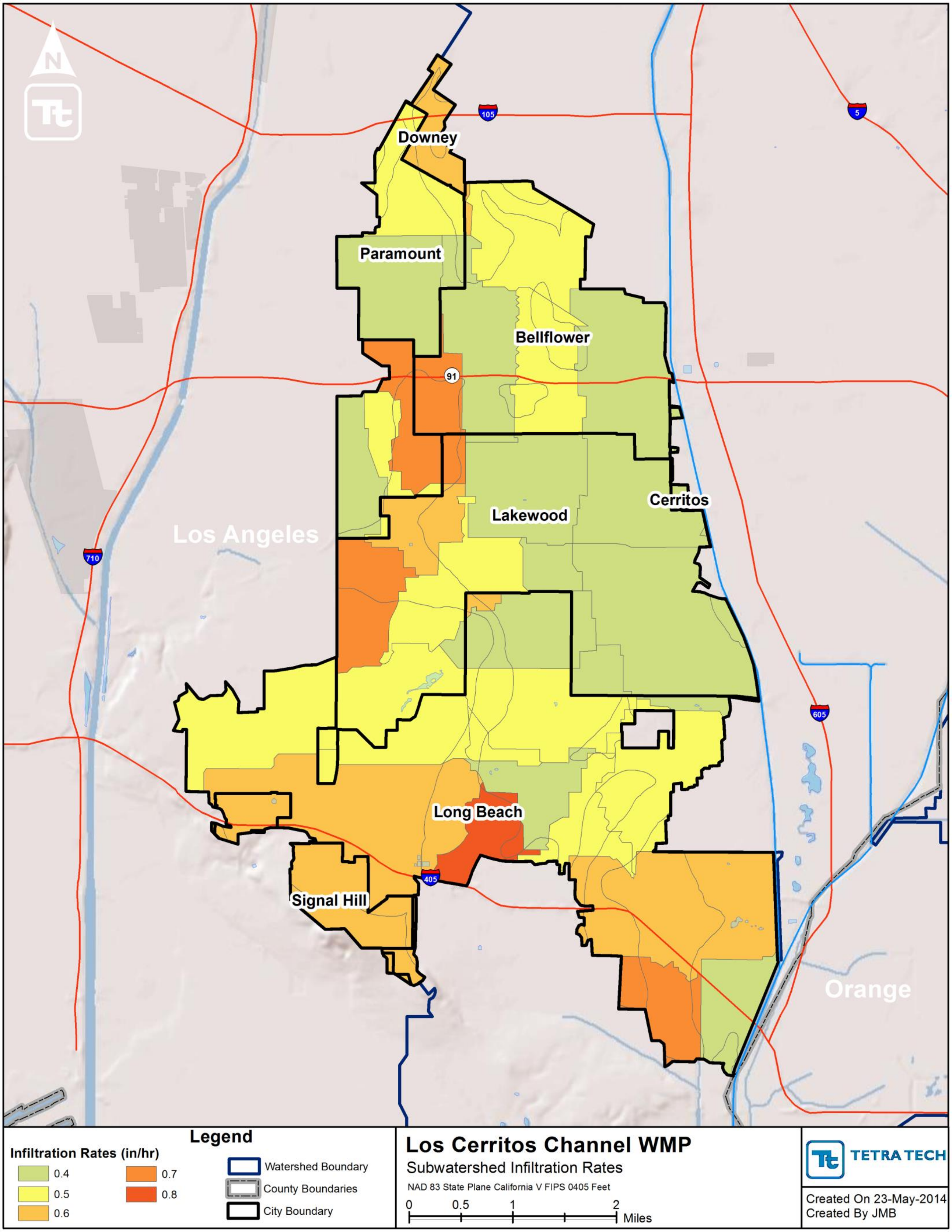

Figure 23. LCC Subwatershed Infiltration Rates

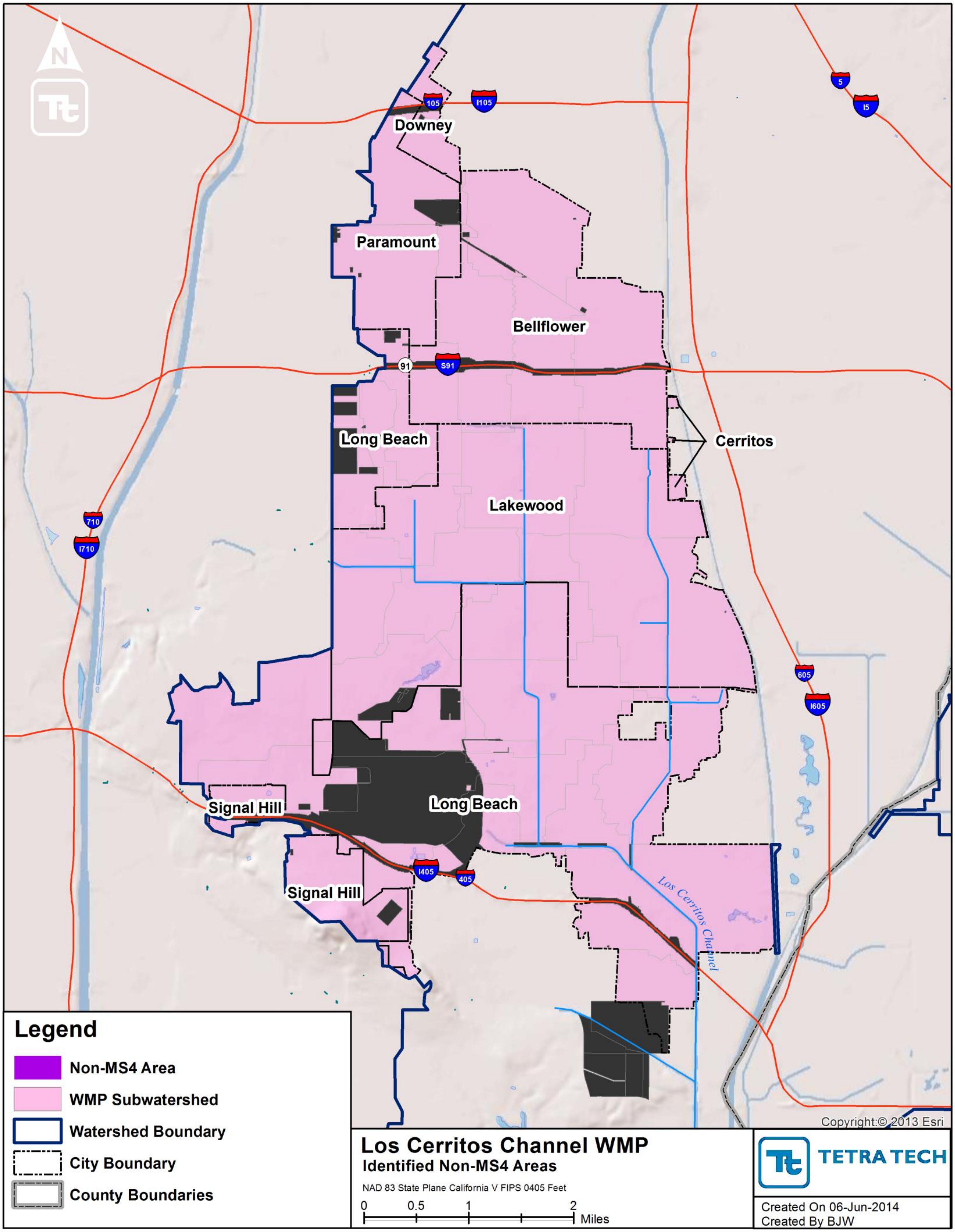

Figure 24. LCC Non-MS4 Permittees

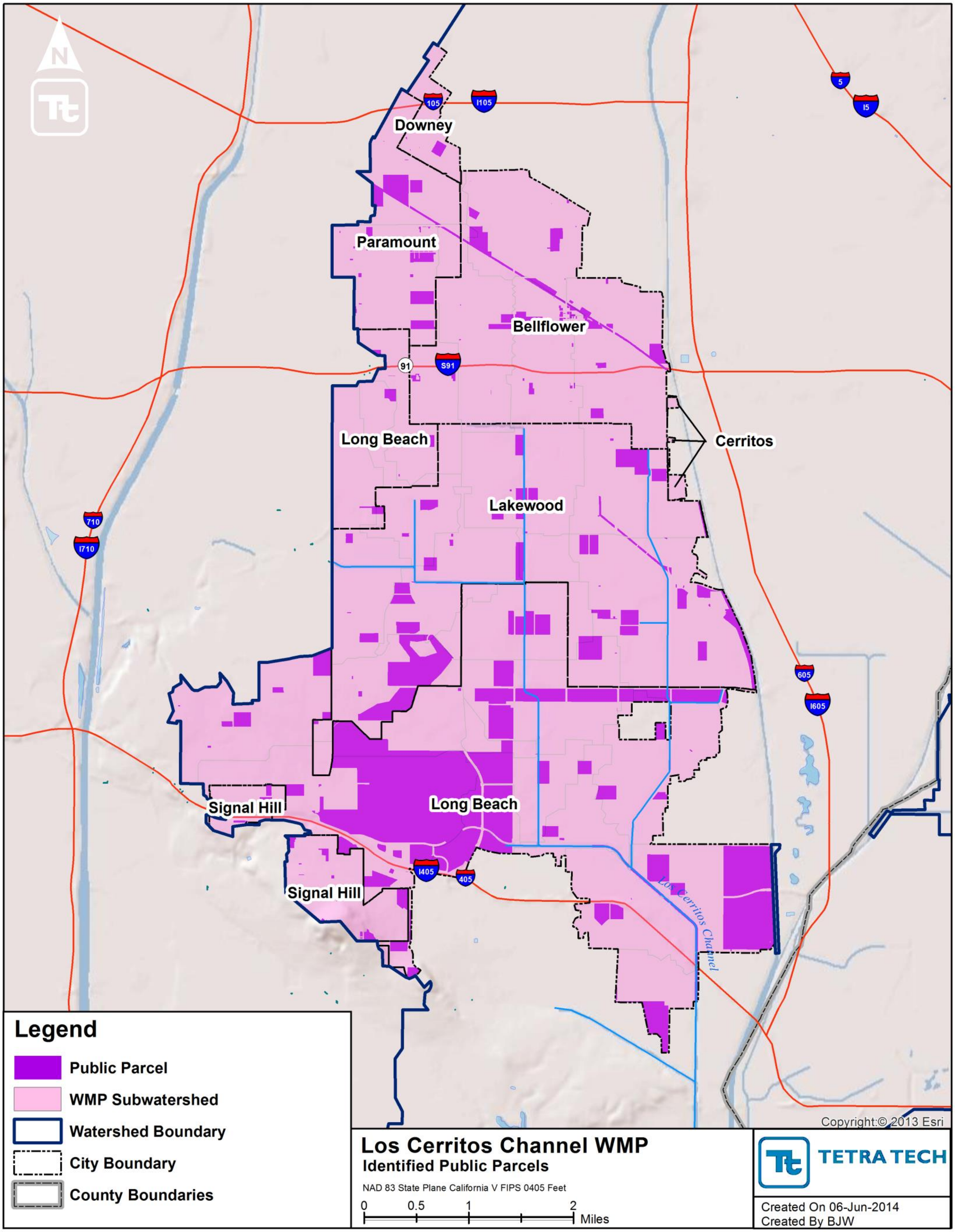

Figure 25. LCC identified public parcels

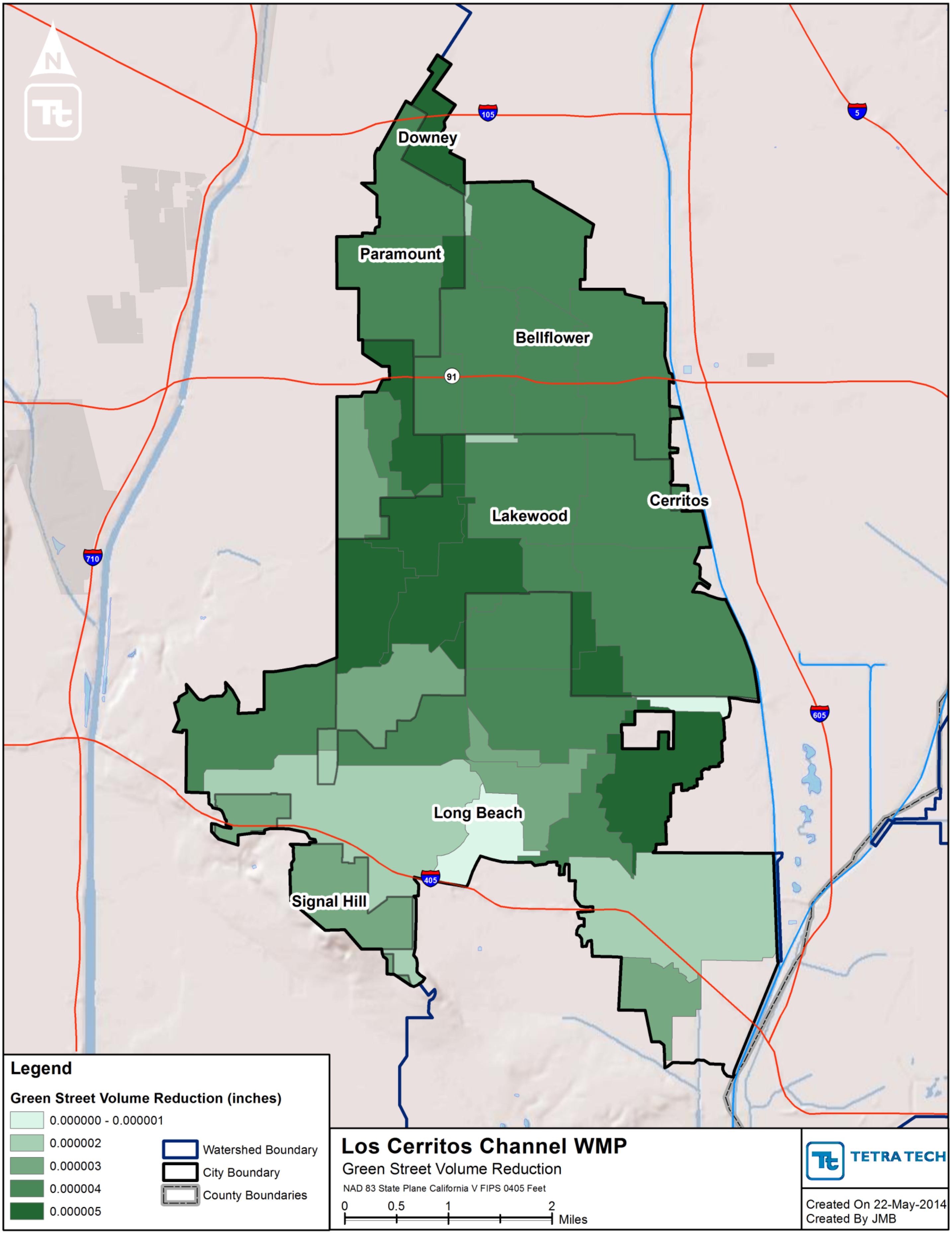

Figure 26. LCC ROW BMP Volume Reduction

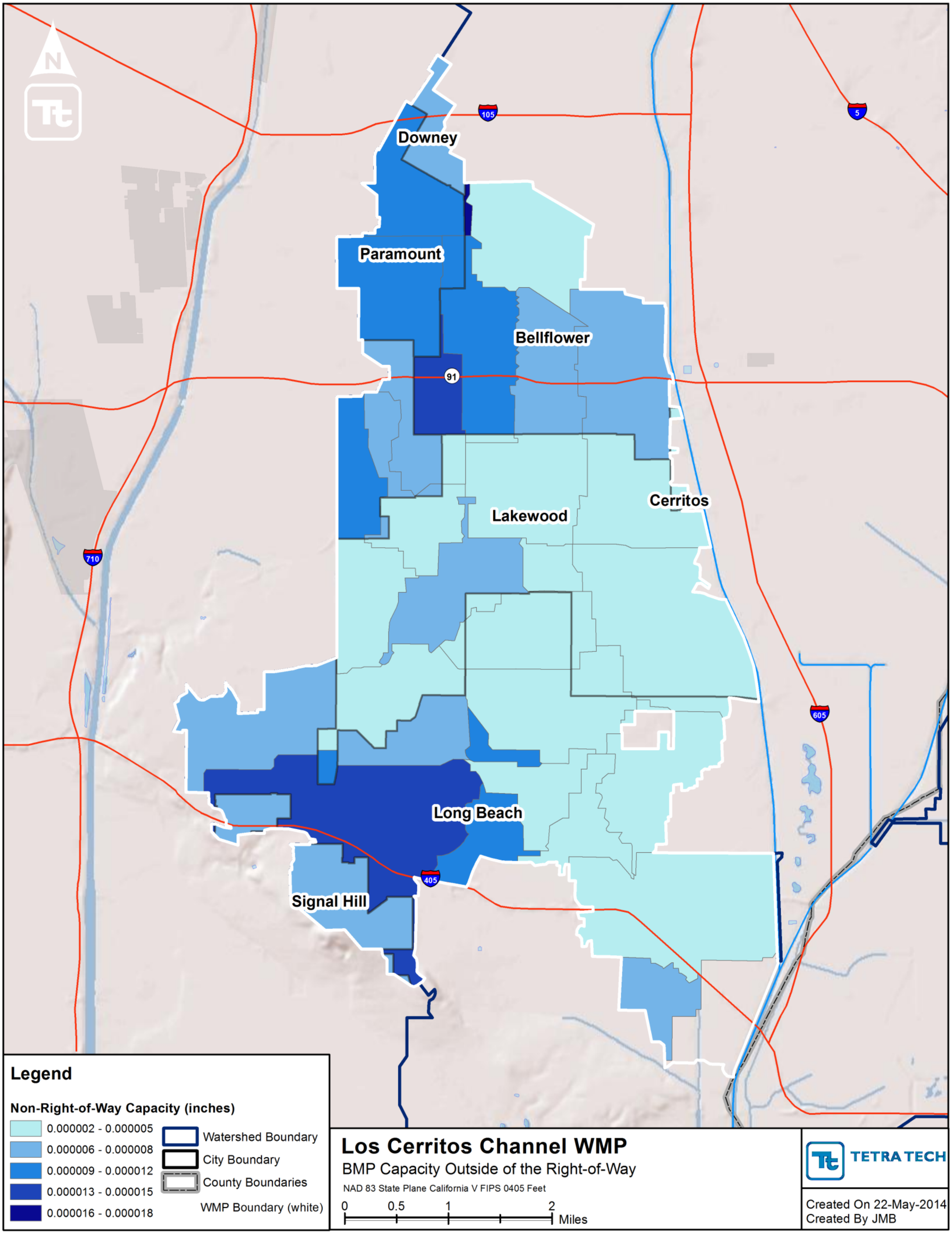

Figure 27. LCC BMP capacity outside of the right-of-way

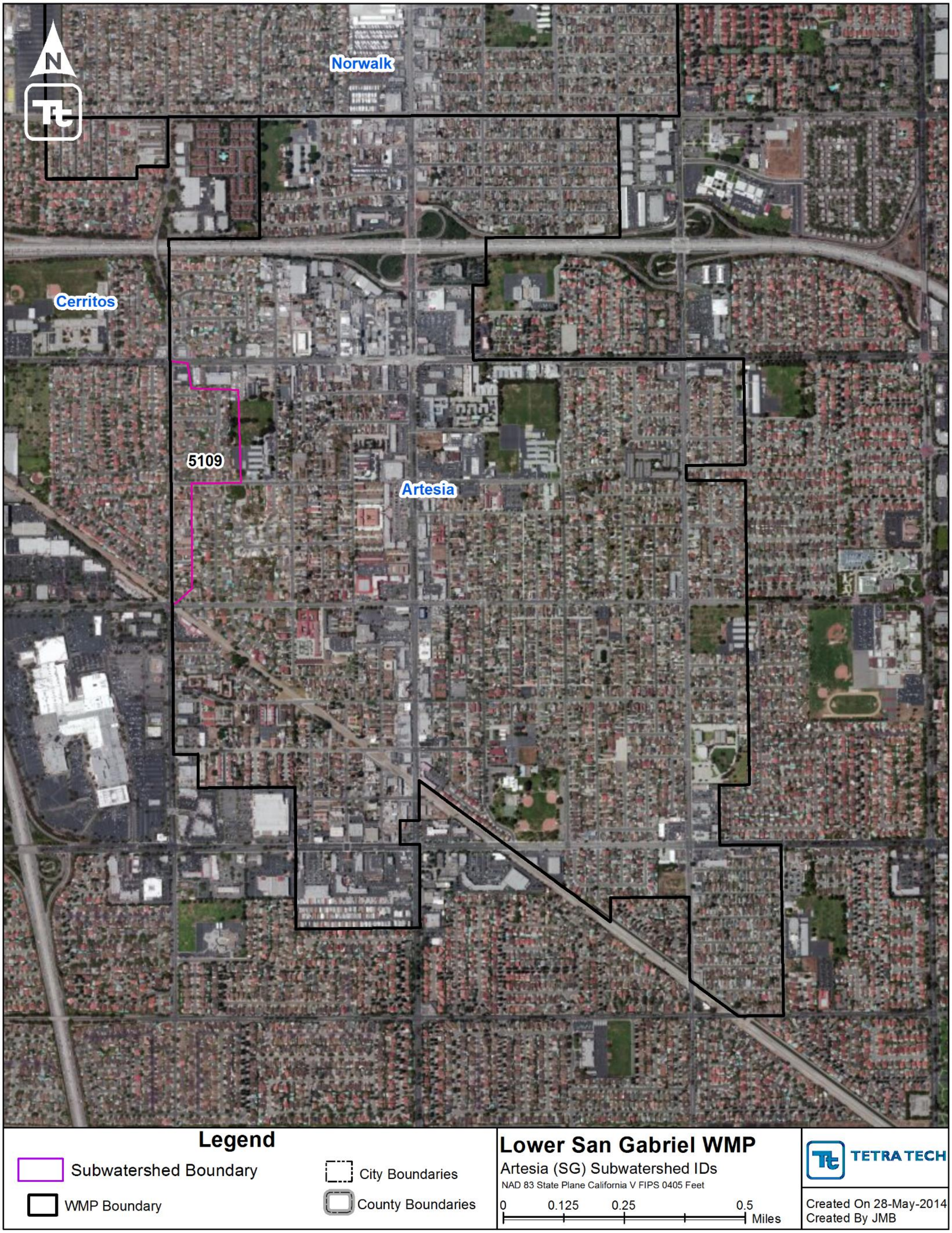

Figure 28. LSGR (SGR) Artesia Subwatershed IDs

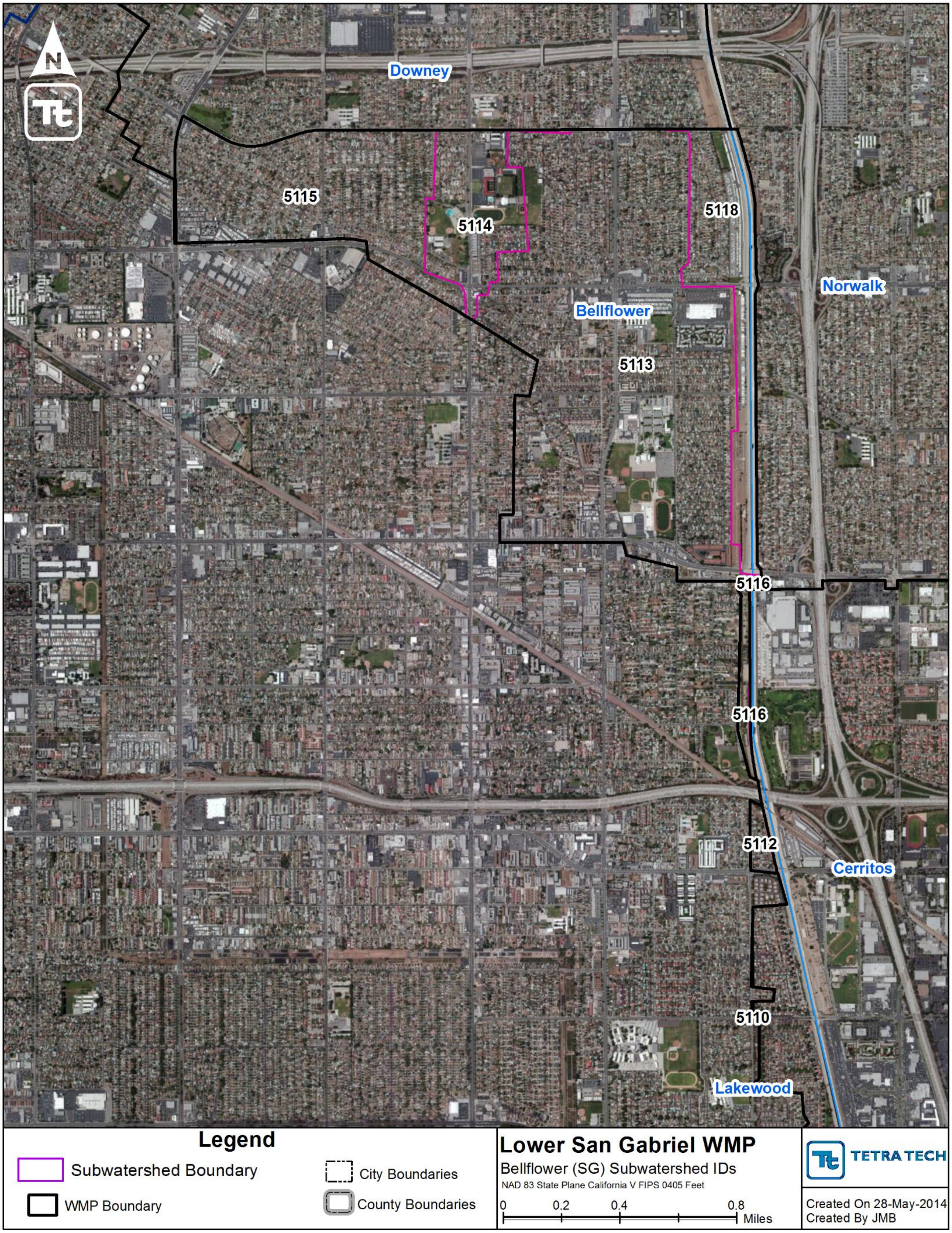

Figure 29. LSGR (SGR) Bellflower Subwatershed IDs

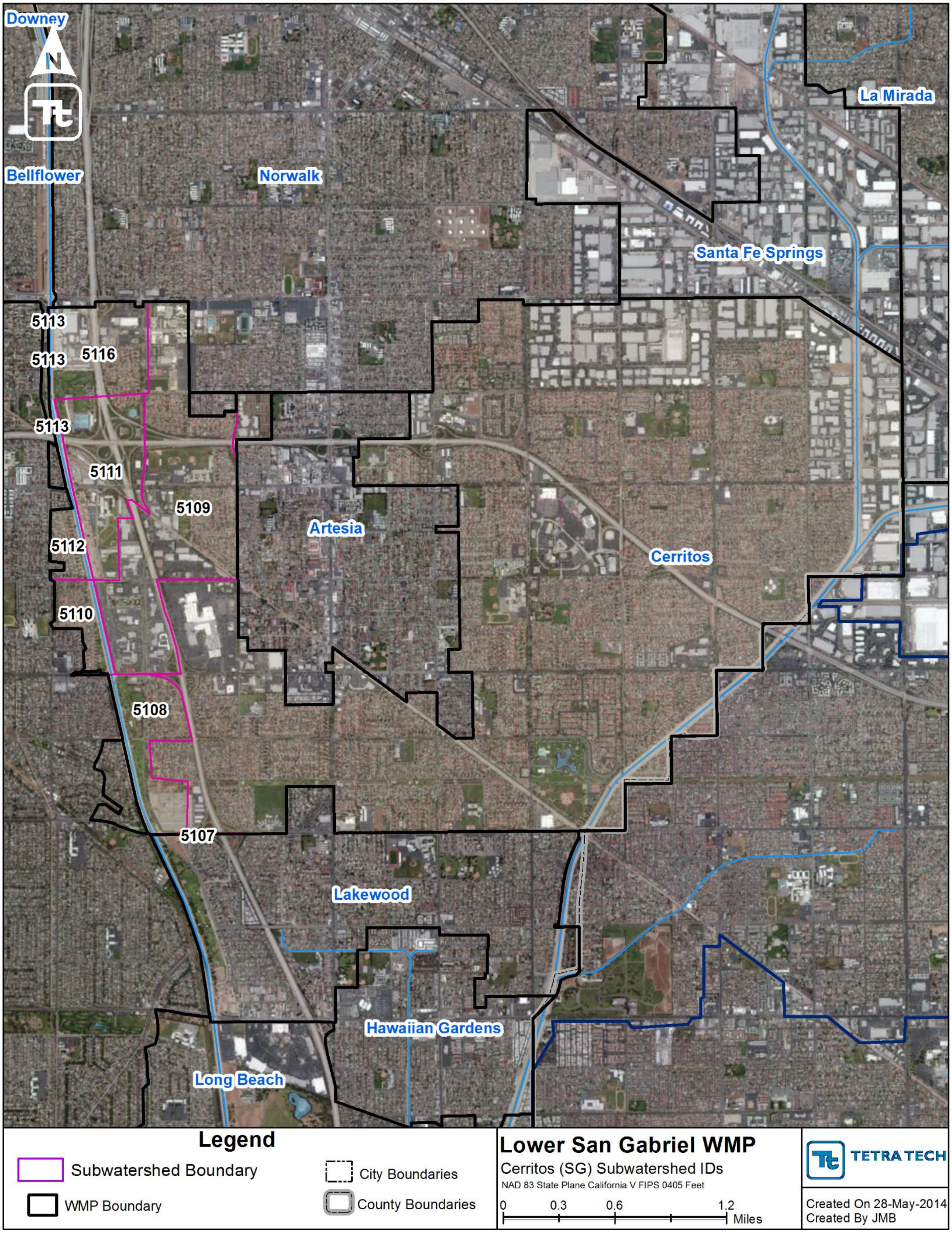

Figure 30. LSGR (SGR) Cerritos Subwatershed IDs

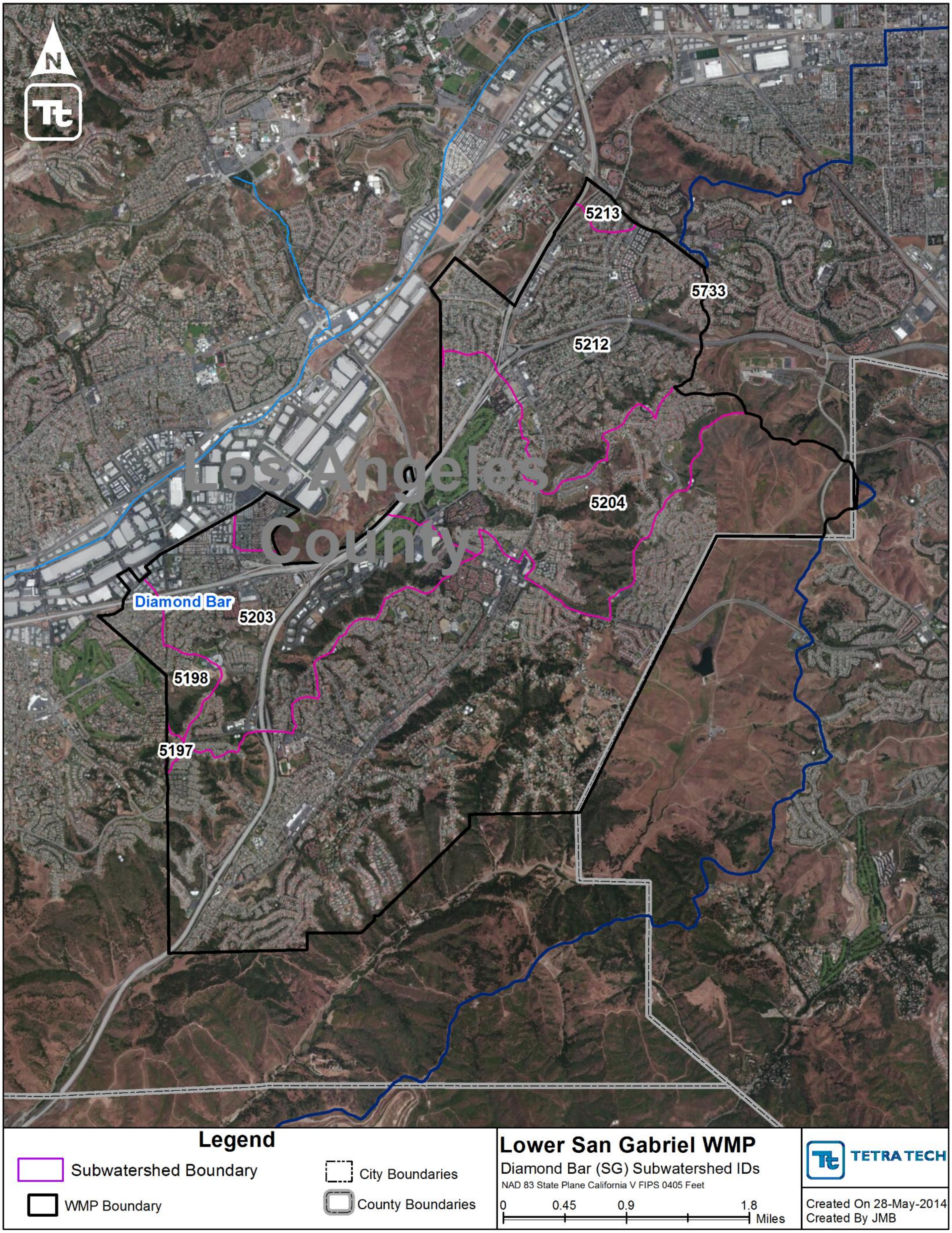

Figure 31. LSGR (SGR) Diamond Bar Subwatershed IDs

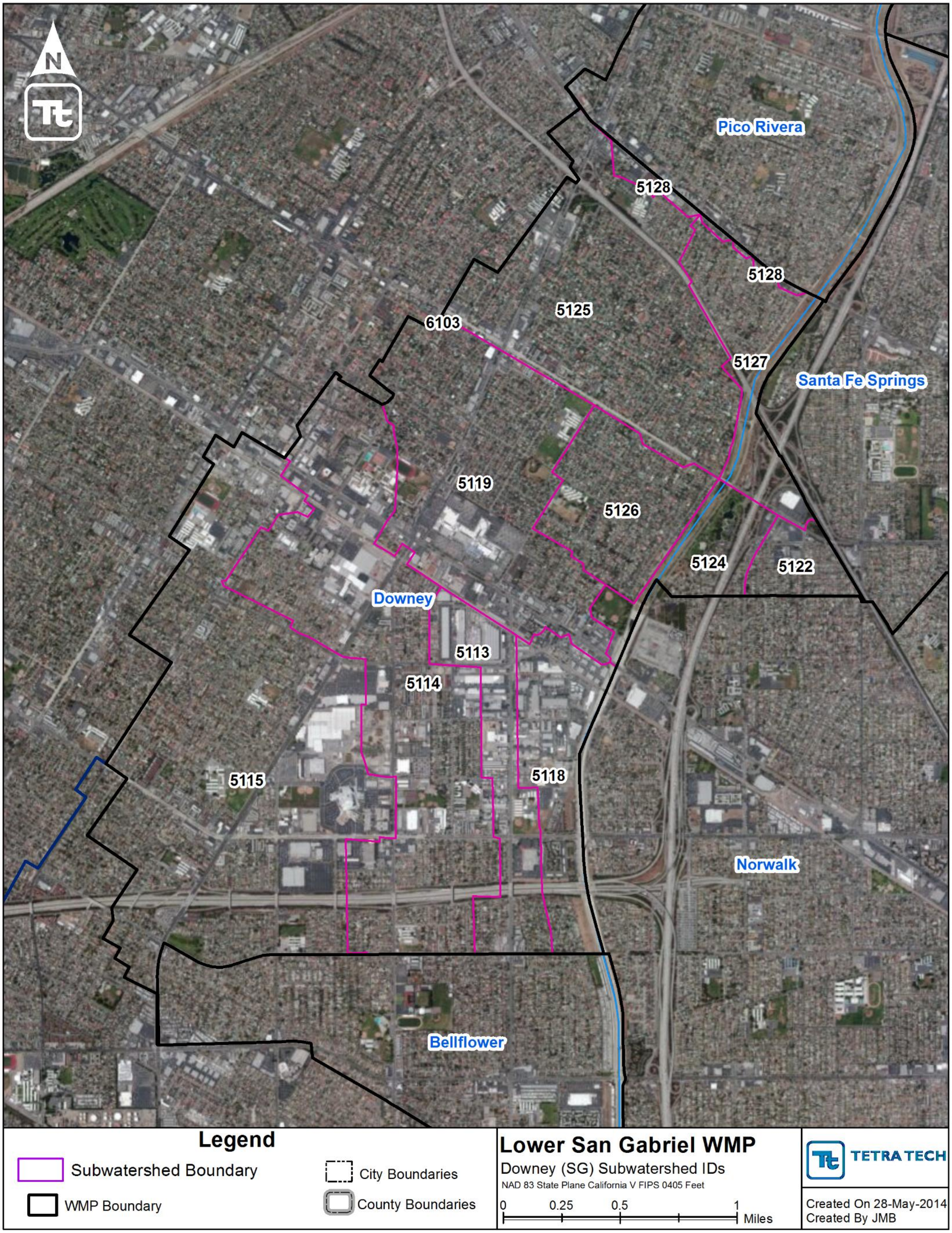

Figure 32. LSGR (SGR) Downey Subwatershed IDs

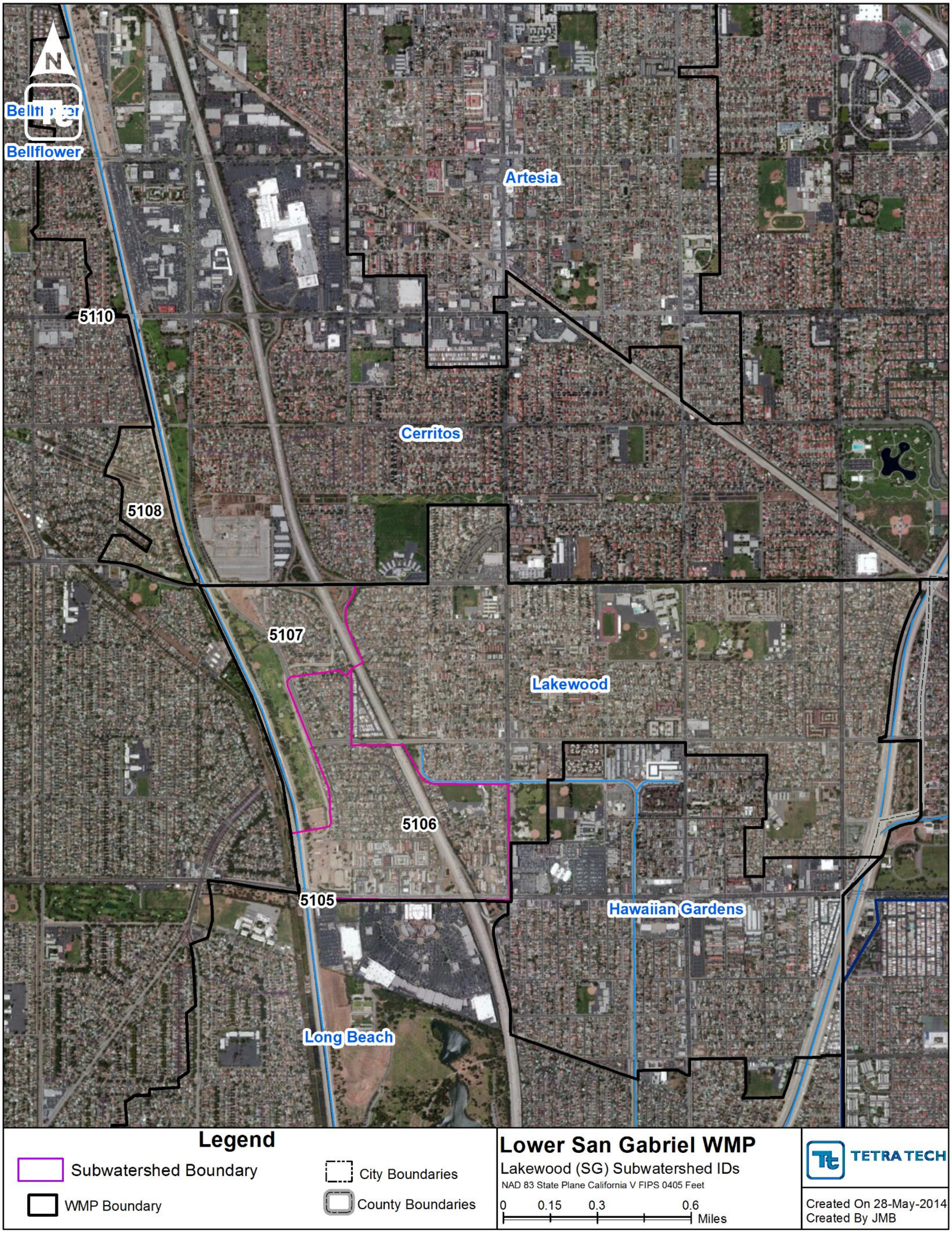

Figure 33. LSGR (SGR) Lakewood Subwatershed IDs

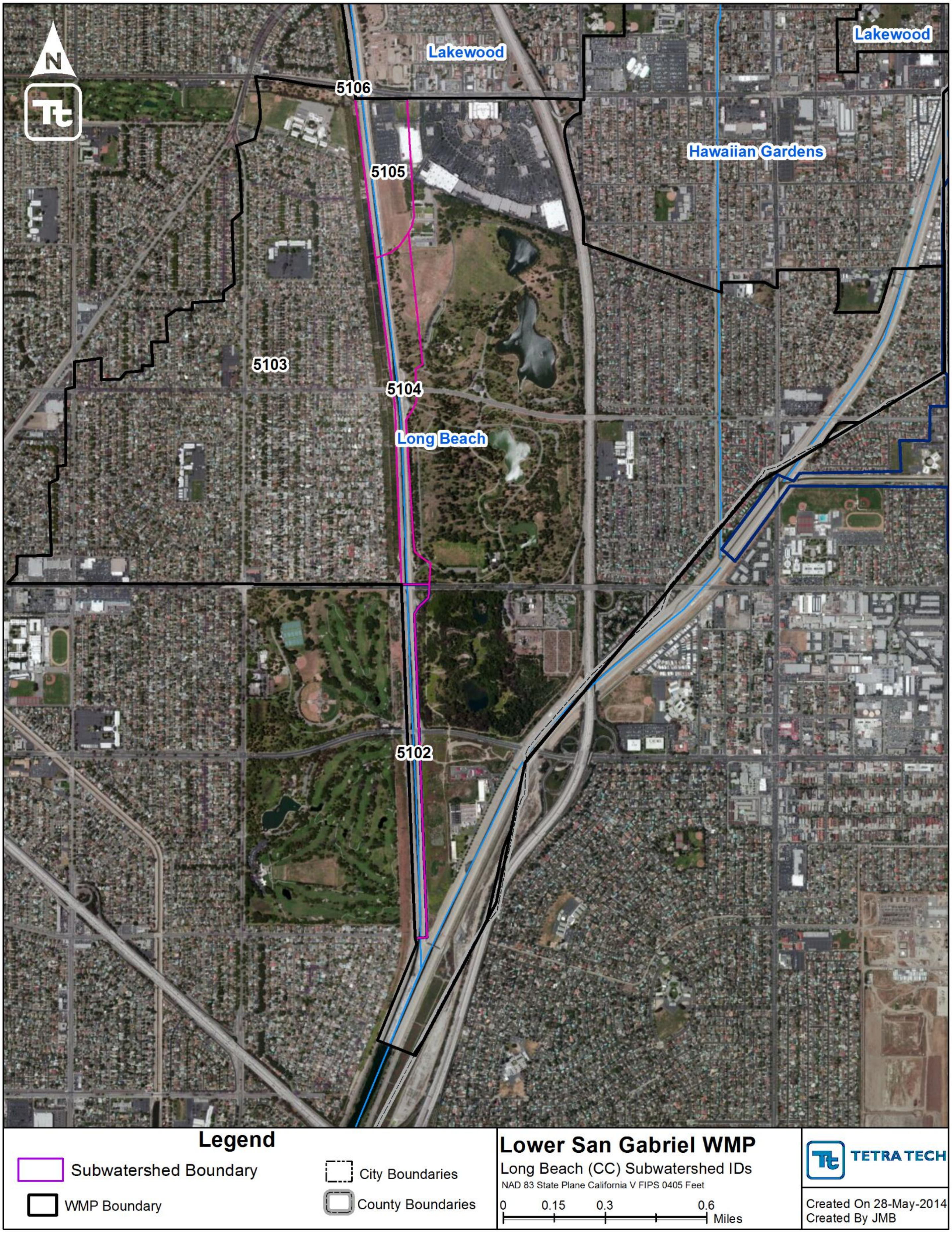

Figure 34. LSGR (SGR) Long Beach Subwatershed IDs

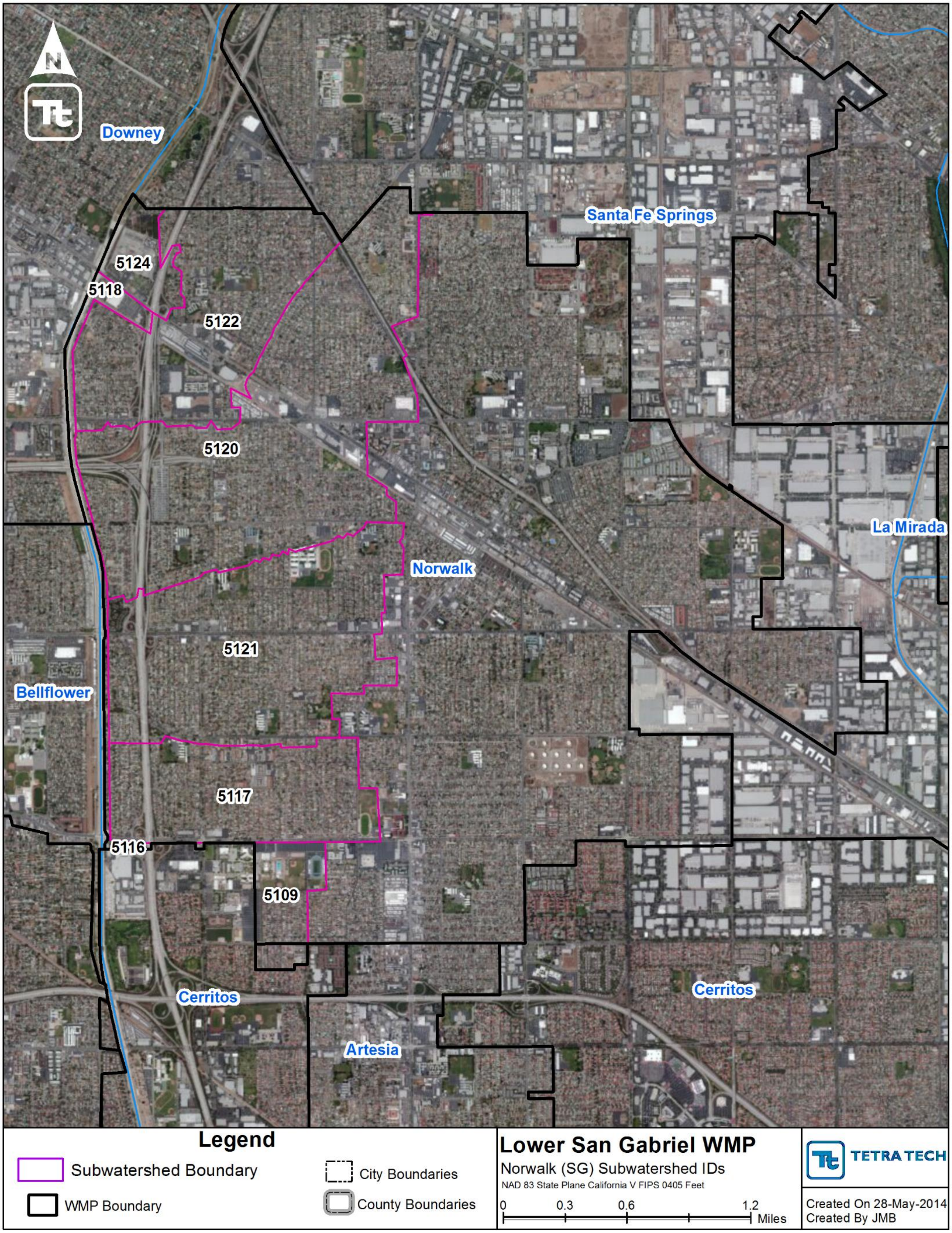

Figure 35. LSGR (SGR) Norwalk Subwatershed IDs

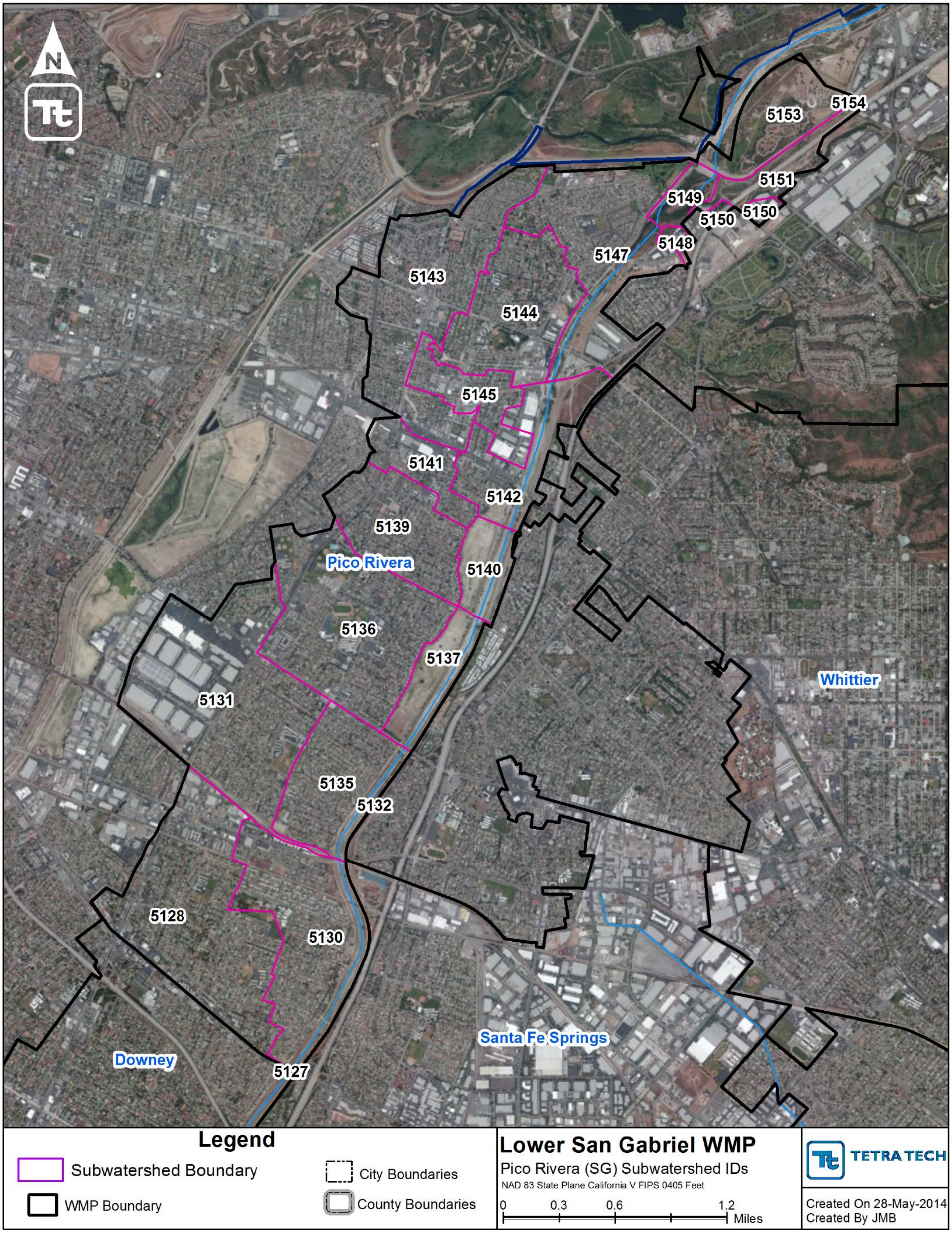

Figure 36. LSGR (SGR) Pico Rivera Subwatershed IDs

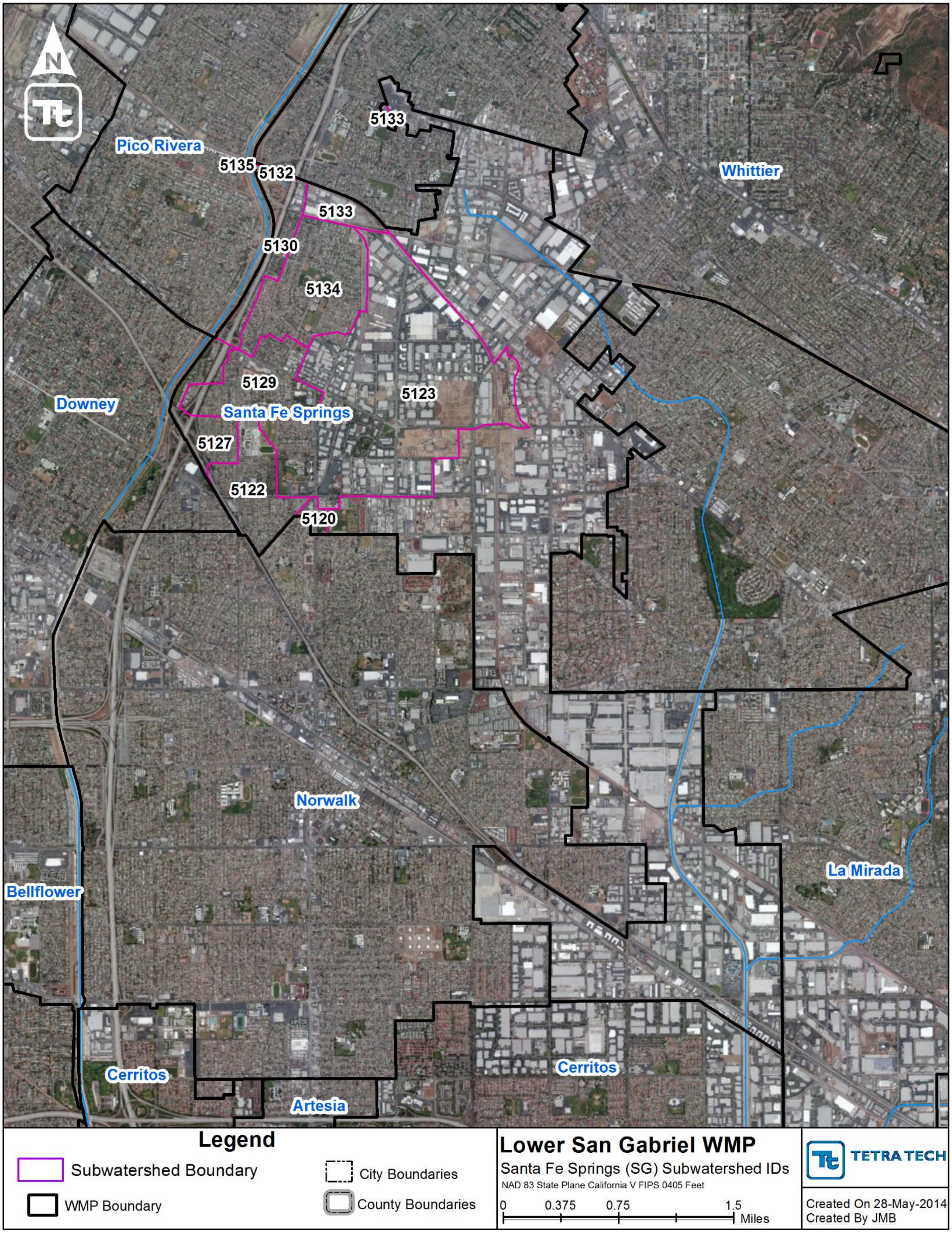

Figure 37. LSGR (SGR) Santa Fe Springs Subwatershed IDs

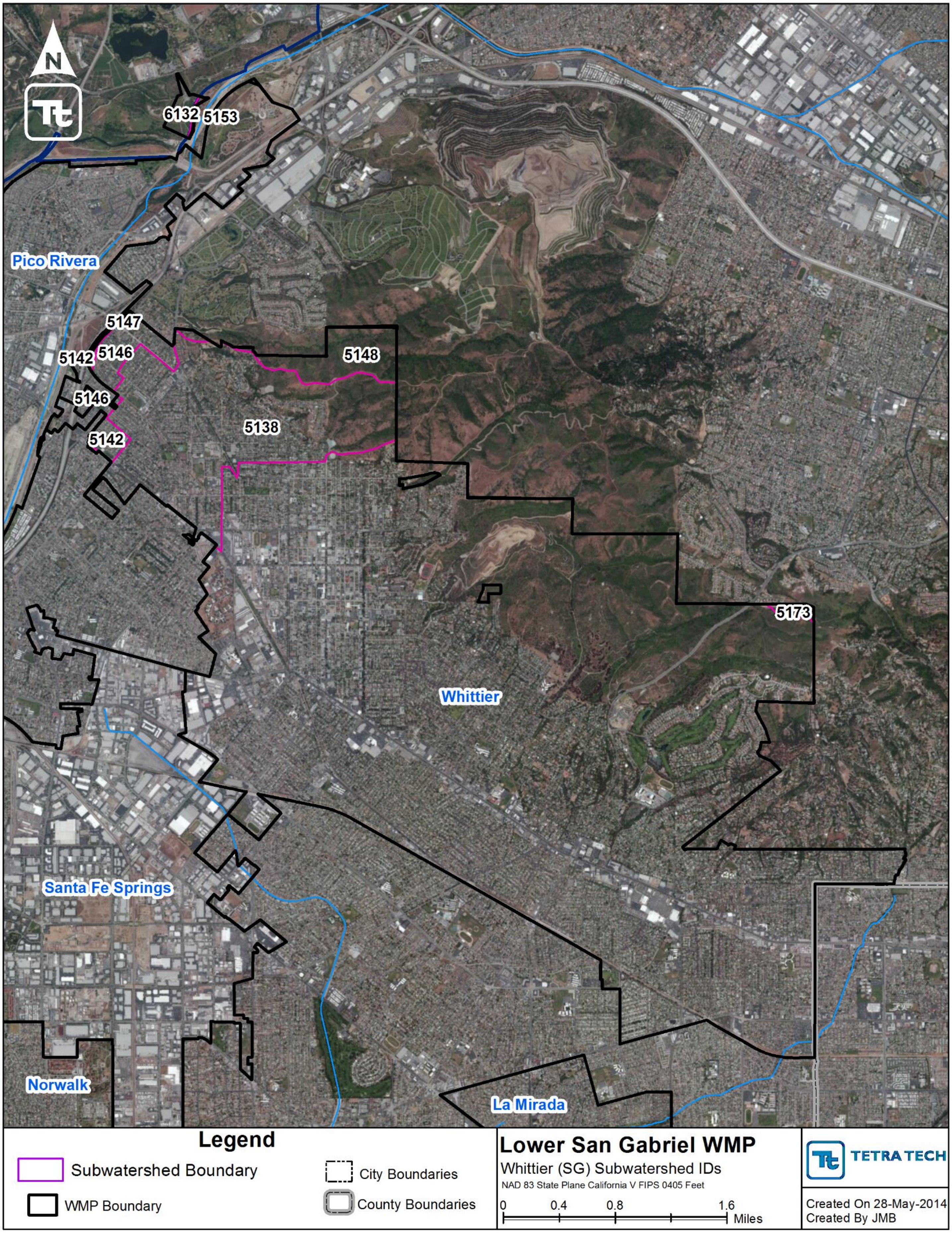

Figure 38. LSGR (SGR) Whittier Subwatershed IDs

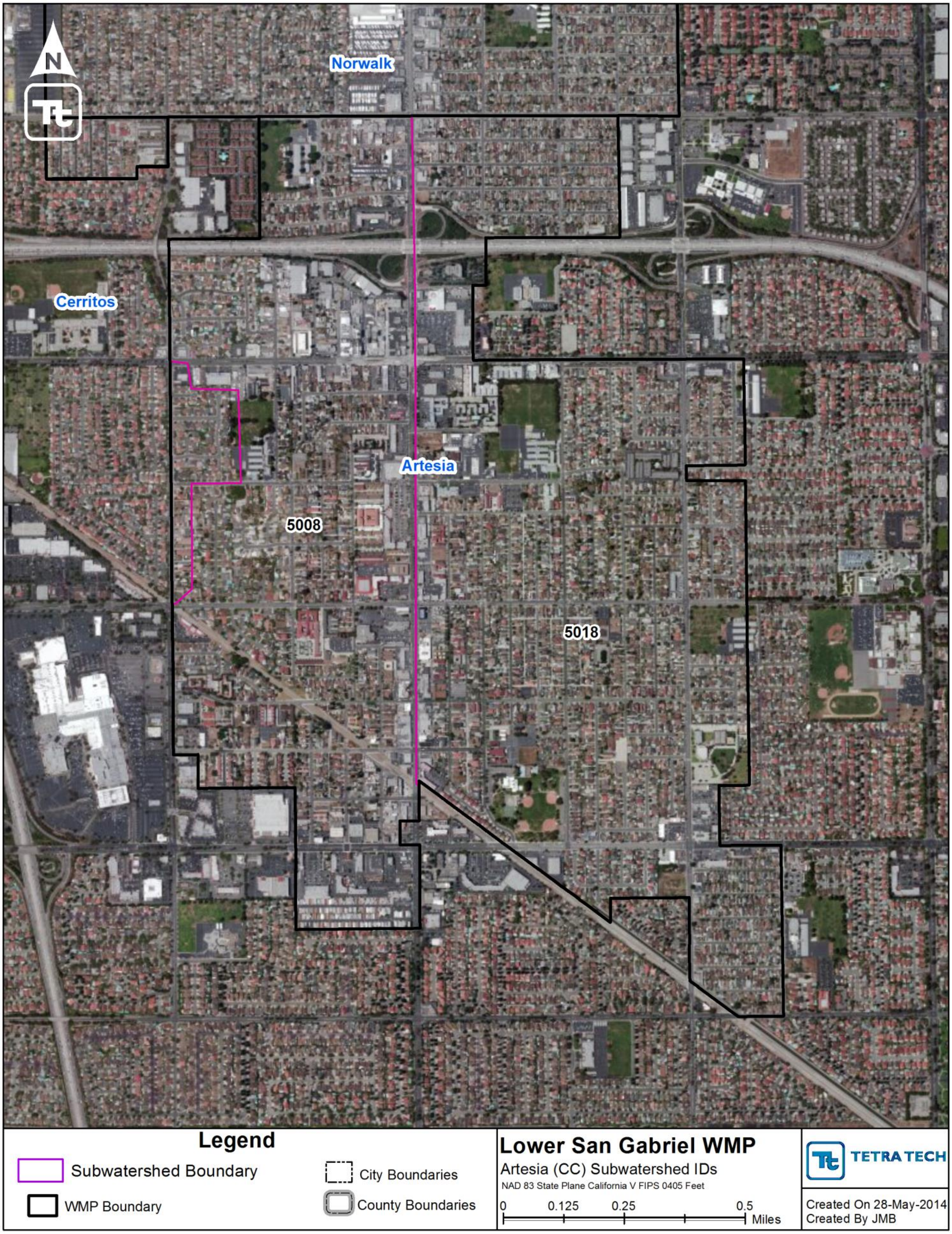

Figure 39. LSGR (CC) Artesia Subwatershed IDs

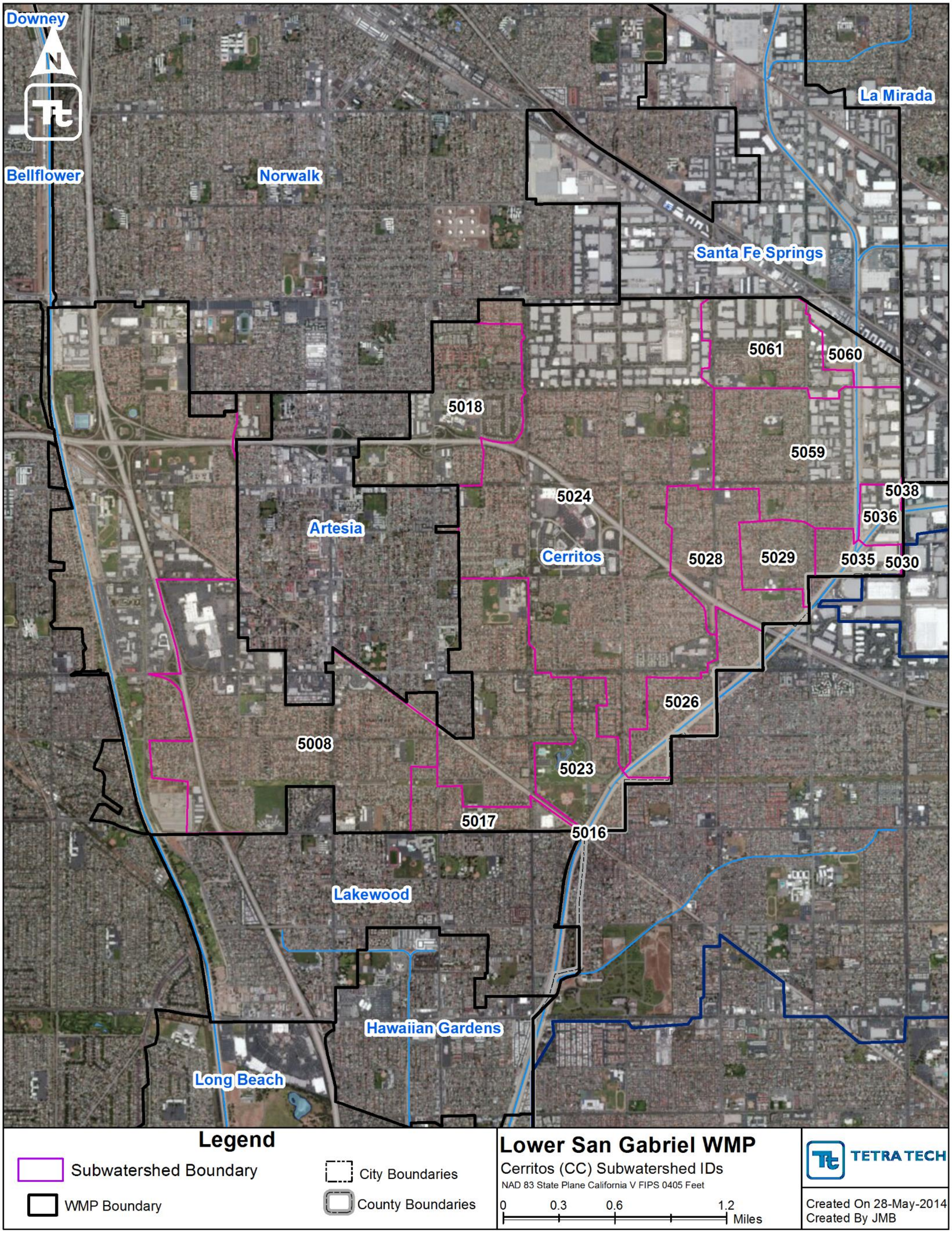

Figure 40. LSGR (CC) Cerritos Subwatershed IDs

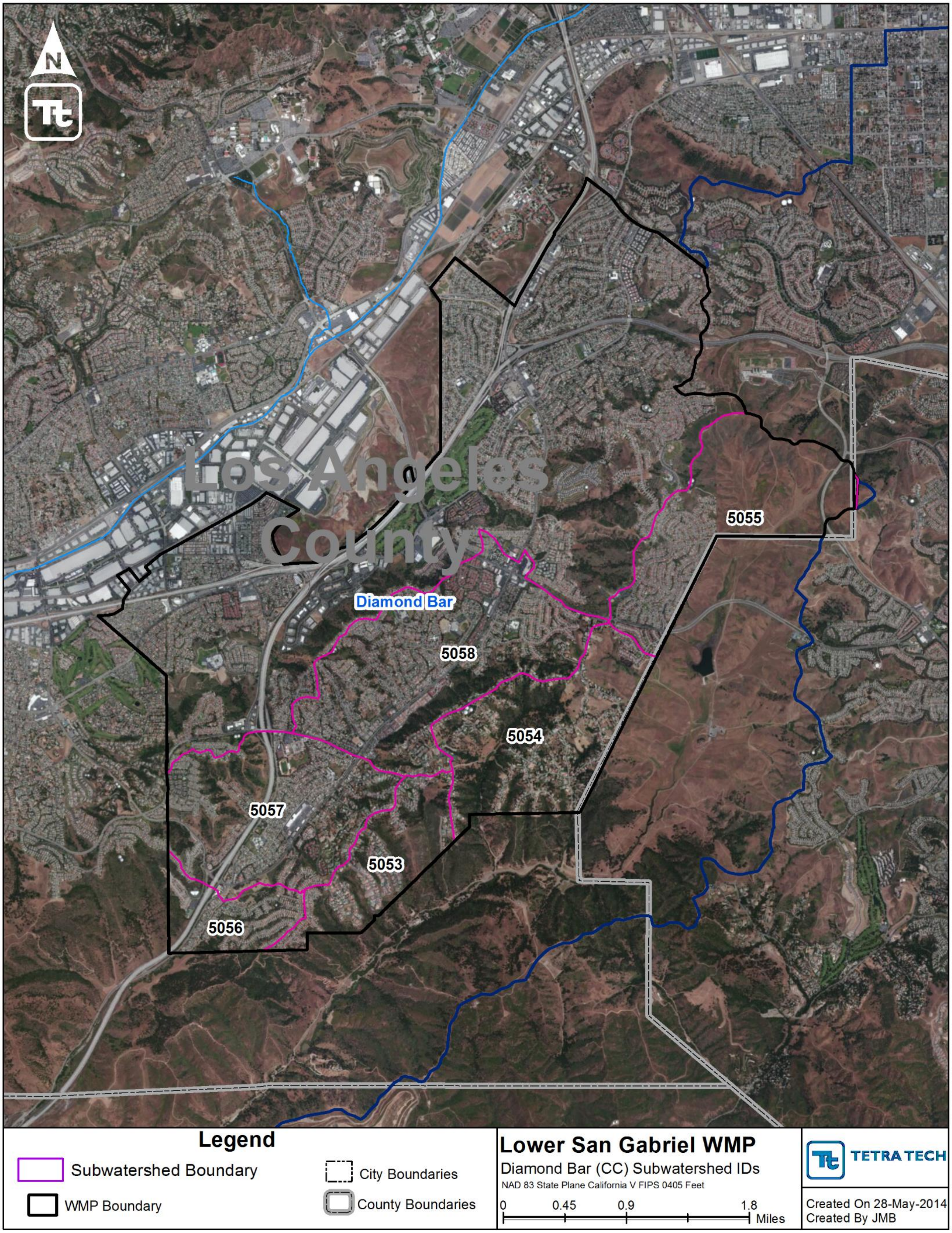

Figure 41. LSGR (CC) Diamond Bar Subwatershed IDs

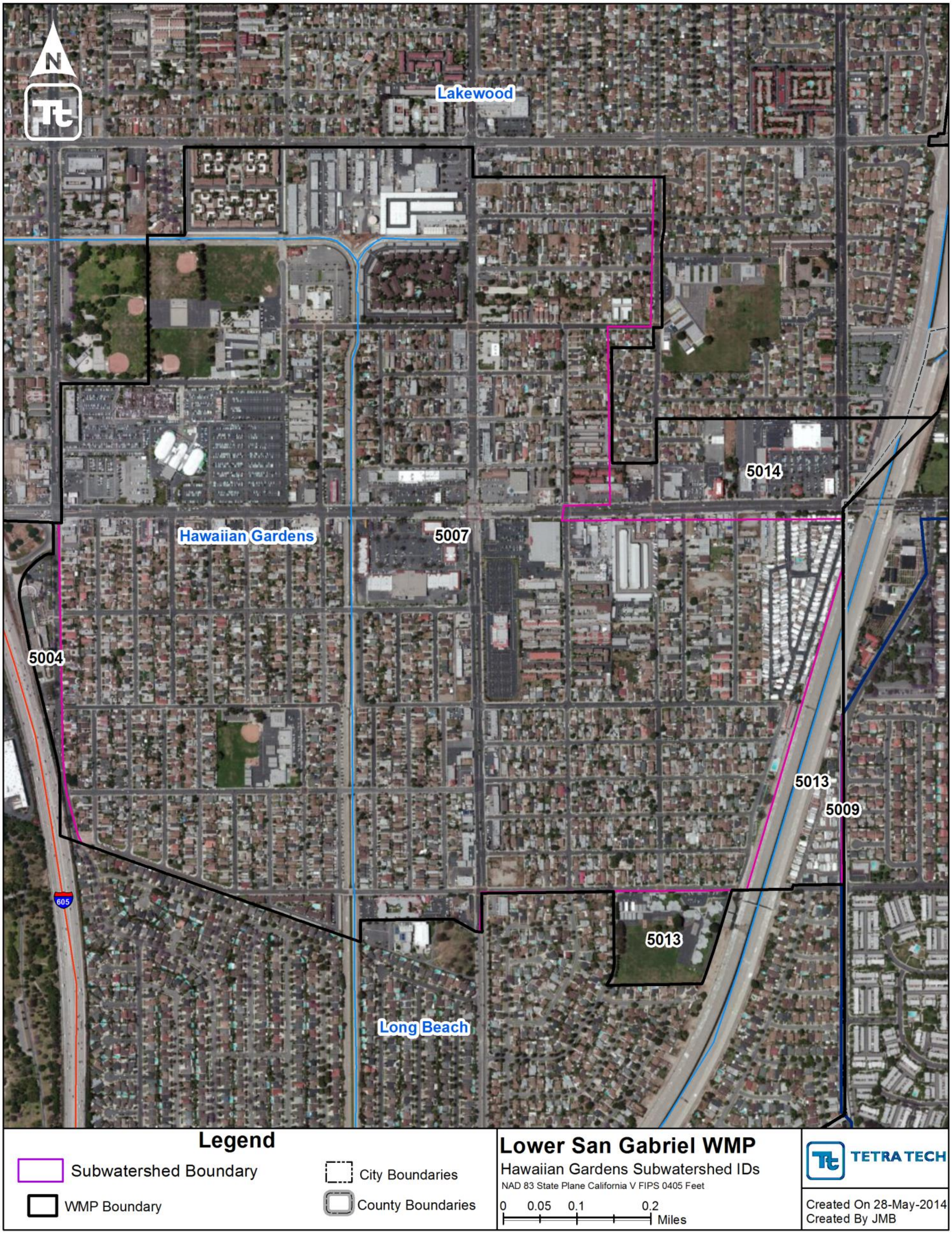

Figure 42. LSGR (CC) Hawaiian Gardens Subwatershed IDs

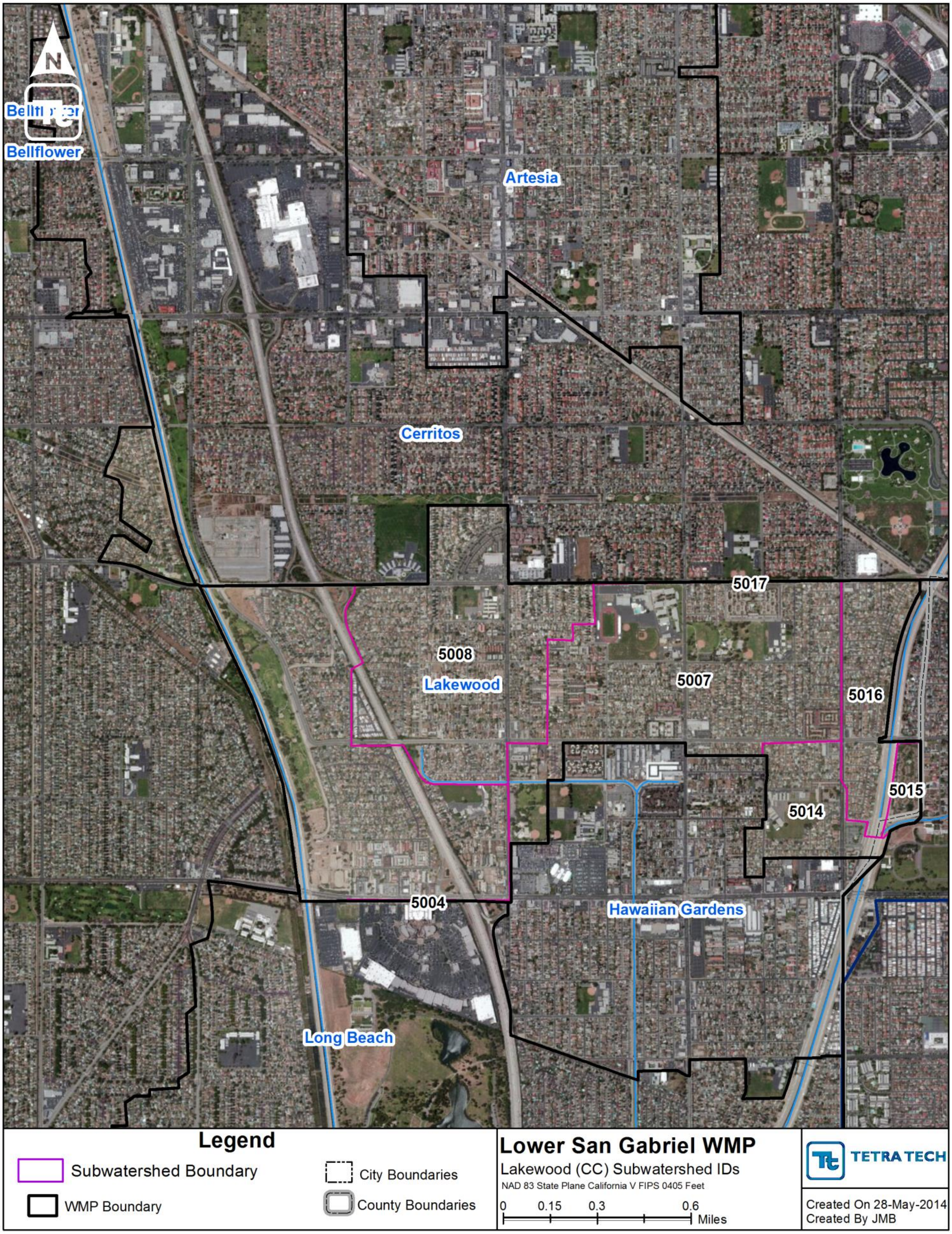

Figure 43. LSGR (CC) Lakewood Subwatershed IDs

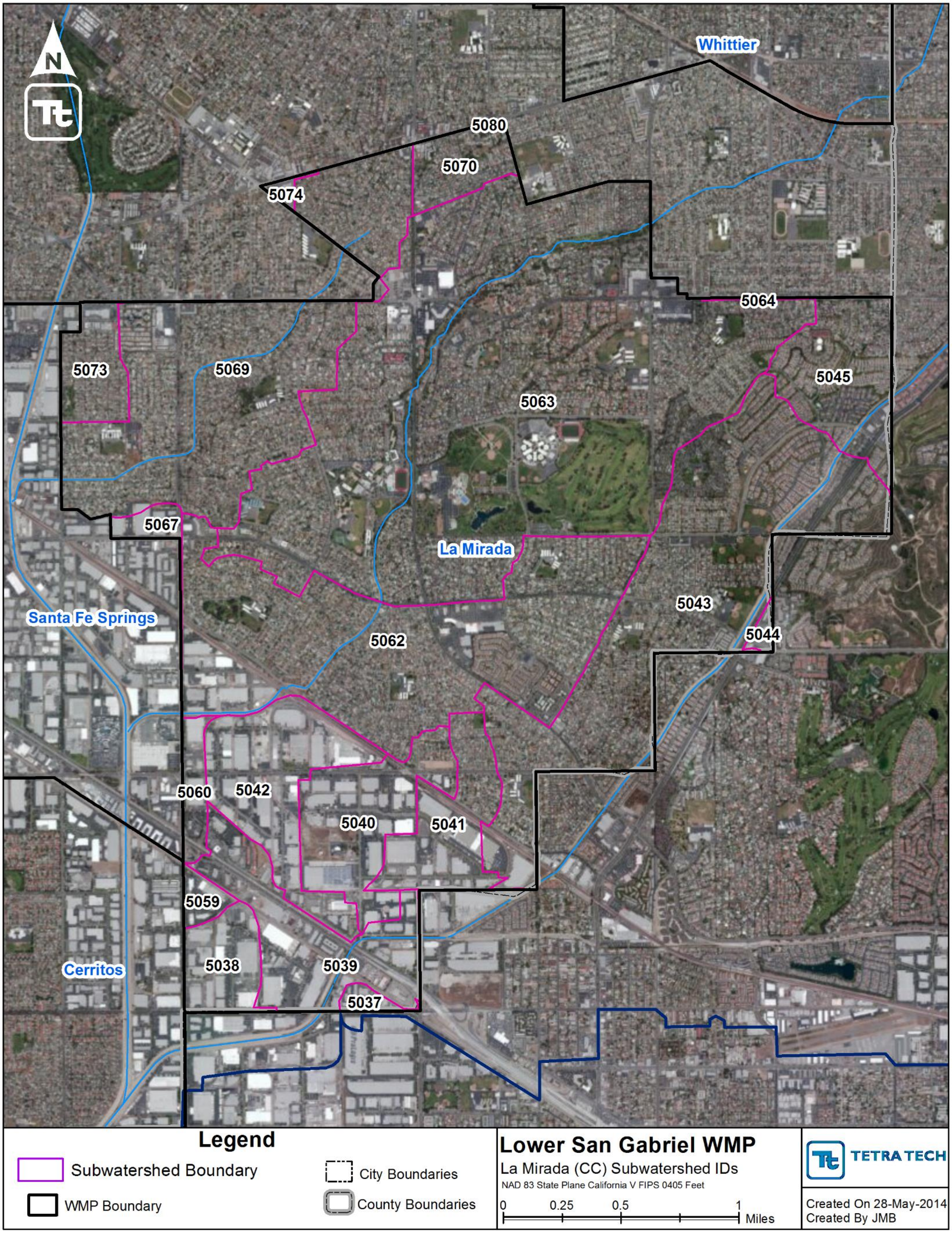

Figure 44. LSGR (CC) La Mirada Subwatershed IDs

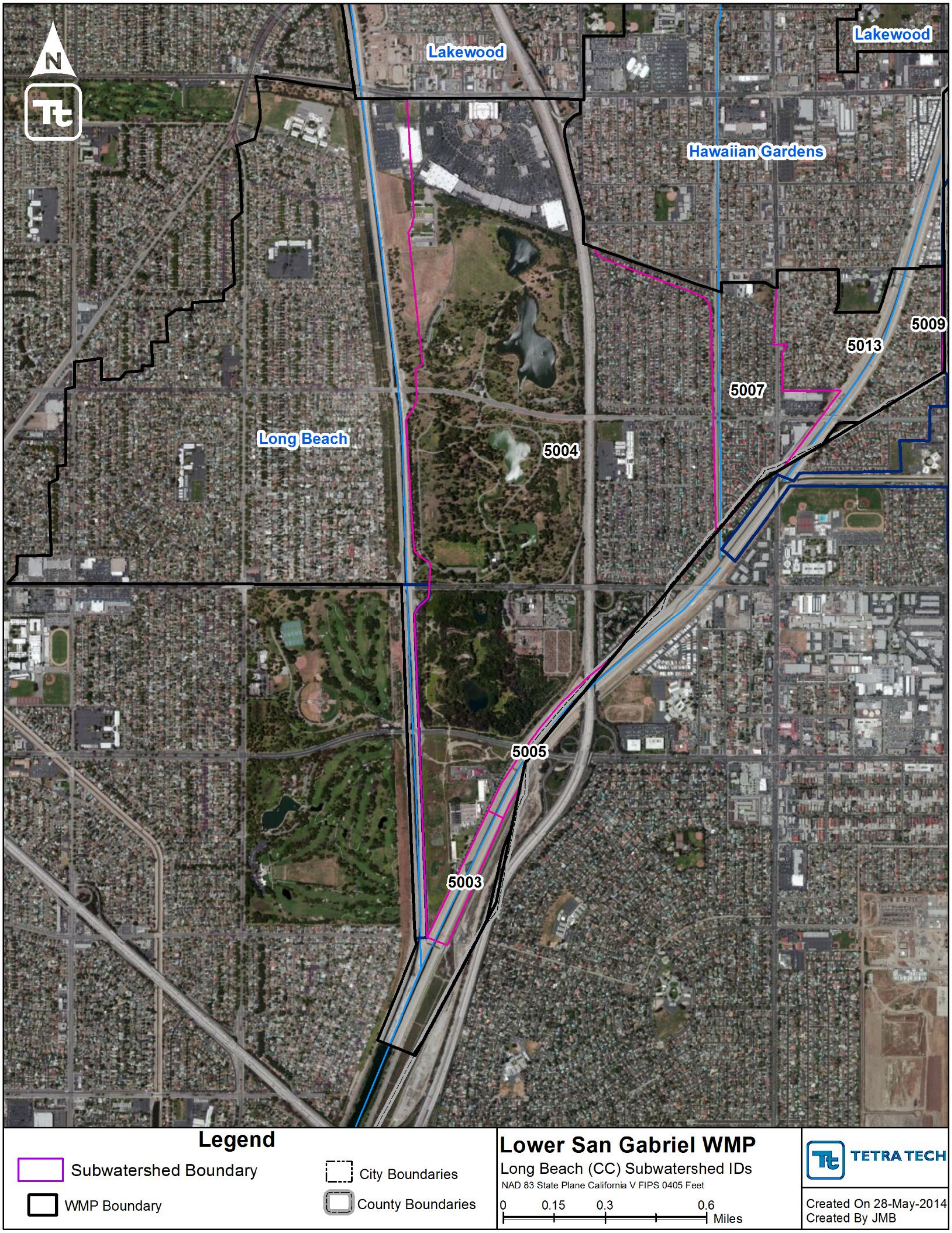

Figure 45. LSGR (CC) Long Beach Subwatershed IDs

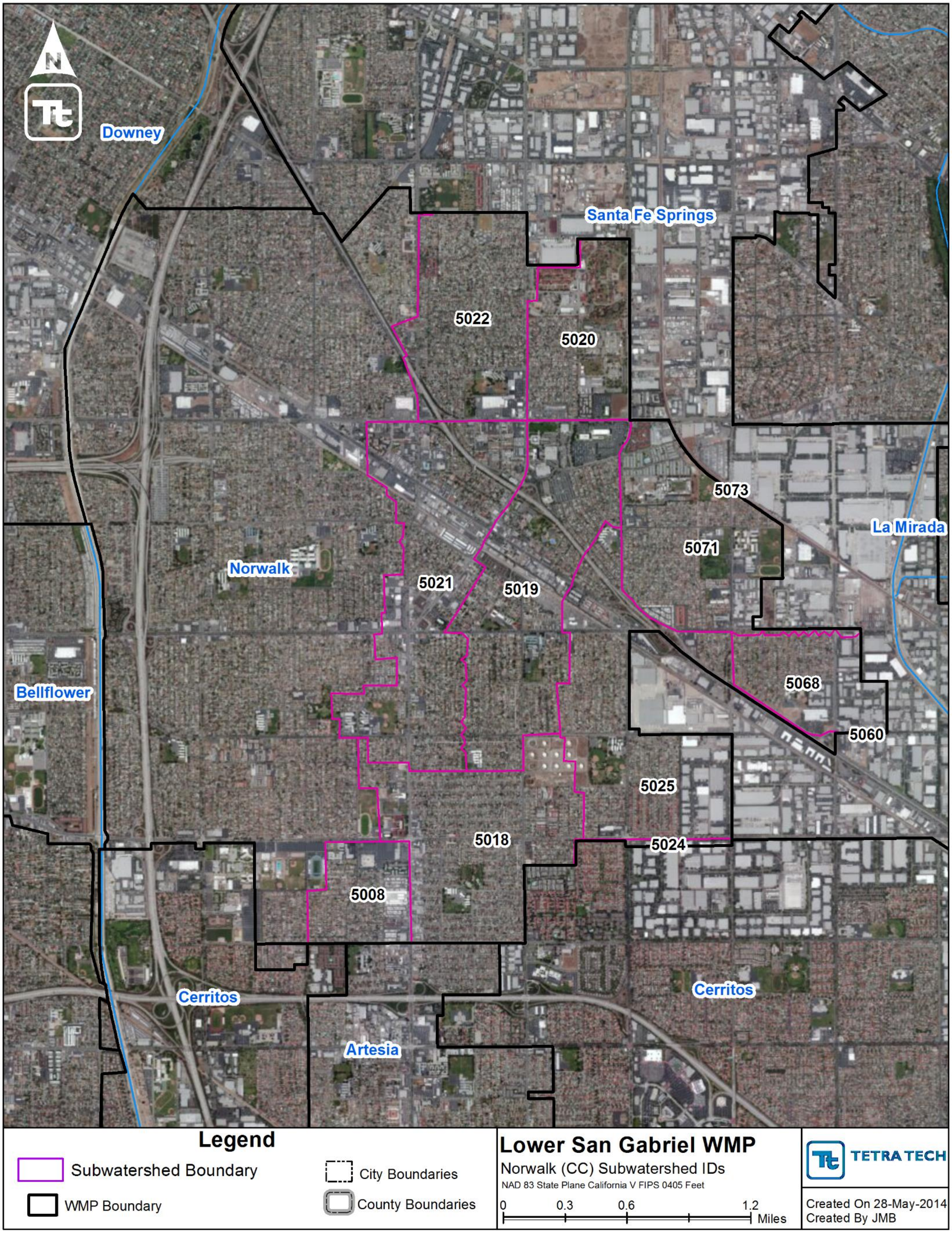

Figure 46. LSGR (CC) Norwalk Subwatershed IDs

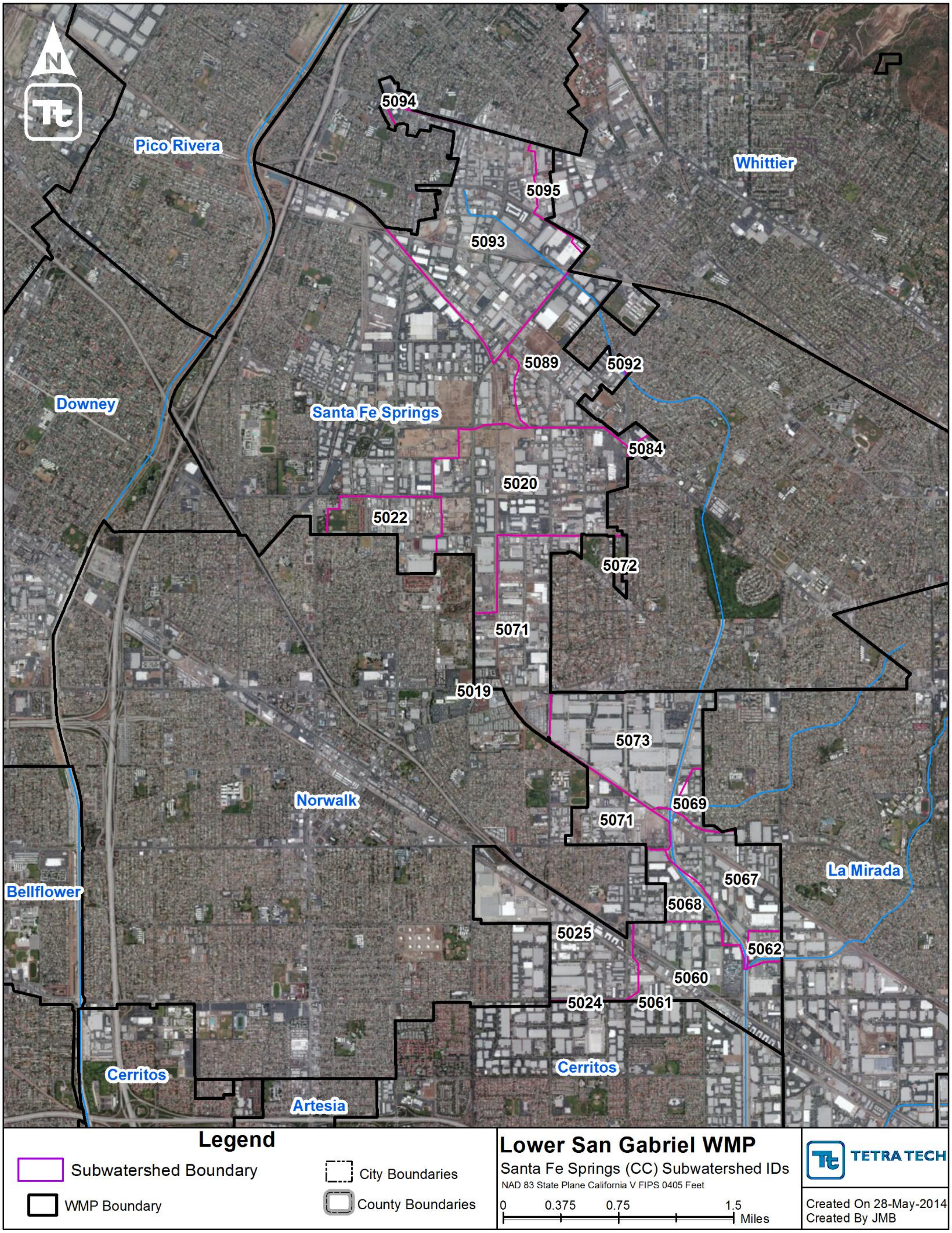

Figure 47. LSGR (CC) Santa Fe Springs Subwatershed IDs

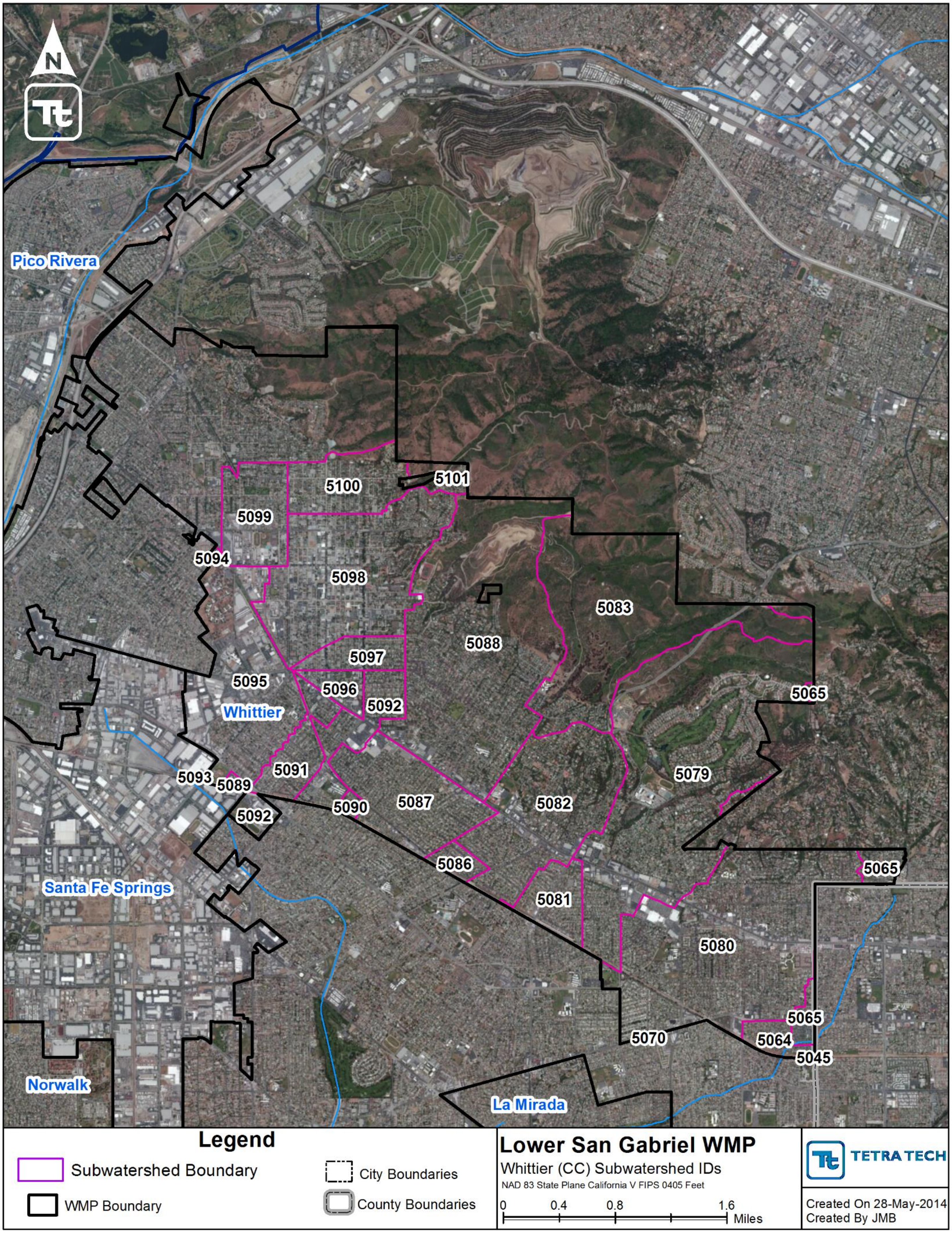

Figure 48. LSGR (CC) Whittier Subwatershed IDs

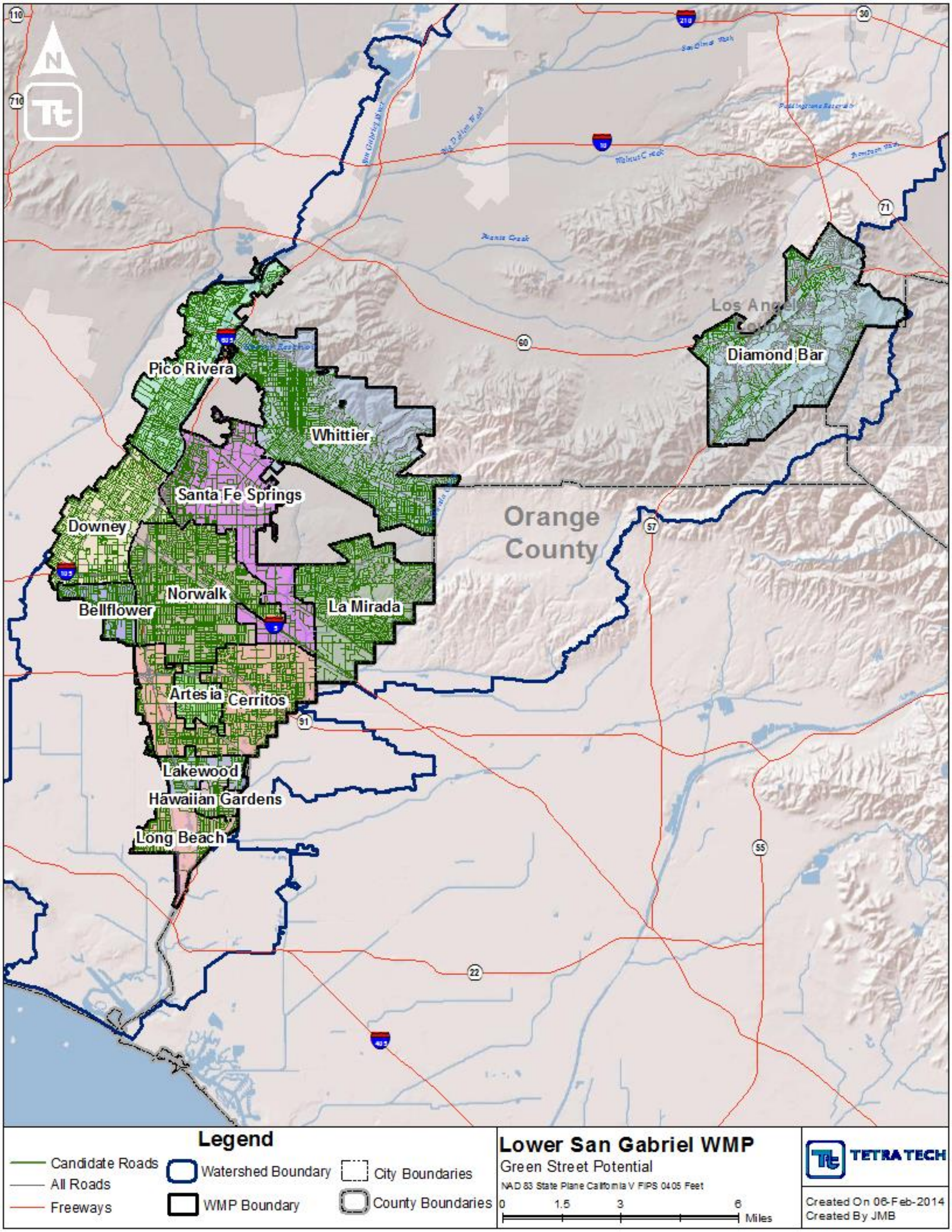

Figure 49. LSGR ROW BMP Potential Opportunities

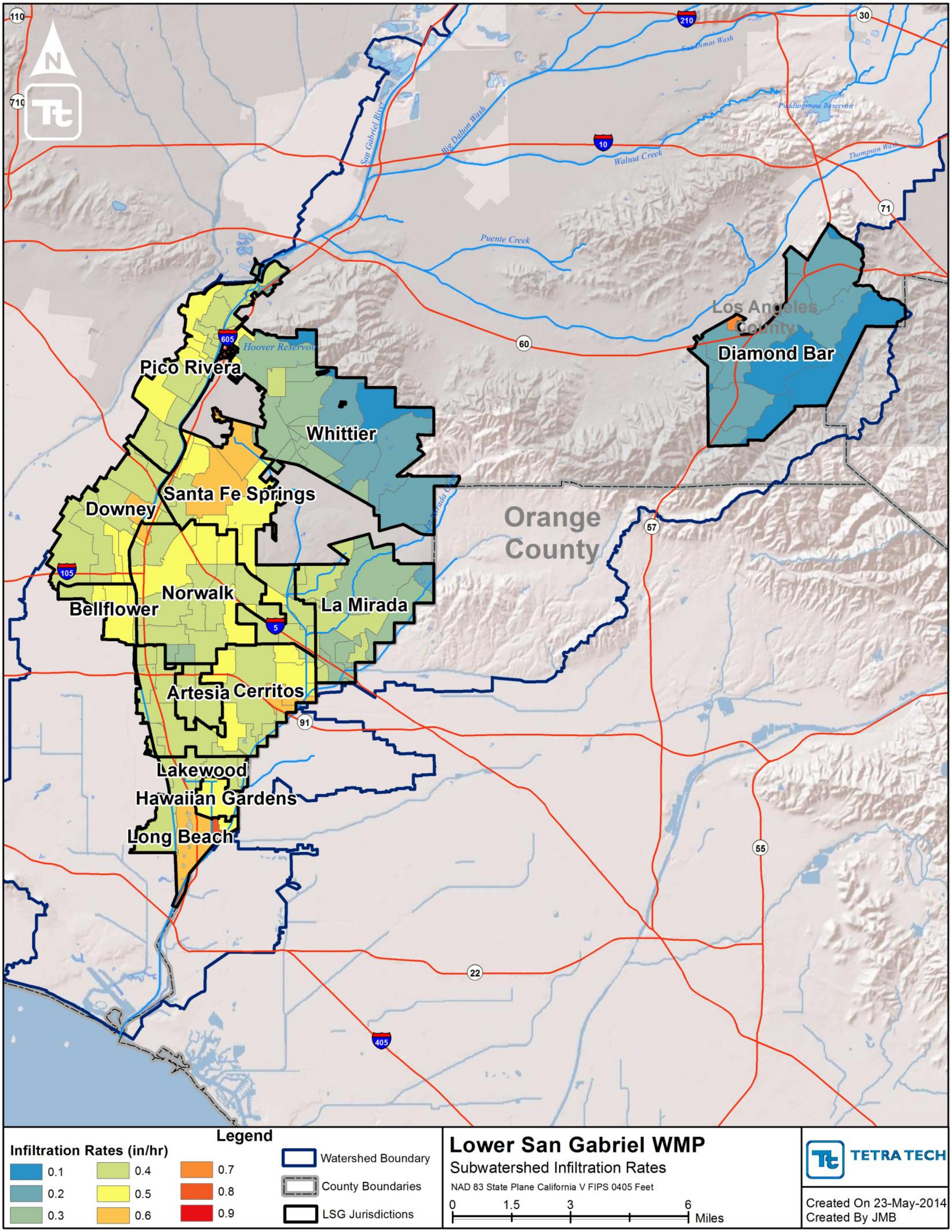

Figure 50. LSGR Subwatershed Infiltration Rates

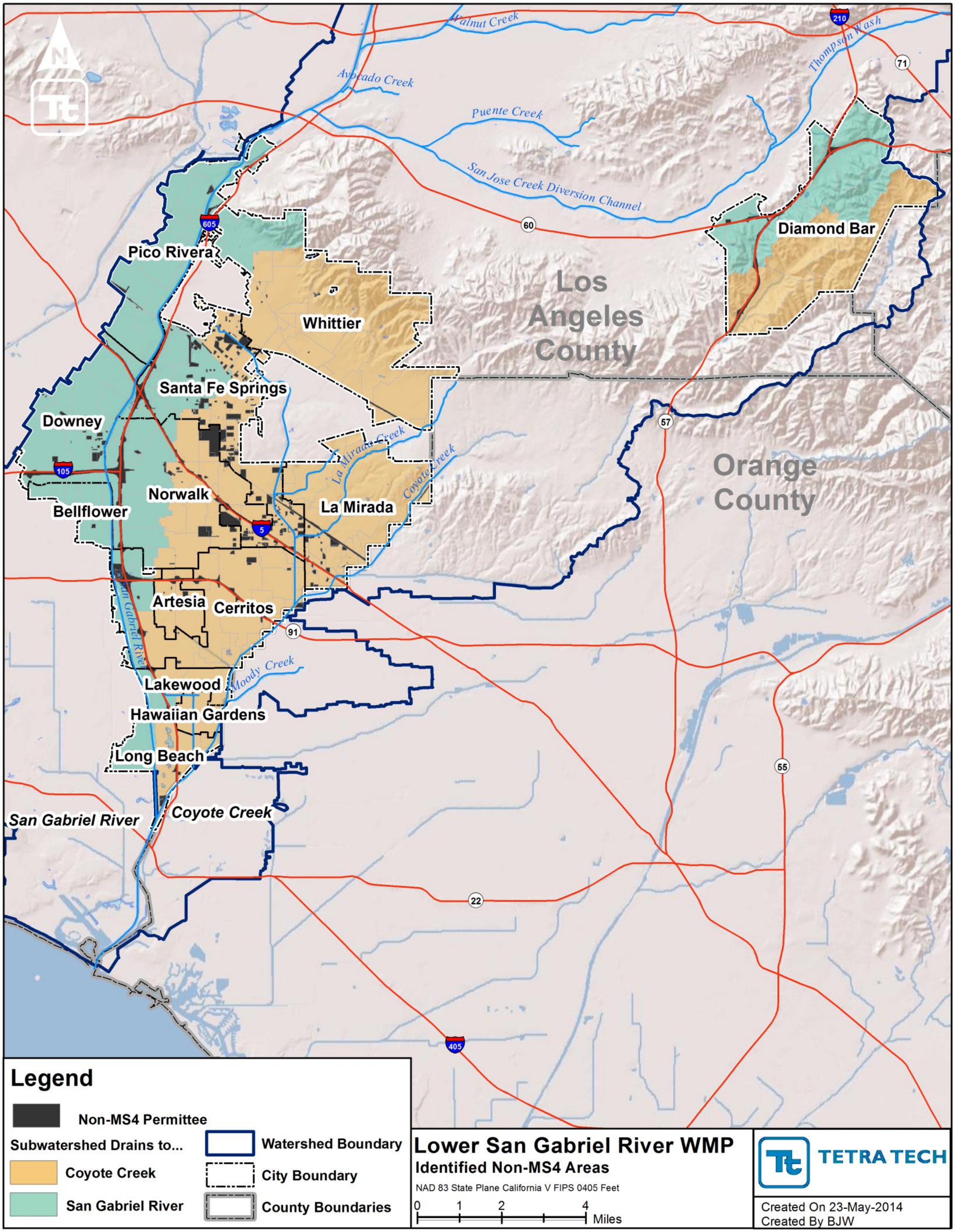

Figure 51. LSGR Non-MS4 Permittees

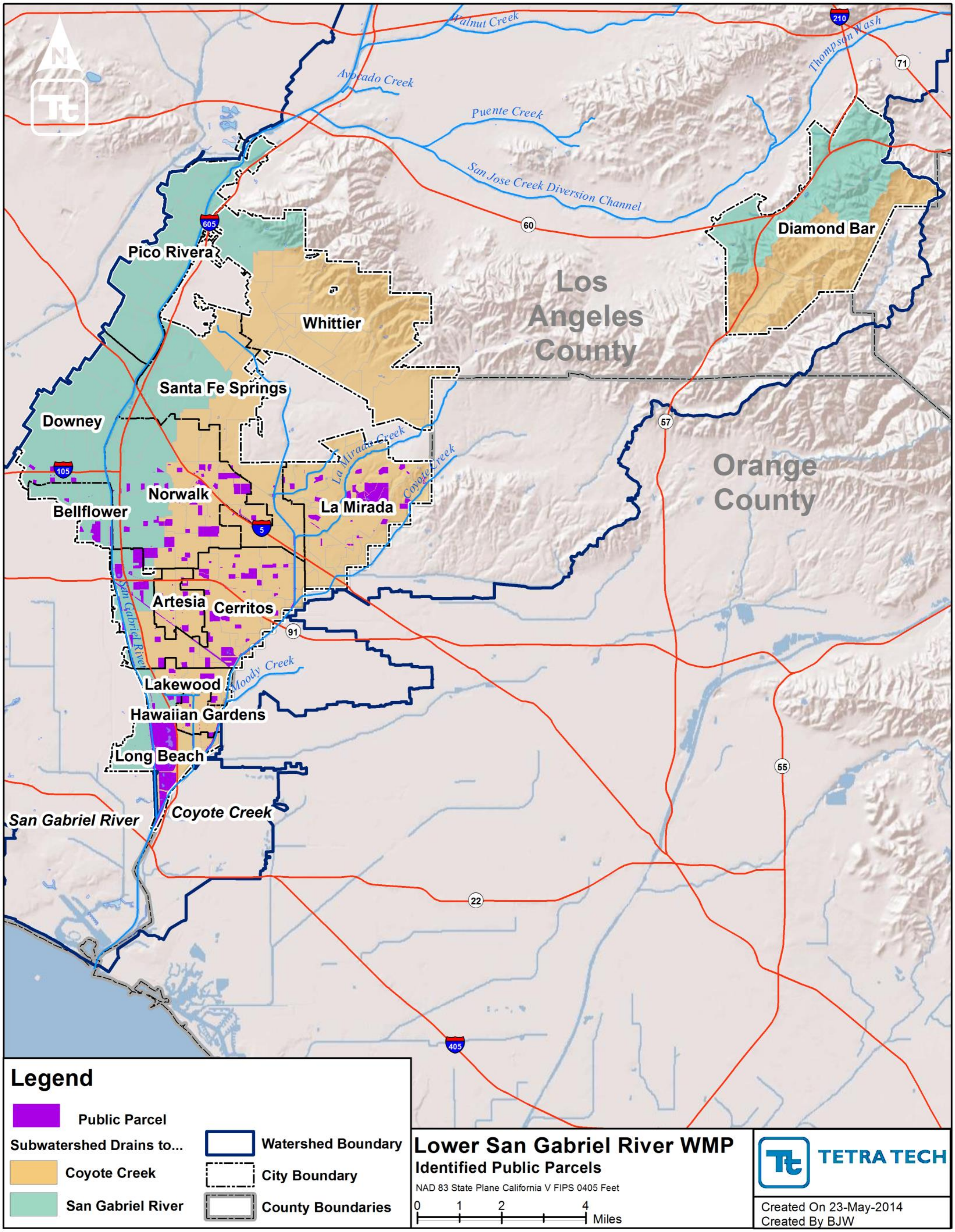

Figure 52. LSGR identified public parcels

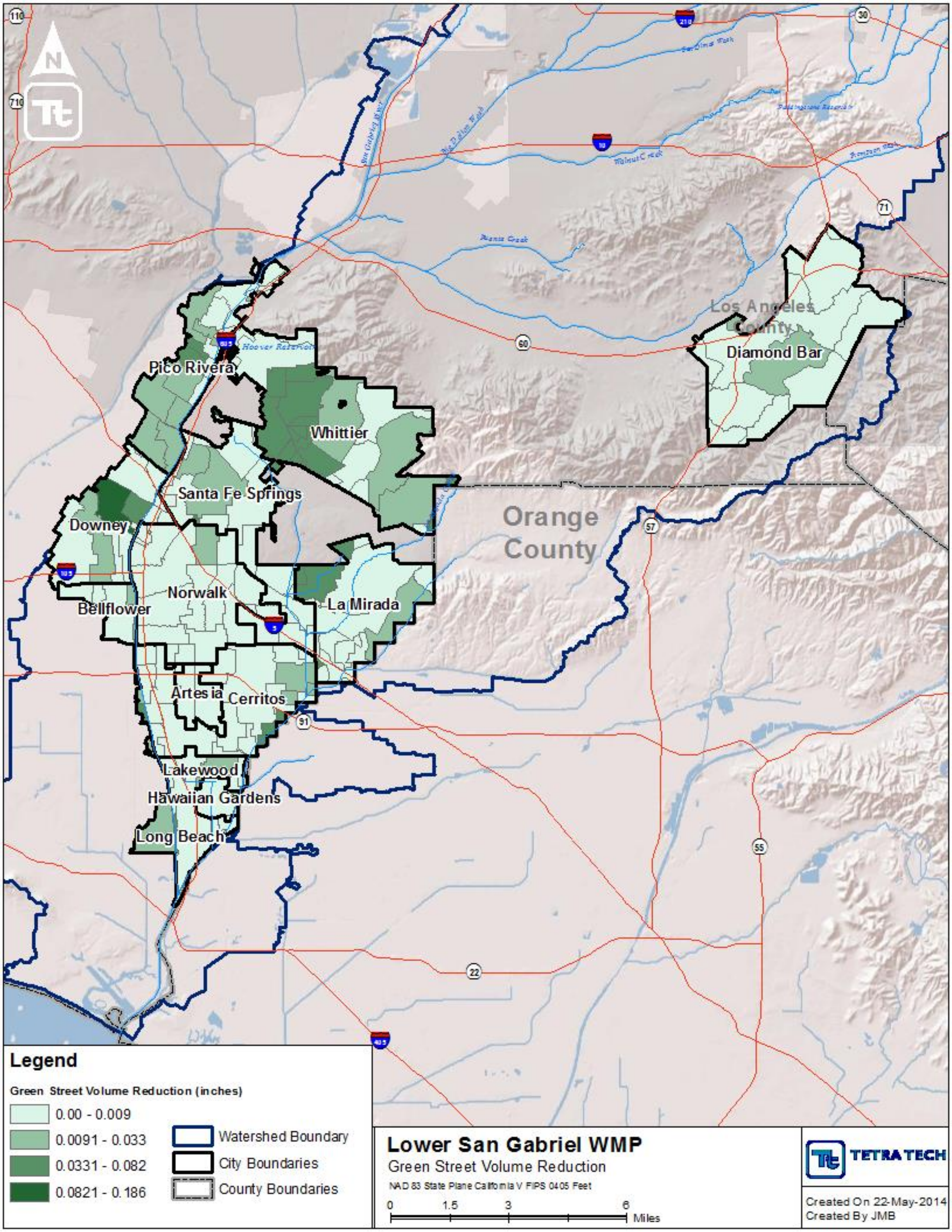

Figure 53. LSGR ROW BMP Volume Reduction

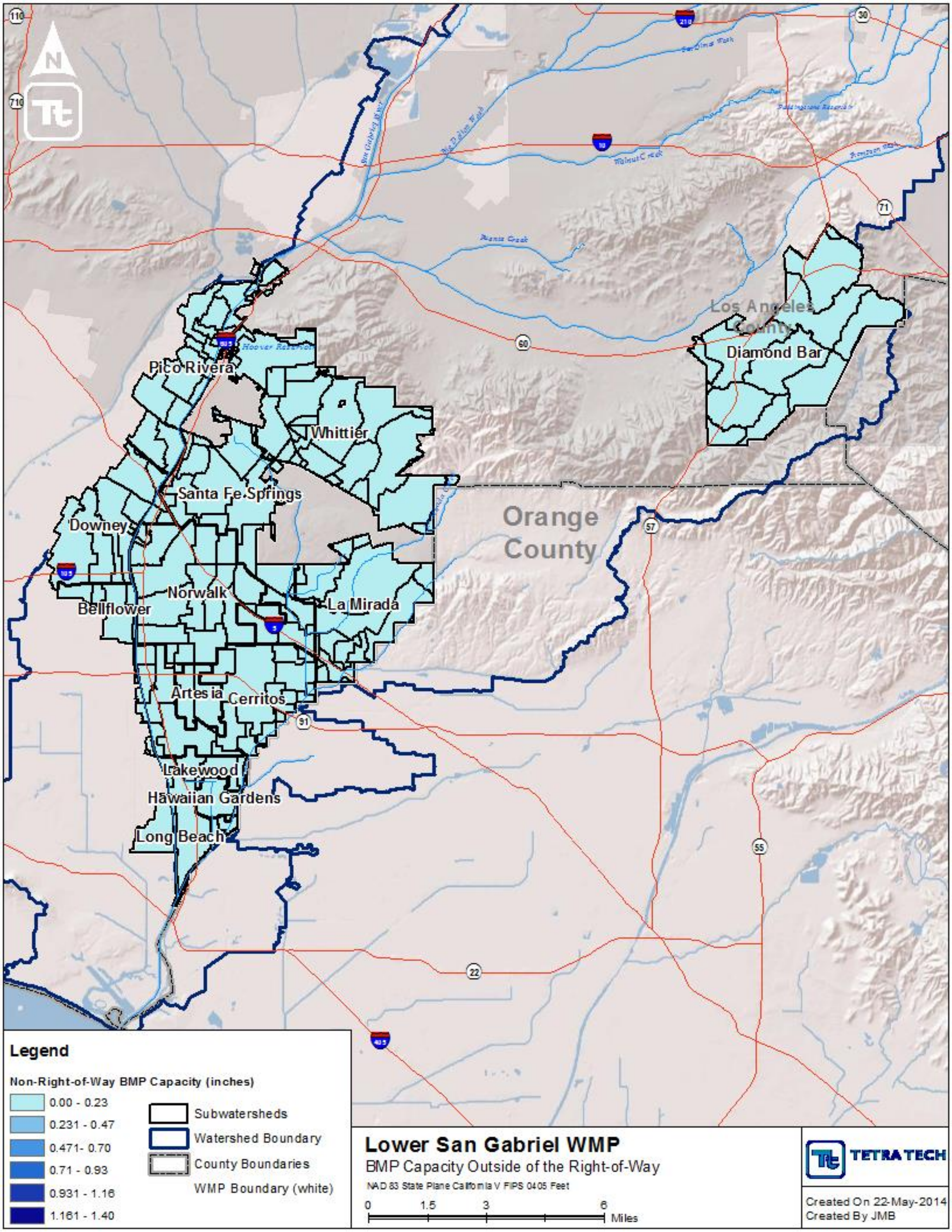

Figure 54. LSGR BMP capacity outside of the right-of-way

Attachment D: Existing and Planned BMPs

Submitted to:

LLAR WMP Group   LCC WMP Group   LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

Contents

D1. Existing and Planned BMPs

The following tables summarize existing and planned BMPs in each jurisdiction.

D1.1. City of Bellflower

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Flow-Through Treatment BMP	Existing	Commercial Gas Station and mart	2008	14300 Bellflower Blvd	33.901581	-118.124915	105114	0.42	ac		
Flow-Through Treatment BMP	Existing	Commercial Storage	2005	10526 Rosecrans	33.902009	-118.108102	575118	19.5	ac		
Infiltration BMPs	Existing	St George Church	2012	15725 Cornuta	33.890539	-118.120735	105113	1.36	ac		
Infiltration BMPs	Existing	Autozone	2012	10239 Rosecrans	33.902265	-118.114834	105113	0.78	ac		

D1.2. City of Downey

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow Through Treatment BMP	Existing	8314 SECOND ST	2/14/2014		33.9409	-118.13243	245114	1322	sf	0.153	cfs
Flow Through Treatment BMP	Existing	10030 LAKEWOOD	8/17/2007		33.9477	-118.11664	245125	24560	sf	0.17	cfs
Infiltration BMP	Existing	12327 WOODRUFF AV	2/14/2014		33.91989	-118.11706	245113	6894.4	sf	430.9	cf
Infiltration BMP	Existing	12145 WOODRUFF	7/8/2008		33.92338	-118.11805	245113	3200	sf	200	cf
Infiltration BMP	Existing	9500 WASHBURN	2/14/2014		33.92366	-118.1172	245113	342000	sf	9500	cf
Infiltration BMP	Existing	9236 HALL	4/17/2007		33.92972	-118.12155	245113	411840	sf	25740	cf
Infiltration BMP	Existing	9737 IMPERIAL	6/22/2010		33.91761	-118.11961	245114	5600	sf	350	cf
Infiltration BMP	Existing	12254 BELLFLOWER	9/13/2003		33.9214	-118.1239	245114	57600	sf	3600	cf
Infiltration BMP	Existing	11904 BELLFLOWER	2/14/2014		33.92607	-118.12515	245114	5400	sf	300	cf
Infiltration BMP	Existing	11610 LAKEWOOD	9/28/2007		33.93101	-118.12594	245114	91520	sf	5720	cf
Infiltration BMP	Existing	8329 DAVIS	6/15/2010		33.9366	-118.13379	245114	12608	sf	788	cf
Infiltration BMP	Existing	8522 FIRESTONE	2/16/2005		33.93678	-118.12978	245114	105456	sf	6591	cf
Infiltration BMP	Existing	8320 FIRESTONE BLVD	1/1/2010		33.9387	-118.13176	245114	90660	sf	525	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9060 IMPERIAL	4/15/2005		33.91646	-118.13532	245115	7056	sf	441	cf
Infiltration BMP	Existing	8141 DE PALMAQ	6/30/2003		33.93618	-118.1402	245115	443008	sf	27688	cf
Infiltration BMP	Existing	8317 DAVIS ST	2/14/2014		33.93683	-118.13441	245115	13920	sf	870	cf
Infiltration BMP	Existing	8333 IOWA	10/11/2001		33.93756	-118.13356	245115	9808	sf	613	cf
Infiltration BMP	Existing	8100 PHLOX	5/20/2004		33.93956	-118.13854	245115	14400	sf	900	cf
Infiltration BMP	Existing	11040 BROOKSHIRE	1/1/2014		33.93932	-118.12496	245119	1923616	sf	120226	cf
Infiltration BMP	Existing	11136 DOLLISON	6/22/2010		33.93448	-118.09613	245122	13824	sf	864	cf
Infiltration BMP	Existing	10239 PICO VISTA	4/7/2003		33.939	-118.10316	245126	2176	sf	136	cf
Infiltration BMP	Existing	10233 PICO VISTA	4/7/2003		33.93914	-118.10305	245126	2176	sf	136	cf
Infiltration BMP	Existing	10228 PICO VISTA	4/7/2003		33.93919	-118.10235	245126	5856	sf	366	cf
Infiltration BMP	Existing	10229 PICO VISTA	4/7/2003		33.93928	-118.10295	245126	2176	sf	136	cf
Infiltration BMP	Existing	10223 PICO VISTA	4/7/2003		33.93946	-118.10289	245126	2048	sf	128	cf
Infiltration BMP	Existing	10218 PICO VISTA	4/7/2003		33.93947	-118.10223	245126	5952	sf	372	cf
Infiltration BMP	Existing	10215 PICO VISTA	4/7/2003		33.93962	-118.10237	245126	2112	sf	132	cf
Infiltration BMP	Existing	10211 PICO VISTA	4/7/2003		33.93969	-118.10255	245126	2304	sf	144	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10219 PICO VISTA	4/7/2003		33.93975	-118.10273	245126	2304	sf	144	cf
Infiltration BMP	Existing	12800 PARAMOUNT	9/16/2008		33.92108	-118.15383	246077	3168	sf	198	cf
Infiltration BMP	Existing	7930 STEWARD & GRAY	11/18/2004		33.93539	-118.14527	246077	1600	sf	100	cf
Infiltration BMP	Existing	12229 JULIUS	1/1/2006		33.93343	-118.1561	246079	944	sf	59	cf
Infiltration BMP	Existing	7845 BENARES ST	6/14/2001		33.93839	-118.14549	246079	3568	sf	223	cf
Infiltration BMP	Existing	7841 BENARES ST	6/14/2001		33.93851	-118.14537	246079	1760	sf	110	cf
Infiltration BMP	Existing	7837 BENARES ST	6/14/2001		33.93863	-118.14528	246079	1760	sf	110	cf
Infiltration BMP	Existing	7848 BENARES ST	6/14/2001		33.93863	-118.14598	246079	10640	sf	665	cf
Infiltration BMP	Existing	7833 BENARES ST	6/14/2001		33.93875	-118.14518	246079	1760	sf	110	cf
Infiltration BMP	Existing	7844 BENARES ST	6/14/2001		33.93876	-118.14591	246079	2000	sf	125	cf
Infiltration BMP	Existing	7840 BENARES ST	6/14/2001		33.93886	-118.14578	246079	2000	sf	125	cf
Infiltration BMP	Existing	11706 RIVES	6/14/2001		33.93888	-118.14506	246079	1760	sf	110	cf
Infiltration BMP	Existing	7816 BENARES ST	6/14/2001		33.93896	-118.14553	246079	9600	sf	600	cf
Infiltration BMP	Existing	7812 BENARES ST	6/14/2001		33.93904	-118.14568	246079	1760	sf	110	cf
Infiltration BMP	Existing	11726 RIVES	6/14/2001		33.93904	-118.14614	246079	1920	sf	120	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93911	-118.14583	246079	1760	sf	110	cf
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93919	-118.14598	246079	1760	sf	110	cf
Infiltration BMP	Existing	7821 BENARES ST	6/14/2001		33.93921	-118.14506	246079	1872	sf	117	cf
Infiltration BMP	Existing	7804 BENARES ST	6/14/2001		33.93926	-118.14613	246079	9760	sf	610	cf
Infiltration BMP	Existing	7817 BENARES ST	6/14/2001		33.93931	-118.14525	246079	1760	sf	110	cf
Infiltration BMP	Existing	7813 BENARES ST	6/14/2001		33.93938	-118.14542	246079	1760	sf	110	cf
Infiltration BMP	Existing	7809 BENARES ST	6/14/2001		33.93945	-118.14557	246079	1760	sf	110	cf
Infiltration BMP	Existing	7805 BENARES ST	6/14/2001		33.93953	-118.14572	246079	1760	sf	110	cf
Infiltration BMP	Existing	7801 BENARES ST	6/14/2001		33.93961	-118.14587	246079	9600	sf	600	cf
Infiltration BMP	Existing	7140 FIRESTONE	10/3/2005		33.94707	-118.15469	246079	24048	sf	1503	cf
Infiltration BMP	Existing	8233 FIRESTONE	6/21/2010		33.94076	-118.13358	246102	91648	sf	5728	cf
Infiltration BMP	Existing	7814 FIRESTONE	2/14/2014		33.94418	-118.14232	246102	3000	sf	125	cf
Infiltration BMP	Existing	7676 FIRESTONE	2/26/2004		33.94527	-118.144	246102	213824	sf	13364	cf
Infiltration BMP	Existing	7201 FIRESTONE	4/19/2007		33.94821	-118.15273	246102	34352	sf	2147	cf
Infiltration BMP	Existing	7360 FLORENCE	6/21/2010		33.95872	-118.141	246102	14496	sf	906	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8129 FLORENCE	6/23/2010		33.95231	-118.12677	246103	8880	sf	555	cf
Infiltration BMP	Existing	8605 GALLATIN ROAD	2/14/2014		33.95768	-118.11432	246103	85792	sf	5362	cf
Infiltration BMP	Existing	9276 DOWNEY	1/4/2007		33.95901	-118.11926	246103	6400	sf	400	cf
Infiltration BMP	Existing	8801 LAKEWOOD	7/14/2006		33.96317	-118.11498	246106	18352	sf	1147	cf
Infiltration BMP	Existing	7880 TELEGRAPH	11/14/2004		33.97112	-118.12113	246111	123104	sf	7694	cf
Permeable Pavement	Existing	9449 IMPERIAL	6/22/2010		33.91809	-118.12656	245115	32160	sf	2010	cf
Permeable Pavement	Existing	9565 FIRESTONE	6/3/2008		33.93043	-118.11175	245119	18928	sf	1183	cf
Permeable Pavement	Existing	12628 PARAMOUNT	2/14/2014		33.92329	-118.15283	246077	15000	sf	284	cf
Permeable Pavement	Existing	11555 PARAMOUNT	2/14/2014		33.94116	-118.14067	246077	8125	sf	400	cf
Permeable Pavement	Existing	8043 SECOND ST	1/1/2009		33.94254	-118.13737	246102	105023	sf	6787	cf
Permeable Pavement	Existing	9250 LAKEWOOD	2/14/2014		33.95768	-118.1153	246103	24662	sf	939	cf
Regional Detention Facility	Existing	9341 IMPERIAL	5/6/2004		33.91918	-118.12898	245115	664624	sf	41539	cf
Regional Infiltration Facility	Existing	12074 LAKEWOOD	5/22/2005		33.9257	-118.13203	245115	960800	sf	60050	cf
Regional Infiltration Facility	Existing	12002 LAKEWOOD	5/22/2005		33.9261	-118.13169	245115	605264	sf	37829	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8764 FIRESTONE	8/14/2008	6523923.595890	6523923.595890	1798908.496460	245119	20064	sf	1254	cf
Infiltration BMP	Existing	9915 DOWNEY	9/27/2005	6523909.682530	6523909.682530	1805554.600030	246103	2265	sf	142	cf
Infiltration BMP	Existing	7602 RUNDELL	1/27/2006	6514863.657960	6514863.657960	1798182.489930	246079	2265	sf	142	cf
Infiltration BMP	Existing	10403 SAMOLINE	10/3/2005	6521224.982130	6521224.982130	1804890.047210	246102	2265	sf	142	cf
Infiltration BMP	Existing	12516 DOLAN	11/18/2005	6518146.741440	6518146.741440	1794105.551200	245115	1698	sf	106	cf
Infiltration BMP	Existing	7845 QUILL	3/28/2006	6515351.811960	6515351.811960	1796427.555720	246079	1698	sf	106	cf
Infiltration BMP	Existing	10435 BIRCHDALE	5/19/2005	6524444.362750	6524444.362750	1802478.415410	245119	1132	sf	71	cf
Infiltration BMP	Existing	8538 ALBIA	9/23/2005	6520089.101510	6520089.101510	1795567.094110	245115	566	sf	35	cf
Infiltration BMP	Existing	12159 CORNUTA	9/16/2005	6525392.928460	6525392.928460	1794233.560240	245114	566	sf	35	cf
Infiltration BMP	Existing	8064 DACOSTA	7/7/2005	6523365.354910	6523365.354910	1805913.806160	246103	566	sf	35	cf
Infiltration BMP	Existing	8551 DALEN	10/6/2005	6518205.327280	6518205.327280	1792517.271110	245115	566	sf	35	cf
Infiltration BMP	Existing	8318 DINSDALE	6/15/2006	6523907.628300	6523907.628300	1804895.972630	246103	566	sf	35	cf
Infiltration BMP	Existing	12641 DOLAN	9/2/2005	6517370.498610	6517370.498610	1793094.154440	245115	566	sf	35	cf
Infiltration BMP	Existing	12837 DOWNEY	6/13/2008	6516221.544620	6516221.544620	1792552.216840	246077	566	sf	35	cf
Infiltration BMP	Existing	12608 DUNROBIN	1/1/2007	6525044.715110	6525044.715110	1792041.222140	245114	566	sf	35	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7715 GAINFORD	5/9/2006	6521302.031220	6521302.031220	1807578.393730	246106	566	sf	35	cf
Infiltration BMP	Existing	12337 HORLEY	6/20/2007	6514828.837130	6514828.837130	1797233.894880	246079	566	sf	35	cf
Infiltration BMP	Existing	12619 IBBETSON	4/7/2008	6525826.717640	6525826.717640	1791950.694670	245114	566	sf	35	cf
Infiltration BMP	Existing	12142 MARBEL	5/5/2008	6521265.537710	6521265.537710	1794924.230550	245115	566	sf	35	cf
Infiltration BMP	Existing	12228 NORLAIN	6/24/2005	6513924.473210	6513924.473210	1798288.206130	246079	566	sf	35	cf
Infiltration BMP	Existing	11733 PATTON	12/9/2005	6521629.388810	6521629.388810	1797656.681610	245114	566	sf	35	cf
Infiltration BMP	Existing	11712 PRUESS	3/29/2006	6518005.349510	6518005.349510	1799785.098800	246077	566	sf	35	cf
Infiltration BMP	Existing	8605 SAMOLINE	10/23/2006	6525562.919850	6525562.919850	1810382.622670	246106	566	sf	35	cf
Infiltration BMP	Existing	7814 SPRINGER	7/20/2005	6515325.745000	6515325.745000	1796943.250000	246079	566	sf	35	cf
Infiltration BMP	Existing	7406 THIRD	9/23/2005	6517102.209740	6517102.209740	1803992.224080	246102	566	sf	35	cf
Infiltration BMP	Existing	8836 TWEEDY	8/21/2006	6524333.205540	6524333.205540	1809897.996880	246106	566	sf	35	cf
Infiltration BMP	Existing	9702 TWEEDY	8/30/2005	6522704.033740	6522704.033740	1807211.824630	246103	566	sf	35	cf
Infiltration BMP	Existing	11414 PARAMOUNT	11/17/2006	6519592.558830	6519592.558830	1800943.348310	245115	37135	sf	2321	cf
Infiltration BMP	Existing	8077 FLORENCE AV	1/1/2009	6523000.000000	6523000.000000	1805200.000000	246103	31872	sf	1992	cf
Infiltration BMP	Existing	8351 FLORENCE	11/29/2005	6524092.726100	6524092.726100	1804613.455750	246103	8252	sf	516	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11003 LAKEWOOD	1/1/2006	6524400.000000	6524400.000000	1799800.000000	245119	8252	sf	516	cf
Infiltration BMP	Existing	9288 LUBEC	6/21/2010	6528705.843900	6528705.843900	1803218.787040	245125	8252	sf	516	cf
Infiltration BMP	Existing	13240 BARLIN	6/24/2005	6517118.017720	6517118.017720	1789361.126310	245524	6189	sf	387	cf
Infiltration BMP	Existing	9802 BROOKSHIRE	4/24/2007	6525737.765210	6525737.765210	1805415.750650	246103	6189	sf	387	cf
Infiltration BMP	Existing	9026 SUVA	10/5/2006	6527186.692380	6527186.692380	1804858.393970	245125	6189	sf	387	cf
Infiltration BMP	Existing	7325 IRWINGROVE	4/27/2005	6518419.969630	6518419.969630	1807291.337240	246102	5158	sf	322	cf
Infiltration BMP	Existing	10064 PANGBORN	8/16/2005	6529846.676910	6529846.676910	1801177.429270	245125	5158	sf	322	cf
Infiltration BMP	Existing	8102 THIRD	3/4/2009	6520617.238210	6520617.238210	1801805.039980	246103	7616	sf	476	cf
Infiltration BMP	Existing	12200 BELLFLOWER	11/4/2008	6524061.916580	6524061.916580	1794195.827920	245114	4126	sf	258	cf
Infiltration BMP	Existing	9818 BIRCHDALE	12/28/2005	6526194.448530	6526194.448530	1804634.814020	245125	4126	sf	258	cf
Infiltration BMP	Existing	10419 BROOKSHIRE	7/30/2007	6523842.460000	6523842.460000	1803179.994160	245119	4126	sf	258	cf
Infiltration BMP	Existing	10432 BROOKSHIRE	2/14/2007	6523911.001360	6523911.001360	1803018.354450	245119	4126	sf	258	cf
Infiltration BMP	Existing	10329 CASANES	1/1/2006	6528565.218740	6528565.218740	1800358.453120	245126	4126	sf	258	cf
Infiltration BMP	Existing	13221 CORRIGAN	3/9/2006	6523120.117490	6523120.117490	1789965.324450	245114	4126	sf	258	cf
Infiltration BMP	Existing	8816 ELSTON	12/28/2005	6526840.850650	6526840.850650	1808666.263650	246103	4126	sf	258	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9278 GAINFORD	6/15/2005	6528421.969980	6528421.969980	1803000.469050	245125	4126	sf	258	cf
Infiltration BMP	Existing	7340 IRWINGROVE	12/6/2005	6518415.507880	6518415.507880	1806990.616650	246102	4126	sf	258	cf
Infiltration BMP	Existing	9055 IRWINGROVE	10/17/2006	6526414.238800	6526414.238800	1802422.724820	245119	4126	sf	258	cf
Infiltration BMP	Existing	9005 KRISTIN	1/1/2006	6524171.005660	6524171.005660	1809376.398810	246106	4126	sf	258	cf
Infiltration BMP	Existing	9015 KRISTIN	1/1/2006	6524137.396040	6524137.396040	1809320.713720	246106	4126	sf	258	cf
Infiltration BMP	Existing	10014 LA REINA	11/3/2005	6523603.973220	6523603.973220	1805275.605180	246103	4126	sf	258	cf
Infiltration BMP	Existing	8334 LEXINGTON	3/20/2006	6523900.000000	6523900.000000	1804200.000000	246103	4126	sf	258	cf
Infiltration BMP	Existing	7114 LUXOR	7/27/2005	6513446.571340	6513446.571340	1802395.175860	246100	4126	sf	258	cf
Infiltration BMP	Existing	10348 PANGBORN	10/12/2006	6529020.867850	6529020.867850	1800144.106260	245126	4126	sf	258	cf
Infiltration BMP	Existing	7268 PELLET	12/8/2005	6516203.991240	6516203.991240	1804244.566160	246104	4126	sf	258	cf
Infiltration BMP	Existing	9821 RIVES	9/12/2005	6521261.613640	6521261.613640	1807221.725140	246106	4126	sf	258	cf
Infiltration BMP	Existing	10427 STAMPS	2/27/2006	6523141.588150	6523141.588150	1803526.008280	246103	4126	sf	258	cf
Infiltration BMP	Existing	8325 TEXAS	8/30/2007	6520789.744350	6520789.744350	1799109.948610	245114	4126	sf	258	cf
Infiltration BMP	Existing	9211 ARRINGTON	6/21/2010	6527822.609270	6527822.609270	1805896.813180	245125	3095	sf	193	cf
Infiltration BMP	Existing	10372 BIRCHDALE	1/17/2006	6524786.108330	6524786.108330	1802711.833690	245119	2660	sf	166	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9509 BROCK	10/6/2005	6524084.133490	6524084.133490	1807438.122200	246103	3095	sf	193	cf
Infiltration BMP	Existing	9600 CORD	5/12/2008	6529842.639410	6529842.639410	1803668.379590	245125	3095	sf	193	cf
Infiltration BMP	Existing	10943 CORD	3/13/2007	6526539.555830	6526539.555830	1798046.595190	245119	3095	sf	193	cf
Infiltration BMP	Existing	12569 DOLAN	9/27/2006	6517675.526540	6517675.526540	1793796.546690	245115	3095	sf	193	cf
Infiltration BMP	Existing	9252A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9252B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9622 HALEDON	3/16/2006	6528283.868130	6528283.868130	1804260.791520	245125	3095	sf	193	cf
Infiltration BMP	Existing	11442 JULIUS	7/26/2007	6517126.240320	6517126.240320	1802109.297720	246079	3095	sf	193	cf
Infiltration BMP	Existing	10026 MATTOCK	1/1/2006	6530326.462180	6530326.462180	1801330.602850	245125	3095	sf	193	cf
Infiltration BMP	Existing	9303 PARAMOUNT	3/14/2006	6523934.101920	6523934.101920	1808355.150660	246106	3095	sf	193	cf
Infiltration BMP	Existing	8739 PARKCLIFF	1/23/2006	6516653.896010	6516653.896010	1788072.265990	245524	2063	sf	129	cf
Infiltration BMP	Existing	9303 PARROT	1/4/2007	6524270.384450	6524270.384450	1808221.036420	246106	3095	sf	193	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7313 PELLET	6/22/2010	6516478.702600	6516478.702600	1804386.841100	246104	3095	sf	193	cf
Infiltration BMP	Existing	10473 PICO VISTA	1/21/2009	6529579.260180	6529579.260180	1798825.132300	245126	3095	sf	193	cf
Infiltration BMP	Existing	7840 THIRD	8/29/2007	6519254.945150	6519254.945150	1802616.251380	246102	3095	sf	193	cf
Infiltration BMP	Existing	8347 VISTA DEL ROSA	7/26/2007	6527061.884710	6527061.884710	1808864.927170	246106	3095	sf	193	cf
Infiltration BMP	Existing	11632 ADENMOOR	6/15/2005	6524141.212380	6524141.212380	1797138.142940	245114	2063	sf	129	cf
Infiltration BMP	Existing	7124 ADWEN	12/20/2007	6513937.816490	6513937.816490	1803059.644840	246100	2063	sf	129	cf
Infiltration BMP	Existing	7258 ADWEN	1/3/2008	6515068.905460	6515068.905460	1802384.347520	246079	2063	sf	129	cf
Infiltration BMP	Existing	7646 ADWEN	10/6/2005	6517037.957040	6517037.957040	1801170.785850	246079	2063	sf	129	cf
Infiltration BMP	Existing	7702 ADWEN	5/11/2006	6517121.727310	6517121.727310	1801116.179360	246079	2063	sf	129	cf
Infiltration BMP	Existing	13032 AIRPOINT	5/14/2007	6517972.459000	6517972.459000	1790335.341940	245115	2063	sf	129	cf
Infiltration BMP	Existing	8455 ALAMEDA	8/7/2008	6519558.018350	6519558.018350	1795721.453060	245115	2063	sf	129	cf
Infiltration BMP	Existing	8632 ALAMEDA	11/2/2006	6520500.318510	6520500.318510	1795019.322380	245115	2063	sf	129	cf
Infiltration BMP	Existing	7945 ALBIA	10/11/2005	6516993.544600	6516993.544600	1797608.073070	246079	2063	sf	129	cf
Infiltration BMP	Existing	8704 ALBIA	5/28/2008	6520928.243910	6520928.243910	1795073.644330	245115	2063	sf	129	cf
Infiltration BMP	Existing	7845 ARNETT	6/18/2010	6518353.322440	6518353.322440	1801165.354440	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9217 ARRINGTON	3/27/2006	6527795.727670	6527795.727670	1805838.303240	245125	2063	sf	129	cf
Infiltration BMP	Existing	7870 BAYSINGER	2/8/2008	6521311.922790	6521311.922790	1805484.679070	246102	2063	sf	129	cf
Infiltration BMP	Existing	9964 BELCHER	5/16/2007	6525622.979960	6525622.979960	1789815.793090	245113	2063	sf	129	cf
Infiltration BMP	Existing	12556 BELLDER	8/17/2007	6518567.857140	6518567.857140	1793310.793680	245115	2063	sf	129	cf
Infiltration BMP	Existing	11614 BELLFLOWER	11/7/2008	6523771.271210	6523771.271210	1797348.312220	245114	2063	sf	129	cf
Infiltration BMP	Existing	11802 BELLMAN	3/9/2007	6521898.080850	6521898.080850	1797268.375540	245114	2063	sf	129	cf
Infiltration BMP	Existing	7502 BENARES	1/30/2009	6515952.395710	6515952.395710	1801162.932420	246079	2063	sf	129	cf
Infiltration BMP	Existing	7824 BORSON	5/24/2007	6514090.231790	6514090.231790	1794571.039330	246077	2063	sf	129	cf
Infiltration BMP	Existing	7442 BROOKMILL	2/6/2006	6515991.568850	6515991.568850	1801492.813950	246079	2063	sf	129	cf
Infiltration BMP	Existing	9202 BUELL	7/21/2008	6526325.599230	6526325.599230	1799668.061170	245119	2063	sf	129	cf
Infiltration BMP	Existing	9340 BUELL	8/9/2006	6527287.659290	6527287.659290	1799162.594770	245126	2063	sf	129	cf
Infiltration BMP	Existing	8707 BYERS	3/15/2006	6521183.641890	6521183.641890	1796053.567730	245115	2063	sf	129	cf
Infiltration BMP	Existing	10446 CASANES	10/26/2006	6528470.793910	6528470.793910	1799828.787480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10932 CASANES	11/17/2005	6527225.467210	6527225.467210	1797760.272650	245119	2063	sf	129	cf
Infiltration BMP	Existing	13341 CASTANA	10/28/2005	6517576.502130	6517576.502130	1788949.477410	245524	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7408 CECILIA	10/27/2005	6517829.130300	6517829.13 0300	1804625.8274 60	246102	2063	sf	129	cf
Infiltration BMP	Existing	7604 CECILIA	5/14/2007	6518455.494160	6518455.49 4160	1804215.7945 90	246102	2063	sf	129	cf
Infiltration BMP	Existing	9116 CHANEY	12/19/2005	6529189.877980	6529189.87 7980	1805493.8171 50	245125	2063	sf	129	cf
Infiltration BMP	Existing	8210 CHEYENNE	3/18/2008	6515440.785260	6515440.78 5260	1792057.3068 90	246077	2063	sf	129	cf
Infiltration BMP	Existing	9663 CLANCEY	8/17/2005	6527712.819630	6527712.81 9630	1804149.9083 20	245125	2063	sf	129	cf
Infiltration BMP	Existing	10708 CLANCEY	12/9/2005	6525546.299290	6525546.29 9290	1800088.7469 00	245119	2063	sf	129	cf
Infiltration BMP	Existing	8336 CLETA	5/8/2006	6520552.025180	6520552.02 5180	1798452.2387 60	245114	2063	sf	129	cf
Infiltration BMP	Existing	8557 CLETA	7/24/2006	6521804.225790	6521804.22 5790	1798033.5152 10	245114	2063	sf	129	cf
Infiltration BMP	Existing	8532 COLE	11/7/2005	6521000.000000	6521000.00 0000	1796400.0000 00	245115	2063	sf	129	cf
Infiltration BMP	Existing	9003 CORD	6/23/2010	6530731.156250	6530731.15 6250	1805583.4098 40	245127	2063	sf	129	cf
Infiltration BMP	Existing	9203 CORD	11/14/2008	6530209.591170	6530209.59 1170	1804419.1699 00	245125	2063	sf	129	cf
Infiltration BMP	Existing	13029 CORNUTA	5/17/2007	6525511.407030	6525511.40 7030	1790564.4409 90	245113	2063	sf	129	cf
Infiltration BMP	Existing	13102 CORNUTA	8/2/2007	6525701.503660	6525701.50 3660	1790504.9149 50	245113	2063	sf	129	cf
Infiltration BMP	Existing	13130 CORNUTA	6/25/2007	6525701.486250	6525701.48 6250	1790230.2513 10	245113	2063	sf	129	cf
Infiltration BMP	Existing	9245 DALEWOOD	9/23/2005	6532196.615620	6532196.61 5620	1804345.9457 60	245127	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13440 DEMPSTER	10/26/2006	6516234.168650	6516234.168650	1789111.153470	245524	2063	sf	129	cf
Infiltration BMP	Existing	13448 DEMPSTER	5/10/2007	6516184.596670	6516184.596670	1789023.378330	245524	2063	sf	129	cf
Infiltration BMP	Existing	8125 DINSDALE	12/20/2005	6523223.693140	6523223.693140	1805447.514320	246103	2063	sf	129	cf
Infiltration BMP	Existing	10343 DOLAN	3/7/2007	6523688.489440	6523688.489440	1803733.392340	246103	2063	sf	129	cf
Infiltration BMP	Existing	10616 DOLAN	12/8/2005	6523091.688370	6523091.688370	1802186.196180	246103	2063	sf	129	cf
Infiltration BMP	Existing	8451 DONOVAN	10/20/2006	6518824.326830	6518824.326830	1794831.678890	245115	2063	sf	129	cf
Infiltration BMP	Existing	11915 DOWNEY	9/26/2007	6519404.158310	6519404.158310	1797577.606330	245115	2063	sf	129	cf
Infiltration BMP	Existing	12269 DOWNEY	3/16/2006	6518129.427940	6518129.427940	1795616.200900	246077	2063	sf	129	cf
Infiltration BMP	Existing	12631 DUNROBIN	1/14/2009	6524865.692630	6524865.692630	1791809.740080	245114	2063	sf	129	cf
Infiltration BMP	Existing	12644 DUNROBIN	12/27/2006	6525045.107610	6525045.107610	1791670.201830	245114	2063	sf	129	cf
Infiltration BMP	Existing	13212 DUNROBIN	3/6/2008	6525046.199690	6525046.199690	1790094.955960	245114	2063	sf	129	cf
Infiltration BMP	Existing	9018 EGLISE	6/18/2010	6530595.364130	6530595.364130	1805560.296250	245127	2063	sf	129	cf
Infiltration BMP	Existing	9252C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9254A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	8902 ELSTON	6/22/2010	6526760.905110	6526760.905110	1808606.155990	246103	2063	sf	129	cf
Infiltration BMP	Existing	8420 EUCALYPTUS	11/1/2007	6518268.185230	6518268.185230	1794519.531140	245115	2063	sf	129	cf
Infiltration BMP	Existing	8543 FARM	7/14/2008	6524366.648200	6524366.648200	1802748.102990	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7963 FIFTH	4/13/2007	6520492.297340	6520492.297340	1803181.748460	246103	2063	sf	129	cf
Infiltration BMP	Existing	7606 FINEVALE	7/23/2007	6522317.087820	6522317.087820	1809781.757910	246111	2063	sf	129	cf
Infiltration BMP	Existing	8740 FIRESTONE	2/5/2008	6523707.154590	6523707.154590	1799037.579000	245119	2063	sf	129	cf
Infiltration BMP	Existing	8663 FONTANA	8/11/2005	6522041.808010	6522041.808010	1796935.622550	245114	2063	sf	129	cf
Infiltration BMP	Existing	7435 FOSTORIA	8/30/2005	6517713.795360	6517713.795360	1804555.032870	246102	2063	sf	129	cf
Infiltration BMP	Existing	7611 FOSTORIA	7/5/2007	6518456.715640	6518456.715640	1804071.041810	246102	2063	sf	129	cf
Infiltration BMP	Existing	8029 FOURTH	6/15/2006	6520786.200710	6520786.200710	1802533.409070	246103	2063	sf	129	cf
Infiltration BMP	Existing	8524 GAINFORD	6/27/2008	6525485.453790	6525485.453790	1804820.431910	245125	2063	sf	129	cf
Infiltration BMP	Existing	9332 GAINFORD	7/20/2006	6528750.550820	6528750.550820	1802746.272930	245125	2063	sf	129	cf
Infiltration BMP	Existing	9330 GALLATIN	8/2/2007	6529116.628720	6529116.628720	1804180.197000	245125	2063	sf	129	cf
Infiltration BMP	Existing	12271 GLYNN	10/18/2005	6518435.603700	6518435.603700	1795389.616520	245115	2063	sf	129	cf
Infiltration BMP	Existing	9123 HALEDON	1/23/2006	6528738.408770	6528738.408770	1805747.051990	245125	2063	sf	129	cf
Infiltration BMP	Existing	7915 HARPER	2/7/2006	6520609.146350	6520609.146350	1804298.454990	246102	2063	sf	129	cf
Infiltration BMP	Existing	9108 HASTY	8/23/2006	6531133.870830	6531133.870830	1805211.202040	245127	2063	sf	129	cf
Infiltration BMP	Existing	10840 HASTY	1/16/2008	6527245.272860	6527245.272860	1798387.513250	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7468 HONDO	12/31/2008	6513888.485770	6513888.485770	1797503.008930	246079	2063	sf	129	cf
Infiltration BMP	Existing	7838 HONDO	2/26/2008	6515366.533450	6515366.533450	1796561.911100	246079	2063	sf	129	cf
Infiltration BMP	Existing	7926 HONDO	7/25/2006	6515828.269550	6515828.269550	1796282.236280	246079	2063	sf	129	cf
Infiltration BMP	Existing	12023 HORTON	10/5/2005	6515547.066470	6515547.066470	1799512.855270	246079	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	11/5/2009	6519723.348540	6519723.348540	1806551.787860	246102	2063	sf	129	cf
Infiltration BMP	Existing	11828 JULIUS	1/3/2008	6515976.382140	6515976.382140	1800524.752810	246079	2063	sf	129	cf
Infiltration BMP	Existing	9256 KLINEDALE	12/4/2007	6531745.367500	6531745.367500	1804500.031620	245127	2063	sf	129	cf
Infiltration BMP	Existing	9452 KLINEDALE	4/24/2008	6531257.497660	6531257.497660	1803653.019950	245127	2063	sf	129	cf
Infiltration BMP	Existing	9031 LEMORAN	1/30/2009	6529792.995960	6529792.995960	1806045.812140	245125	2063	sf	129	cf
Infiltration BMP	Existing	9910 LESTERFORD	8/3/2005	6531140.582200	6531140.582200	1801442.142180	245125	2063	sf	129	cf
Infiltration BMP	Existing	8533 LOWMAN	1/3/2008	6525796.079270	6525796.079270	1810845.309540	246106	2063	sf	129	cf
Infiltration BMP	Existing	8349 LUBEC	12/27/2006	6524776.248350	6524776.248350	1805794.753990	246103	2063	sf	129	cf
Infiltration BMP	Existing	7630 LUXOR	6/27/2005	6516552.896900	6516552.896900	1800452.817120	246079	2063	sf	129	cf
Infiltration BMP	Existing	12342 MARBEL	3/23/2006	6520586.635090	6520586.635090	1793799.804370	245115	2063	sf	129	cf
Infiltration BMP	Existing	9045 MARGARET ST	1/1/2006	6524143.176440	6524143.176440	1798109.987740	245114	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10410 MATTOCK	10/2/2007	6529164.649420	6529164.649420	1799820.803610	245126	2063	sf	129	cf
Infiltration BMP	Existing	10615 MATTOCK	2/22/2006	6528479.681880	6528479.681880	1798952.207590	245126	2063	sf	129	cf
Infiltration BMP	Existing	9136 MELDAR	3/1/2007	6526738.891530	6526738.891530	1807241.651780	246103	2063	sf	129	cf
Infiltration BMP	Existing	7437 MULLER	10/3/2005	6518230.115820	6518230.115820	1805283.479580	246102	1032	sf	64	cf
Infiltration BMP	Existing	7452 MULLER	10/3/2005	6518271.461030	6518271.461030	1805049.518080	246102	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	8/9/2007	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	7/14/2008	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10261 NEWVILLE	10/30/2007	6529641.666020	6529641.666020	1800383.942770	245126	2063	sf	129	cf
Infiltration BMP	Existing	10311 NEWVILLE	1/29/2009	6529538.574620	6529538.574620	1800214.882210	245126	2063	sf	129	cf
Infiltration BMP	Existing	10420 NEWVILLE	4/11/2008	6529346.061190	6529346.061190	1799529.176420	245126	2063	sf	129	cf
Infiltration BMP	Existing	10524 NEWVILLE	6/11/2007	6529062.272820	6529062.272820	1798916.257500	245126	2063	sf	129	cf
Infiltration BMP	Existing	9842 NORLAIN	3/9/2007	6519878.070320	6519878.070320	1807987.575840	246111	2063	sf	129	cf
Infiltration BMP	Existing	10403 PANGBORN	9/16/2005	6528806.561730	6528806.561730	1800136.574080	245126	2063	sf	129	cf
Infiltration BMP	Existing	10421 PANGBORN	6/5/2006	6528710.057740	6528710.057740	1799977.600600	245126	2063	sf	129	cf
Infiltration BMP	Existing	10903 PANGBORN	5/12/2008	6527497.056040	6527497.056040	1797964.159830	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9508 PARAMOUNT	7/23/2007	6523724.334180	6523724.334180	1807653.518330	246106	2063	sf	129	cf
Infiltration BMP	Existing	9709 PARROT	6/20/2008	6523336.123150	6523336.123150	1806770.831150	246103	2063	sf	129	cf
Infiltration BMP	Existing	7107 PELLET	10/26/2005	6515228.221140	6515228.221140	1805197.090730	246104	2063	sf	129	cf
Infiltration BMP	Existing	10316 PICO VISTA	6/22/2010	6530326.941520	6530326.941520	1799752.739480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10459 PICO VISTA	8/20/2008	6529643.308750	6529643.308750	1798930.291180	245126	2063	sf	129	cf
Infiltration BMP	Existing	11809 POMERING	1/25/2008	6515588.727520	6515588.727520	1800891.851040	246079	2063	sf	129	cf
Infiltration BMP	Existing	11821 POMERING	11/20/2008	6515535.205010	6515535.205010	1800794.072400	246079	2063	sf	129	cf
Infiltration BMP	Existing	9050 PRISCILLA	2/21/2007	6519218.937330	6519218.937330	1790014.532510	245115	2063	sf	129	cf
Infiltration BMP	Existing	8230 PURITAN	7/12/2007	6515756.650110	6515756.650110	1792196.388750	246077	2063	sf	129	cf
Infiltration BMP	Existing	8107 RAVILLER	6/22/2010	6524405.759790	6524405.759790	1808219.110840	246106	2063	sf	129	cf
Infiltration BMP	Existing	9940 RICHEON	12/26/2007	6520640.158150	6520640.158150	1807053.597690	246106	2063	sf	129	cf
Infiltration BMP	Existing	12015 RICHEON	6/21/2010	6515852.443580	6515852.443580	1799404.256870	246079	2063	sf	129	cf
Infiltration BMP	Existing	7336 RIO HONDO PL	12/26/2007	6516915.991390	6516915.991390	1804928.334260	246104	2063	sf	129	cf
Infiltration BMP	Existing	8418 RIVES	9/30/2005	6525367.917230	6525367.917230	1811575.863460	246106	1032	sf	64	cf
Infiltration BMP	Existing	11638 RIVES	11/2/2006	6517541.202300	6517541.202300	1800577.741160	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11706 RIVES	10/16/2006	6517702.333530	6517702.333530	1800238.435400	246079	2063	sf	129	cf
Infiltration BMP	Existing	12436 ROSE	11/6/2006	6520776.455000	6520776.455000	1793075.765000	245115	2063	sf	129	cf
Infiltration BMP	Existing	12033 SAMOLINE	2/22/2008	6517025.771360	6517025.771360	1798249.691900	246079	2063	sf	129	cf
Infiltration BMP	Existing	12051 SAMOLINE	9/3/2008	6516919.542440	6516919.542440	1798077.846870	246079	2063	sf	129	cf
Infiltration BMP	Existing	12302 SAMOLINE	6/22/2010	6516399.204110	6516399.204110	1796321.463670	246077	2063	sf	129	cf
Infiltration BMP	Existing	7921 SECOND	2/15/2006	6519427.915180	6519427.915180	1802349.970040	246102	2063	sf	129	cf
Infiltration BMP	Existing	9700 SHELLEYFIELD	7/17/2008	6527622.312900	6527622.312900	1804250.399390	245125	2063	sf	129	cf
Infiltration BMP	Existing	10553 SHELLEYFIELD	6/11/2008	6525493.222190	6525493.222190	1800845.190450	245119	2063	sf	129	cf
Infiltration BMP	Existing	8732 SMALLWOOD	2/16/2006	6524307.398160	6524307.398160	1810444.440300	246106	2063	sf	129	cf
Infiltration BMP	Existing	8816 SMALLWOOD	10/11/2005	6524123.348010	6524123.348010	1810138.117570	246106	2063	sf	129	cf
Infiltration BMP	Existing	9127 SONGFEST	12/1/2005	6531508.595900	6531508.595900	1805094.820630	245127	2063	sf	129	cf
Infiltration BMP	Existing	9143 STEWART & GRAY	11/30/2005	6523803.019500	6523803.019500	1796254.085000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9211 STEWART & GRAY	11/27/2006	6524190.537790	6524190.537790	1796254.765000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9112 STOAKES	8/23/2006	6526782.391540	6526782.391540	1807626.036510	246103	2063	sf	129	cf
Infiltration BMP	Existing	9533 SUVA	6/27/2006	6530409.847860	6530409.847860	1802701.771860	245125	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9729 TRISTAN	10/18/2005	6526617.474570	6526617.474570	1804798.283870	245125	2063	sf	129	cf
Infiltration BMP	Existing	9216 TWEEDY	12/9/2005	6523630.155980	6523630.155980	1808715.397490	246106	2063	sf	129	cf
Infiltration BMP	Existing	13602 VERDURA	6/28/2007	6516296.473820	6516296.473820	1788728.235150	245524	2063	sf	129	cf
Infiltration BMP	Existing	10305 VULTEE	10/9/2006	6525949.622700	6525949.622700	1802510.250780	245119	2063	sf	129	cf
Infiltration BMP	Existing	10017 WILEY BURKE	6/22/2010	6520091.056520	6520091.056520	1807145.868160	246106	2063	sf	129	cf
Infiltration BMP	Existing	8538 ADOREE	9/26/2007	6517768.216360	6517768.216360	1792006.503470	245115	1032	sf	64	cf
Infiltration BMP	Existing	9407 ADOREE	1/1/2006	6522413.313750	6522413.313750	1791106.017430	245115	1032	sf	64	cf
Infiltration BMP	Existing	7134 ADWEN	1/1/2005	6514021.670500	6514021.670500	1803005.164870	246100	1032	sf	64	cf
Infiltration BMP	Existing	7343 ADWEN	9/4/2007	6515521.914470	6515521.914470	1802266.858280	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 ADWEN	12/5/2006	6517543.195590	6517543.195590	1801041.561520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7802 ADWEN	10/18/2005	6517699.212930	6517699.212930	1800872.280990	246079	1032	sf	64	cf
Infiltration BMP	Existing	7828 ADWEN	8/4/2005	6517918.117250	6517918.117250	1800738.511970	246079	1032	sf	64	cf
Infiltration BMP	Existing	7852 ADWEN	1/9/2009	6518131.432520	6518131.432520	1800607.974520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7855 ADWEN	11/23/2005	6518235.708380	6518235.708380	1800774.963010	246079	1032	sf	64	cf
Infiltration BMP	Existing	12823 AIRPOINT	6/29/2007	6518348.749200	6518348.749200	1791281.430170	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8441 ALAMEDA	10/31/2005	6519442.769190	6519442.769190	1795780.926380	245115	1032	sf	64	cf
Infiltration BMP	Existing	8549 ALAMEDA	6/23/2010	6520129.148230	6520129.148230	1795426.542360	245115	1032	sf	64	cf
Infiltration BMP	Existing	8448 ALBIA	1/1/2007	6519556.734390	6519556.734390	1795840.452920	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 ALBIA	2/27/2007	6520000.245000	6520000.245000	1795612.955000	245115	1032	sf	64	cf
Infiltration BMP	Existing	9718 ALIWIN	8/2/2005	6532030.038780	6532030.038780	1804115.104340	245127	1032	sf	64	cf
Infiltration BMP	Existing	7936 ALLENGROVE	1/22/2007	6524421.678930	6524421.678930	1809567.173140	246106	1032	sf	64	cf
Infiltration BMP	Existing	8116 ALLENGROVE	12/5/2005	6525137.825210	6525137.825210	1808747.451430	246106	1032	sf	64	cf
Infiltration BMP	Existing	9166 ANGELL	9/2/2008	6520625.089300	6520625.089300	1790394.866750	245115	1032	sf	64	cf
Infiltration BMP	Existing	9351 APPLEBY	1/3/2008	6529580.566170	6529580.566170	1804445.997380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9520 ARDINE	10/6/2005	6527613.323800	6527613.323800	1797533.903060	245119	1032	sf	64	cf
Infiltration BMP	Existing	7814 ARNETT	6/22/2010	6517981.553910	6517981.553910	1801095.347060	246079	1032	sf	64	cf
Infiltration BMP	Existing	7815 ARNETT	6/22/2010	6518066.490340	6518066.490340	1801237.713920	246079	1032	sf	64	cf
Infiltration BMP	Existing	7832 ARNETT	1/11/2007	6518132.684800	6518132.684800	1801021.243050	246079	1032	sf	64	cf
Infiltration BMP	Existing	8241 ARNETT	11/29/2006	6520442.071210	6520442.071210	1799867.842140	245115	1032	sf	64	cf
Infiltration BMP	Existing	7743 BAIRNSDALE	5/16/2006	6523474.546480	6523474.546480	1810551.323320	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12904 BARLIN	1/15/2009	6518150.890370	6518150.890370	1791163.941140	245115	1032	sf	64	cf
Infiltration BMP	Existing	13247 BARLIN	5/5/2005	6516868.829160	6516868.829160	1789428.146200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7871 BAYSINGER	1/10/2007	6521422.493960	6521422.493960	1805635.813480	246102	1032	sf	64	cf
Infiltration BMP	Existing	8607 BAYSINGER	1/1/2005	6525304.240800	6525304.240800	1803291.716200	245119	1032	sf	64	cf
Infiltration BMP	Existing	9131 BAYSINGER	9/10/2008	6526918.982970	6526918.982970	1802474.767100	245119	1032	sf	64	cf
Infiltration BMP	Existing	9411 BAYSINGER	9/24/2007	6528736.042510	6528736.042510	1801262.782730	245126	1032	sf	64	cf
Infiltration BMP	Existing	9320 BELCHER	4/10/2007	6520600.361450	6520600.361450	1789754.109890	245115	1032	sf	64	cf
Infiltration BMP	Existing	9969 BELCHER	7/29/2009	6525669.288070	6525669.288070	1789992.480470	245113	1032	sf	64	cf
Infiltration BMP	Existing	10375 BELDER	6/22/2010	6522812.240000	6522812.240000	1803043.757460	246103	1032	sf	64	cf
Infiltration BMP	Existing	7441 BENARES	10/25/2005	6515921.019300	6515921.019300	1801396.174500	246079	1032	sf	64	cf
Infiltration BMP	Existing	7503 BENARES	1/16/2008	6516046.045620	6516046.045620	1801313.189720	246079	1032	sf	64	cf
Infiltration BMP	Existing	11014 BENFIELD	12/19/2005	6531918.630750	6531918.630750	1797937.959120	245122	1032	sf	64	cf
Infiltration BMP	Existing	8555 BIGBY	8/22/2005	6524606.668030	6524606.668030	1802914.545010	245119	1032	sf	64	cf
Infiltration BMP	Existing	9308 BIGBY	12/18/2008	6527591.908660	6527591.908660	1800839.109380	245126	1032	sf	64	cf
Infiltration BMP	Existing	9345 BIGBY	5/16/2006	6527999.312020	6527999.312020	1800803.102000	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9389 BIGBY	9/20/2007	6528361.925530	6528361.925530	1800582.426270	245126	1032	sf	64	cf
Infiltration BMP	Existing	8246 BIRCHCREST	11/28/2005	6526713.325530	6526713.325530	1809350.628180	246106	1032	sf	64	cf
Infiltration BMP	Existing	10434 BIRCHDALE	12/2/2008	6524586.579650	6524586.579650	1802390.820140	245119	1032	sf	64	cf
Infiltration BMP	Existing	8812 BIRCHLEAF	5/3/2007	6527457.897210	6527457.897210	1808468.377860	246103	1032	sf	64	cf
Infiltration BMP	Existing	8912 BIRCHLEAF	10/9/2007	6527209.329660	6527209.329660	1808281.543500	246103	1032	sf	64	cf
Infiltration BMP	Existing	13330 BIXLER	3/21/2007	6516259.886220	6516259.886220	1789972.109000	245524	1032	sf	64	cf
Infiltration BMP	Existing	13411 BIXLER	9/30/2008	6515914.285010	6515914.285010	1789635.314360	245524	1032	sf	64	cf
Infiltration BMP	Existing	13425 BIXLER	8/17/2005	6515841.147610	6515841.147610	1789505.869380	245524	1032	sf	64	cf
Infiltration BMP	Existing	13454 BIXLER	5/10/2007	6515808.905200	6515808.905200	1789174.120800	245524	1032	sf	64	cf
Infiltration BMP	Existing	8220 BLANDWOOD	6/22/2010	6526086.691350	6526086.691350	1808873.058080	246103	1032	sf	64	cf
Infiltration BMP	Existing	12809 BLODGETT	1/1/2006	6518629.647540	6518629.647540	1791208.759970	245115	1032	sf	64	cf
Infiltration BMP	Existing	13026 BLODGETT	1/1/2005	6518225.401930	6518225.401930	1790248.943990	245115	1032	sf	64	cf
Infiltration BMP	Existing	13045 BLODGETT	10/6/2005	6517990.284020	6517990.284020	1790176.483690	245115	1032	sf	64	cf
Infiltration BMP	Existing	13114 BLODGETT	10/6/2005	6517888.613290	6517888.613290	1789931.616790	245115	1032	sf	64	cf
Infiltration BMP	Existing	7931 BORSON	9/6/2006	6514752.824370	6514752.824370	1794266.718830	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8202 BORSON	6/5/2006	6516202.097710	6516202.097710	1793267.543860	246077	1032	sf	64	cf
Infiltration BMP	Existing	8428 BORSON	11/21/2008	6517449.915190	6517449.915190	1792528.167220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8515 BORSON	3/14/2005	6517771.929480	6517771.929480	1792500.505870	245115	1032	sf	64	cf
Infiltration BMP	Existing	8345 BOYNE	6/18/2010	6519344.143470	6519344.143470	1796446.421390	245115	1032	sf	64	cf
Infiltration BMP	Existing	8402 BOYNE	1/1/2005	6519302.113240	6519302.113240	1796279.573520	245115	1032	sf	64	cf
Infiltration BMP	Existing	8525 BOYNE	7/20/2006	6520189.715440	6520189.715440	1796009.699660	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 BOYNE	2/22/2007	6520138.661540	6520138.661540	1795848.718800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8613 BOYSON	1/1/2006	6520167.899980	6520167.899980	1794794.451220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8647 BOYSON	7/29/2008	6520447.155570	6520447.155570	1794619.557270	245115	1032	sf	64	cf
Infiltration BMP	Existing	10216 BRANSCOMB	2/21/2007	6526794.108720	6526794.108720	1790310.156040	245113	1032	sf	64	cf
Infiltration BMP	Existing	10291 BRANSCOMB	7/25/2006	6527529.378260	6527529.378260	1790458.207730	245118	1032	sf	64	cf
Infiltration BMP	Existing	9624 BROCK	4/22/2005	6523849.153810	6523849.153810	1806723.688440	246103	1032	sf	64	cf
Infiltration BMP	Existing	12351 BROCK	9/3/2008	6516676.858850	6516676.858850	1795612.256100	246077	1032	sf	64	cf
Infiltration BMP	Existing	12608 BROCK	2/11/2005	6516008.590090	6516008.590090	1794308.259250	246077	1032	sf	64	cf
Infiltration BMP	Existing	8269 BROOKGREEN	1/1/2006	6526709.836510	6526709.836510	1808858.860970	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BROOKMILL	6/21/2010	6518005.266020	6518005.266020	1800484.266850	246079	1032	sf	64	cf
Infiltration BMP	Existing	8025 BROOKPARK	1/1/2005	6525207.617130	6525207.617130	1809814.105880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9707 BROOKSHIRE	3/14/2005	6525762.512240	6525762.512240	1805795.982660	246103	1032	sf	64	cf
Infiltration BMP	Existing	10429 BROOKSHIRE	1/19/2005	6523911.001360	6523911.001360	1803018.354450	245119	1032	sf	64	cf
Infiltration BMP	Existing	12404 BROOKSHIRE	6/25/2007	6518808.785660	6518808.785660	1794169.944640	245115	1032	sf	64	cf
Infiltration BMP	Existing	7622 BRUNACHE	10/31/2007	6515665.309920	6515665.309920	1799097.073030	246079	1032	sf	64	cf
Infiltration BMP	Existing	8216 BRUNACHE	11/6/2007	6518414.904440	6518414.904440	1797242.748270	245115	1032	sf	64	cf
Infiltration BMP	Existing	9033 BUCKLES	6/21/2010	6523179.898540	6523179.898540	1796909.863810	245114	1032	sf	64	cf
Infiltration BMP	Existing	7540 BUELL	1/1/2004	6518499.698980	6518499.698980	1804545.470300	246102	1032	sf	64	cf
Infiltration BMP	Existing	9330 BUELL	2/15/2006	6527195.126160	6527195.126160	1799219.087810	245126	1032	sf	64	cf
Infiltration BMP	Existing	9351 BUELL	6/21/2010	6527484.251630	6527484.251630	1799288.621620	245126	1032	sf	64	cf
Infiltration BMP	Existing	9634 BUELL	3/16/2006	6528774.281270	6528774.281270	1798139.573770	245126	1032	sf	64	cf
Infiltration BMP	Existing	9067 BUHMAN	11/20/2007	6530056.595350	6530056.595350	1805336.923900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9208 BUHMAN	6/16/2008	6529799.831660	6529799.831660	1804544.819190	245125	1032	sf	64	cf
Infiltration BMP	Existing	10237 CASANES	3/23/2006	6528975.248660	6528975.248660	1801017.460740	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10321 CASANES	1/1/2007	6528597.524650	6528597.524650	1800411.412530	245126	1032	sf	64	cf
Infiltration BMP	Existing	10403 CASANES	12/21/2005	6528532.829940	6528532.829940	1800305.536240	245126	1032	sf	64	cf
Infiltration BMP	Existing	10408 CASANES	1/1/2005	6528665.671960	6528665.671960	1800149.799930	245126	1032	sf	64	cf
Infiltration BMP	Existing	10812 CASANES	3/14/2005	6527610.698650	6527610.698650	1798391.295520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10835 CASANES	4/1/2008	6527345.484730	6527345.484730	1798305.683780	245119	1032	sf	64	cf
Infiltration BMP	Existing	10944 CASANES	1/1/2006	6527151.352860	6527151.352860	1797710.972890	245119	1032	sf	64	cf
Infiltration BMP	Existing	8457 CAVEL	9/24/2007	6519984.576530	6519984.576530	1796420.555450	245115	1032	sf	64	cf
Infiltration BMP	Existing	9502 CECILIA	10/11/2007	6527927.079440	6527927.079440	1798327.652080	245126	1032	sf	64	cf
Infiltration BMP	Existing	9531 CECILIA	8/23/2006	6528208.236430	6528208.236430	1798317.933420	245126	1032	sf	64	cf
Infiltration BMP	Existing	9435 CEDARTREE	6/22/2010	6530636.457520	6530636.457520	1805866.234670	245127	1032	sf	64	cf
Infiltration BMP	Existing	9010 CHANEY	11/30/2005	6529789.693370	6529789.693370	1806340.793150	245125	1032	sf	64	cf
Infiltration BMP	Existing	9011 CHANEY	1/31/2006	6529640.900410	6529640.900410	1806424.653160	245125	1032	sf	64	cf
Infiltration BMP	Existing	9134 CHANEY	1/1/2005	6529119.825860	6529119.825860	1805332.958450	245125	1032	sf	64	cf
Infiltration BMP	Existing	10252 CHANEY	1/1/2006	6527373.631100	6527373.631100	1801932.130180	245119	1032	sf	64	cf
Infiltration BMP	Existing	10530 CHANEY	6/3/2008	6526461.472620	6526461.472620	1800532.795270	245119	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8355 CHARLOMA	9/16/2005	6524931.861530	6524931.861530	1806017.636180	246103	1032	sf	64	cf
Infiltration BMP	Existing	9037 CHARLOMA	9/25/2007	6527230.271760	6527230.271760	1804669.291940	245125	1032	sf	64	cf
Infiltration BMP	Existing	8565 CHEROKEE	2/14/2008	6524386.530150	6524386.530150	1802386.701010	245119	1032	sf	64	cf
Infiltration BMP	Existing	8030 CHEYENNE	1/1/2005	6514573.751210	6514573.751210	1792580.925090	246077	1032	sf	64	cf
Infiltration BMP	Existing	8117 CHEYENNE	4/10/2006	6515045.470000	6515045.470000	1792480.065000	246077	1032	sf	64	cf
Infiltration BMP	Existing	8418 CHEYENNE	1/1/2006	6516589.334020	6516589.334020	1791278.419980	245524	1032	sf	64	cf
Infiltration BMP	Existing	9303 CLANCEY	4/3/2006	6528228.489510	6528228.489510	1805319.961840	245125	1032	sf	64	cf
Infiltration BMP	Existing	10518 CLANCEY	3/9/2007	6526045.670270	6526045.670270	1800904.969960	245119	1032	sf	64	cf
Infiltration BMP	Existing	8316 CLETA	4/3/2007	6520383.826830	6520383.826830	1798544.940710	245114	1032	sf	64	cf
Infiltration BMP	Existing	8529 CLETA	1/1/2004	6521562.602410	6521562.602410	1798134.090240	245114	1032	sf	64	cf
Infiltration BMP	Existing	13113 COLDBROOK	6/13/2007	6524340.025750	6524340.025750	1790440.866070	245114	3095	sf	193	cf
Infiltration BMP	Existing	13227 COLDBROOK	2/22/2008	6524428.823880	6524428.823880	1789883.562480	245114	1032	sf	64	cf
Infiltration BMP	Existing	8554 COMOLETTE	6/21/2010	6517765.395020	6517765.395020	1791693.915800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8417 CONKLIN	1/1/2006	6516931.143420	6516931.143420	1791819.671020	245524	1032	sf	64	cf
Infiltration BMP	Existing	7219 COOLGROVE	4/25/2006	6521787.460350	6521787.460350	1811479.001950	246111	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7605 COOLGROVE	6/22/2010	6522636.872680	6522636.872680	1810413.845850	246111	1032	sf	64	cf
Infiltration BMP	Existing	10210 CORD	2/12/2009	6528662.670970	6528662.670970	1801499.064930	245126	1032	sf	64	cf
Infiltration BMP	Existing	7706 COREY	6/22/2010	6515304.522120	6515304.522120	1798247.325380	246079	1032	sf	64	cf
Infiltration BMP	Existing	11708 CORRIGAN	5/30/2006	6523410.919990	6523410.919990	1796690.721900	245114	1032	sf	64	cf
Infiltration BMP	Existing	13227 CORRIGAN	4/11/2006	6523118.258510	6523118.258510	1789898.574120	245114	1032	sf	64	cf
Infiltration BMP	Existing	10809 CROSSDALE	1/30/2006	6532012.269030	6532012.269030	1798722.436870	245122	1032	sf	64	cf
Infiltration BMP	Existing	7803 DACOSTA	1/1/2006	6521705.534400	6521705.534400	1807011.928190	246106	1032	sf	64	cf
Infiltration BMP	Existing	7808 DACOSTA	3/29/2007	6521675.640660	6521675.640660	1806840.332210	246106	1032	sf	64	cf
Infiltration BMP	Existing	7826 DACOSTA	3/23/2007	6521825.889640	6521825.889640	1806744.301550	246106	1032	sf	64	cf
Infiltration BMP	Existing	8064 DACOSTA	1/6/2009	6523365.354910	6523365.354910	1805913.806160	246103	1032	sf	64	cf
Infiltration BMP	Existing	9242 DALEWOOD	5/17/2007	6532339.520890	6532339.520890	1804239.830010	245127	1032	sf	64	cf
Infiltration BMP	Existing	7044 DE PALMA	1/30/2006	6513058.006240	6513058.006240	1802286.102090	246100	1032	sf	64	cf
Infiltration BMP	Existing	7956 DE PALMA	7/28/2005	6517915.235930	6517915.235930	1799223.139650	246077	1032	sf	64	cf
Infiltration BMP	Existing	8232 DE PALMA	12/10/2008	6519342.730110	6519342.730110	1798392.424410	245115	1032	sf	64	cf
Infiltration BMP	Existing	13134 DEMING	2/6/2007	6518053.947000	6518053.947000	1789691.993030	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DEMING	8/12/2005	6518068.820530	6518068.820530	1789032.682680	245115	1032	sf	64	cf
Infiltration BMP	Existing	13415 DEMPSTER	1/1/2007	6516194.546390	6516194.546390	1789419.790430	245524	1032	sf	64	cf
Infiltration BMP	Existing	13434 DEMPSTER	1/12/2006	6516258.965410	6516258.965410	1789155.039770	245524	1032	sf	64	cf
Infiltration BMP	Existing	13452 DEMPSTER	9/20/2005	6516159.819690	6516159.819690	1788979.483200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7324 DINSDALE	6/21/2010	6518936.024560	6518936.024560	1807958.155410	246106	1032	sf	64	cf
Infiltration BMP	Existing	8352 DINSDALE	12/19/2005	6524191.795240	6524191.795240	1804722.231880	246103	1032	sf	64	cf
Infiltration BMP	Existing	9325 DINSDALE	7/3/2007	6528635.640220	6528635.640220	1802187.000380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9812 DOLAN	1/10/2007	6524918.033470	6524918.033470	1805427.859430	246103	1032	sf	64	cf
Infiltration BMP	Existing	10410 DOLAN	9/19/2007	6523686.660150	6523686.660150	1803351.652190	245119	1032	sf	64	cf
Infiltration BMP	Existing	12522 DOLAN	12/9/2005	6518109.498100	6518109.498100	1794046.260040	245115	1032	sf	64	cf
Infiltration BMP	Existing	12634 DOLAN	4/11/2006	6517527.198260	6517527.198260	1793053.966010	245115	1032	sf	64	cf
Infiltration BMP	Existing	12712 DOLAN	4/27/2005	6517393.756980	6517393.756980	1792842.640770	245115	1032	sf	64	cf
Infiltration BMP	Existing	8740 DONOVAN	11/2/2006	6520467.711390	6520467.711390	1793463.175520	245115	1032	sf	64	cf
Infiltration BMP	Existing	6408 DOS RIOS	3/7/2007	6523246.583700	6523246.583700	1811462.058000	246111	1032	sf	64	cf
Infiltration BMP	Existing	6420 DOS RIOS	7/14/2008	6523082.430580	6523082.430580	1811381.024700	246111	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6449 DOS RIOS	8/23/2005	6522675.424950	6522675.424950	1811505.638050	246111	1032	sf	64	cf
Infiltration BMP	Existing	6481 DOS RIOS	8/8/2007	6522296.417970	6522296.417970	1811546.494500	246111	1032	sf	64	cf
Infiltration BMP	Existing	9532 DOWNEY	9/21/2007	6524828.225510	6524828.225510	1806555.186060	246103	1032	sf	64	cf
Infiltration BMP	Existing	12115 DOWNEY	8/12/2005	6518801.058860	6518801.058860	1796628.276370	245115	1032	sf	64	cf
Infiltration BMP	Existing	12116 DOWNEY	7/24/2008	6518985.048760	6518985.048760	1796501.621880	245115	1032	sf	64	cf
Infiltration BMP	Existing	12545 DOWNEY	7/7/2005	6517126.997680	6517126.997680	1794204.833310	246077	1032	sf	64	cf
Infiltration BMP	Existing	13620 DOWNEY	10/24/2007	6515777.167020	6515777.167020	1788934.803130	245524	1032	sf	64	cf
Infiltration BMP	Existing	9756 DOWNEY SANFORD BRIDGE	11/6/2008	6530232.905320	6530232.905320	1802732.275270	245125	1032	sf	64	cf
Infiltration BMP	Existing	12109 DUNROBIN	5/27/2008	6524849.554990	6524849.554990	1794742.565720	245114	1032	sf	64	cf
Infiltration BMP	Existing	12602 DUNROBIN	4/21/2008	6525045.021790	6525045.021790	1792096.938130	245114	1032	sf	64	cf
Infiltration BMP	Existing	13118 DUNROBIN	8/1/2008	6525045.611060	6525045.611060	1790357.500340	245114	1032	sf	64	cf
Infiltration BMP	Existing	13447 EARNSHAW	3/4/2005	6516486.580000	6516486.580000	1788881.960000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12246 EASTBROOK	7/3/2007	6525290.855020	6525290.855020	1793729.113600	245114	1032	sf	64	cf
Infiltration BMP	Existing	13102 EASTBROOK	5/30/2006	6525376.065000	6525376.065000	1790509.718450	245114	1032	sf	64	cf
Infiltration BMP	Existing	13207 EASTBROOK	1/1/2006	6525181.215010	6525181.215010	1790147.343800	245114	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9010 EGLISE	6/22/2010	6530616.481070	6530616.48 1070	1805612.9309 40	245127	1032	sf	64	cf
Infiltration BMP	Existing	9124 EGLISE	1/1/2006	6530099.347460	6530099.34 7460	1804464.0361 40	245125	1032	sf	64	cf
Infiltration BMP	Existing	10228 EGLISE	6/16/2008	6528317.527320	6528317.52 7320	1801552.4961 90	245126	1032	sf	64	cf
Infiltration BMP	Existing	8432 EUCALYPTUS	6/21/2010	6518375.883890	6518375.88 3890	1794450.2522 20	245115	1032	sf	64	cf
Infiltration BMP	Existing	8451 EUCALYPTUS	11/5/2008	6518648.903650	6518648.90 3650	1794509.4491 60	245115	1032	sf	64	cf
Infiltration BMP	Existing	8449 EVEREST	9/20/2006	6518402.636450	6518402.63 6450	1794253.8409 80	245115	1032	sf	64	cf
Infiltration BMP	Existing	9036 FARM	1/1/2005	6525791.032450	6525791.03 2450	1801568.3358 90	245119	1032	sf	64	cf
Infiltration BMP	Existing	9068 FARM	1/1/2005	6526062.157630	6526062.15 7630	1801402.9772 90	245119	1032	sf	64	cf
Infiltration BMP	Existing	8334 FIFTH	6/24/2005	6522409.331110	6522409.33 1110	1801742.5364 30	245114	1032	sf	64	cf
Infiltration BMP	Existing	8540 FIFTH	1/1/2005	6523591.182480	6523591.18 2480	1801021.4504 70	245114	1032	sf	64	cf
Infiltration BMP	Existing	7238 FLORENCE	11/14/2005	6518231.298960	6518231.29 8960	1807648.9493 10	246104	1032	sf	64	cf
Infiltration BMP	Existing	8324 FONTANA	1/1/2006	6519936.868340	6519936.86 8340	1797701.6914 40	245115	1032	sf	64	cf
Infiltration BMP	Existing	7322 FOSTER BRIDGE	6/18/2010	6520302.817760	6520302.81 7760	1810322.8490 60	246111	1032	sf	64	cf
Infiltration BMP	Existing	7441 FOSTORIA	10/25/2005	6517764.674110	6517764.67 4110	1804520.9530 30	246102	1032	sf	64	cf
Infiltration BMP	Existing	7520 FOSTORIA	1/20/2006	6517974.460950	6517974.46 0950	1804167.7598 20	246102	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7639 FOSTORIA	7/27/2007	6518691.469740	6518691.469740	1803918.676960	246102	1032	sf	64	cf
Infiltration BMP	Existing	7915 FOURTH	5/29/2007	6519890.537430	6519890.537430	1803170.158590	246102	1032	sf	64	cf
Infiltration BMP	Existing	7922 FOURTH	1/1/2005	6519878.319950	6519878.319950	1802959.531390	246102	1032	sf	64	cf
Infiltration BMP	Existing	7411 FOURTH PL	9/10/2007	6517375.746060	6517375.746060	1804408.156270	246102	1032	sf	64	cf
Infiltration BMP	Existing	7519 FOURTH PL	6/23/2005	6517868.488420	6517868.488420	1804088.501010	246102	1032	sf	64	cf
Infiltration BMP	Existing	7329 GAINFORD	9/20/2007	6519599.973200	6519599.973200	1808409.397520	246111	1032	sf	64	cf
Infiltration BMP	Existing	7725 GAINFORD	6/21/2010	6521357.607460	6521357.607460	1807543.814610	246106	1032	sf	64	cf
Infiltration BMP	Existing	7735 GAINFORD	12/15/2006	6521461.236080	6521461.236080	1807480.220630	246106	1032	sf	64	cf
Infiltration BMP	Existing	7771 GAINFORD	12/3/2007	6521758.954890	6521758.954890	1807297.289390	246106	1032	sf	64	cf
Infiltration BMP	Existing	8353 GAINFORD	1/4/2007	6524689.963810	6524689.963810	1805534.024270	246103	1032	sf	64	cf
Infiltration BMP	Existing	8553 GAINFORD	4/7/2008	6525875.670020	6525875.670020	1804802.065800	245125	1032	sf	64	cf
Infiltration BMP	Existing	9114 GAINFORD	6/23/2010	6527375.967240	6527375.967240	1803418.253090	245125	1032	sf	64	cf
Infiltration BMP	Existing	8319 GALLATIN	6/23/2010	6525634.222480	6525634.222480	1807445.394810	246103	1032	sf	64	cf
Infiltration BMP	Existing	9069 GALLATIN	3/1/2005	6527846.830170	6527846.830170	1805432.059660	245125	1032	sf	64	cf
Infiltration BMP	Existing	9243 GALLATIN	6/19/2006	6528915.102070	6528915.102070	1804595.777040	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8408 GALT	6/18/2010	6520848.594160	6520848.594160	1798562.646220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8435 GALT	12/27/2005	6521154.530230	6521154.530230	1798569.782020	245114	1032	sf	64	cf
Infiltration BMP	Existing	9119 GARNISH	6/22/2010	6529517.516530	6529517.516530	1805110.082900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9136 GARNISH	2/5/2007	6529607.954040	6529607.954040	1804869.027300	245125	1032	sf	64	cf
Infiltration BMP	Existing	9024 GAYMONT	8/28/2007	6523451.624790	6523451.624790	1809501.434890	246111	1032	sf	64	cf
Infiltration BMP	Existing	12636 GLYNN	10/25/2005	6517337.921050	6517337.921050	1793251.757000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12751 GLYNN	1/1/2005	6516780.406550	6516780.406550	1792749.927780	245524	1032	sf	64	cf
Infiltration BMP	Existing	12755 GLYNN	6/18/2010	6516753.778610	6516753.778610	1792707.557200	245524	1032	sf	64	cf
Infiltration BMP	Existing	12912 GLYNN	1/1/2005	6516567.905690	6516567.905690	1791996.175300	245524	1032	sf	64	cf
Infiltration BMP	Existing	8731 GUATEMALA	10/30/2008	6523507.693960	6523507.693960	1811098.218950	246106	1032	sf	64	cf
Infiltration BMP	Existing	9203 GUATEMALA	3/23/2006	6521893.308510	6521893.308510	1810154.570390	246111	1032	sf	64	cf
Infiltration BMP	Existing	9959 GUATEMALA	6/23/2010	6518699.649950	6518699.649950	1808234.818150	246111	1032	sf	64	cf
Infiltration BMP	Existing	13537 GUNDERSON	3/3/2008	6517350.406160	6517350.406160	1787757.556610	245524	1032	sf	64	cf
Infiltration BMP	Existing	13547 GUNDERSON	6/19/2006	6517298.502270	6517298.502270	1787667.099660	245524	1032	sf	64	cf
Infiltration BMP	Existing	11538 GURLEY	5/3/2005	6520211.328840	6520211.328840	1799382.602480	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11935 GURLEY	6/18/2010	6519051.777570	6519051.777570	1797582.114550	245115	1032	sf	64	cf
Infiltration BMP	Existing	12019 GURLEY	6/18/2010	6518869.145640	6518869.145640	1797295.091770	245115	1032	sf	64	cf
Infiltration BMP	Existing	12052 GURLEY	1/10/2006	6518841.793230	6518841.793230	1796925.916150	245115	1032	sf	64	cf
Infiltration BMP	Existing	12117 GURLEY	1/1/2007	6518497.250390	6518497.250390	1796711.283370	245115	1032	sf	64	cf
Infiltration BMP	Existing	9117 HALEDON	7/31/2006	6528761.573350	6528761.573350	1805801.190120	245125	1032	sf	64	cf
Infiltration BMP	Existing	10341 HALEDON	5/1/2006	6526657.457480	6526657.457480	1801653.926760	245119	1032	sf	64	cf
Infiltration BMP	Existing	10349 HALEDON	2/8/2005	6526618.690140	6526618.690140	1801591.635520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10425 HALEDON	4/14/2005	6526424.760130	6526424.760130	1801280.406410	245119	1032	sf	64	cf
Infiltration BMP	Existing	10439 HALEDON	9/30/2005	6526346.747570	6526346.747570	1801155.573630	245119	1032	sf	64	cf
Infiltration BMP	Existing	10525 HALEDON	1/28/2005	6526113.410380	6526113.410380	1800804.505840	245119	1032	sf	64	cf
Infiltration BMP	Existing	10550 HALEDON	12/19/2005	6526112.578950	6526112.578950	1800485.376650	245119	1032	sf	64	cf
Infiltration BMP	Existing	9049 HALL ROAD	4/30/2008	6523684.587500	6523684.587500	1797586.831540	245114	1032	sf	64	cf
Infiltration BMP	Existing	7215 HANNON	12/19/2008	6521498.261440	6521498.261440	1811442.204100	246111	1032	sf	64	cf
Infiltration BMP	Existing	13005 HANWELL	2/11/2009	6519590.457150	6519590.457150	1789492.134120	245115	1032	sf	64	cf
Infiltration BMP	Existing	9022 HASTY	10/13/2005	6531232.650260	6531232.650260	1805433.916070	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 HASTY	6/22/2010	6530848.690890	6530848.690890	1804978.371330	245127	1032	sf	64	cf
Infiltration BMP	Existing	9206 HASTY	1/1/2005	6531000.691980	6531000.691980	1804885.411940	245127	1032	sf	64	cf
Infiltration BMP	Existing	9241 HASTY	1/1/2006	6530719.487200	6530719.487200	1804649.180550	245127	1032	sf	64	cf
Infiltration BMP	Existing	7736 HONDO	2/8/2005	6514830.078530	6514830.078530	1796886.774430	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 HONDO	1/24/2007	6515005.269000	6515005.269000	1796951.957630	246079	1032	sf	64	cf
Infiltration BMP	Existing	7803 HONDO	10/11/2005	6515156.509020	6515156.509020	1796903.351830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7808 HONDO	6/22/2010	6515109.805390	6515109.805390	1796717.393590	246079	1032	sf	64	cf
Infiltration BMP	Existing	7814 HONDO	7/25/2008	6515161.093050	6515161.093050	1796686.379320	246079	1032	sf	64	cf
Infiltration BMP	Existing	7920 HONDO	8/21/2006	6515777.018460	6515777.018460	1796313.217950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7932 HONDO	1/1/2006	6515879.568480	6515879.568480	1796251.099580	246079	1032	sf	64	cf
Infiltration BMP	Existing	9008 HORLEY	7/19/2007	6523080.991430	6523080.991430	1809910.740800	246111	1032	sf	64	cf
Infiltration BMP	Existing	9838 HORLEY	7/3/2008	6521155.061500	6521155.061500	1807271.870840	246106	1032	sf	64	cf
Infiltration BMP	Existing	12307 HORLEY	1/1/2005	6514989.782150	6514989.782150	1797487.116040	246079	1032	sf	64	cf
Infiltration BMP	Existing	11427 HORTON	11/23/2005	6517266.456490	6517266.456490	1802136.009270	246079	1032	sf	64	cf
Infiltration BMP	Existing	11553 HORTON	4/21/2005	6516872.120940	6516872.120940	1801498.085040	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11708 HORTON	10/25/2005	6516455.941870	6516455.941870	1800783.417100	246079	1032	sf	64	cf
Infiltration BMP	Existing	12646 IBBETSON	5/6/2005	6526008.756240	6526008.756240	1791650.535870	245114	1032	sf	64	cf
Infiltration BMP	Existing	8217 IMPERIAL	1/5/2009	6516889.628840	6516889.628840	1794092.786860	246077	1032	sf	64	cf
Infiltration BMP	Existing	7320 IRWINGROVE	1/1/2006	6518255.802480	6518255.802480	1807084.876440	246102	1032	sf	64	cf
Infiltration BMP	Existing	7710 IRWINGROVE	12/11/2007	6520151.425540	6520151.425540	1805902.138310	246102	1032	sf	64	cf
Infiltration BMP	Existing	12208 IZETTA	1/1/2006	6524718.745010	6524718.745010	1794118.344290	245114	1032	sf	64	cf
Infiltration BMP	Existing	12252 IZETTA	7/10/2008	6524718.900100	6524718.900100	1793666.382200	245114	1032	sf	64	cf
Infiltration BMP	Existing	12631 IZETTA	8/28/2007	6524602.625920	6524602.625920	1791809.267080	245114	1032	sf	64	cf
Infiltration BMP	Existing	10228 JULIUS	5/20/2008	6519748.327880	6519748.327880	1806603.074440	246102	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	6/22/2010	6519723.348540	6519723.348540	1806551.787860	246102	1032	sf	64	cf
Infiltration BMP	Existing	11848 JULIUS	6/23/2010	6515875.825190	6515875.825190	1800351.825190	246079	1032	sf	64	cf
Infiltration BMP	Existing	11859 JULIUS	8/23/2005	6515676.490910	6515676.490910	1800355.137490	246079	1032	sf	64	cf
Infiltration BMP	Existing	11865 JULIUS	11/13/2006	6515650.173870	6515650.173870	1800309.916770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12129 JULIUS	9/29/2005	6514728.334670	6514728.334670	1798846.683770	246079	1032	sf	64	cf
Infiltration BMP	Existing	9263 KLINEDALE	6/21/2010	6531573.525950	6531573.525950	1804517.918460	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 LA REINA	11/27/2006	6525690.537020	6525690.537020	1808255.600740	246103	1032	sf	64	cf
Infiltration BMP	Existing	9251 LA REINA	8/10/2007	6525325.121400	6525325.121400	1807968.316200	246103	1032	sf	64	cf
Infiltration BMP	Existing	9260 LA REINA	6/14/2007	6525343.506110	6525343.506110	1807785.350080	246103	1032	sf	64	cf
Infiltration BMP	Existing	9633 LA REINA	9/24/2007	6524180.010720	6524180.010720	1806496.849820	246103	1032	sf	64	cf
Infiltration BMP	Existing	10026 LA REINA	1/1/2005	6523542.730590	6523542.730590	1805175.247470	246103	1032	sf	64	cf
Infiltration BMP	Existing	10219 LA REINA	5/25/2006	6522978.941790	6522978.941790	1804778.433210	246103	1032	sf	64	cf
Infiltration BMP	Existing	8346 LA VILLA	8/29/2005	6522426.709000	6522426.709000	1801414.465390	245114	1032	sf	64	cf
Infiltration BMP	Existing	9524 LA VILLA	9/27/2005	6527942.492070	6527942.492070	1797972.664540	245119	1032	sf	64	cf
Infiltration BMP	Existing	14305 LAKEWOOD	1/1/2006	6518183.322800	6518183.322800	1787270.059950	245524	1032	sf	64	cf
Infiltration BMP	Existing	8218 LANKIN	3/28/2006	6516908.705740	6516908.705740	1794755.893760	246077	1032	sf	64	cf
Infiltration BMP	Existing	13407 LAURELDALE	10/25/2005	6516128.982330	6516128.982330	1789557.891060	245524	1032	sf	64	cf
Infiltration BMP	Existing	11034 LE FLOSS	3/21/2008	6531318.633350	6531318.633350	1797718.334360	245124	1032	sf	64	cf
Infiltration BMP	Existing	9013 LEMORAN	3/16/2006	6529860.990680	6529860.990680	1806212.694780	245125	1032	sf	64	cf
Infiltration BMP	Existing	10036 LESTERFORD	1/11/2006	6530911.516090	6530911.516090	1801094.347740	245125	1032	sf	64	cf
Infiltration BMP	Existing	8355 LEXINGTON	6/15/2005	6523932.891700	6523932.891700	1804236.927600	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7432 LUBEC	7/8/2005	6519806.105180	6519806.105180	1808430.037290	246111	1032	sf	64	cf
Infiltration BMP	Existing	9318 LUBEC	1/1/2006	6528946.832250	6528946.832250	1803071.454980	245125	1032	sf	64	cf
Infiltration BMP	Existing	7341 LUXOR	9/30/2005	6515165.173860	6515165.173860	1801559.243950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 LUXOR	8/18/2006	6517197.964320	6517197.964320	1800308.569440	246079	1032	sf	64	cf
Infiltration BMP	Existing	7809 LUXOR	1/1/2006	6517239.593210	6517239.593210	1799986.863830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7982 LUXOR	7/3/2007	6518306.219270	6518306.219270	1799333.376300	246077	1032	sf	64	cf
Infiltration BMP	Existing	8509 LUXOR	12/31/2008	6521183.510000	6521183.510000	1797885.775000	245114	1032	sf	64	cf
Infiltration BMP	Existing	11505 MAC GOVERN	5/1/2006	6519990.708800	6519990.708800	1799977.759420	245115	1032	sf	64	cf
Infiltration BMP	Existing	11527 MAC GOVERN	11/19/2007	6519889.562820	6519889.562820	1799806.361750	245115	1032	sf	64	cf
Infiltration BMP	Existing	8518 MANATEE	4/27/2005	6521541.591450	6521541.591450	1798287.495050	245114	1032	sf	64	cf
Infiltration BMP	Existing	12306 MARBEL	12/29/2005	6520780.434840	6520780.434840	1794110.003960	245115	1032	sf	64	cf
Infiltration BMP	Existing	12322 MARBEL	8/24/2005	6520697.258530	6520697.258530	1793976.926170	245115	1032	sf	64	cf
Infiltration BMP	Existing	10423 MATTOCK	11/21/2008	6528946.576280	6528946.576280	1799798.739650	245126	1032	sf	64	cf
Infiltration BMP	Existing	10527 MATTOCK	1/11/2007	6528618.163260	6528618.163260	1799183.483330	245126	1032	sf	64	cf
Infiltration BMP	Existing	8602 MEADOW	2/28/2008	6519007.155950	6519007.155950	1793158.643900	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8606 MEADOW	10/26/2006	6519050.372960	6519050.372960	1793129.529230	245115	1032	sf	64	cf
Infiltration BMP	Existing	8739 MEADOW	12/17/2007	6520051.313480	6520051.313480	1792689.390880	245115	1032	sf	64	cf
Infiltration BMP	Existing	9106 MELDAR	4/23/2007	6526980.004600	6526980.004600	1807421.893550	246103	1032	sf	64	cf
Infiltration BMP	Existing	7819 MELVA	1/1/2005	6515811.952890	6515811.952890	1797638.263460	246079	1032	sf	64	cf
Infiltration BMP	Existing	8609 MELVA	4/6/2007	6520260.479750	6520260.479750	1795043.474460	245115	1032	sf	64	cf
Infiltration BMP	Existing	9558 METRO	4/3/2008	6531485.802060	6531485.802060	1804114.777900	245127	1032	sf	64	cf
Infiltration BMP	Existing	11711 MITLA	7/13/2005	6513453.724060	6513453.724060	1802912.278240	246100	1032	sf	64	cf
Infiltration BMP	Existing	11819 MORNING	6/21/2010	6517496.555960	6517496.555960	1799723.226450	246077	1032	sf	64	cf
Infiltration BMP	Existing	12070 MORNING	9/13/2006	6516788.931410	6516788.931410	1797957.975300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8637 MORY	1/1/2005	6520217.929830	6520217.929830	1794453.857040	245115	1032	sf	64	cf
Infiltration BMP	Existing	10903 MYRTLE	10/25/2005	6520809.999180	6520809.999180	1802308.735020	246103	1032	sf	64	cf
Infiltration BMP	Existing	8208 NADA	6/29/2005	6518679.653960	6518679.653960	1797804.552950	245115	1032	sf	64	cf
Infiltration BMP	Existing	8249 NADA	2/12/2008	6519111.183860	6519111.183860	1797730.010570	245115	1032	sf	64	cf
Infiltration BMP	Existing	9458 NANCE	6/20/2005	6526752.832360	6526752.832360	1796717.105850	245119	1032	sf	64	cf
Infiltration BMP	Existing	10609 NEDRA	6/3/2005	6522752.614640	6522752.614640	1802538.434710	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10850 NEWVILLE	7/3/2007	6528159.933410	6528159.933410	1797635.549950	245119	1032	sf	64	cf
Infiltration BMP	Existing	7510 NOREN	5/23/2006	6520838.348300	6520838.348300	1809064.222230	246111	1032	sf	64	cf
Infiltration BMP	Existing	11720 NORLAIN	9/22/2006	6515696.110230	6515696.110230	1801264.632180	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 NORLAIN	8/1/2007	6513658.838460	6513658.838460	1797875.767390	246079	1032	sf	64	cf
Infiltration BMP	Existing	11628 OLD RIVER SCHOOL	1/1/2006	6515797.838400	6515797.838400	1801876.521840	246079	1032	sf	64	cf
Infiltration BMP	Existing	8521 ORANGE	3/9/2007	6519427.831130	6519427.831130	1794911.101980	245115	1032	sf	64	cf
Infiltration BMP	Existing	9255 ORIZABA	2/15/2006	6525108.451310	6525108.451310	1808168.208600	246103	1032	sf	64	cf
Infiltration BMP	Existing	9719 ORIZABA	8/8/2007	6523780.810110	6523780.810110	1806377.528150	246103	1032	sf	64	cf
Infiltration BMP	Existing	12615 ORIZABA	1/27/2006	6516062.877730	6516062.877730	1794206.618320	246077	1032	sf	64	cf
Infiltration BMP	Existing	8511 OTTO	4/12/2005	6525130.700850	6525130.700850	1804530.864040	245125	1032	sf	64	cf
Infiltration BMP	Existing	9933 PANGBORN	6/29/2006	6530067.434760	6530067.434760	1801915.181390	245125	1032	sf	64	cf
Infiltration BMP	Existing	10202 PANGBORN	1/1/2006	6529571.236640	6529571.236640	1801045.668670	245125	1032	sf	64	cf
Infiltration BMP	Existing	11009 PANGBORN	1/31/2007	6527339.080190	6527339.080190	1797691.116980	245119	1032	sf	64	cf
Infiltration BMP	Existing	9530 PARAMOUNT	7/14/2005	6523601.663290	6523601.663290	1807461.311510	246103	1032	sf	64	cf
Infiltration BMP	Existing	9624 PARAMOUNT	5/9/2005	6523328.526550	6523328.526550	1807031.980170	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8603 PARROT	3/14/2006	6526080.240790	6526080.240790	1809719.746830	246106	1032	sf	64	cf
Infiltration BMP	Existing	9625 PARROT	1/1/2005	6523451.735380	6523451.735380	1806960.011690	246103	1032	sf	64	cf
Infiltration BMP	Existing	9708 PARROT	6/29/2006	6523491.321500	6523491.321500	1806678.668660	246103	1032	sf	64	cf
Infiltration BMP	Existing	12045 PARROT	6/22/2010	6517861.439330	6517861.439330	1797868.798060	246077	1032	sf	64	cf
Infiltration BMP	Existing	12751 PARROT	12/14/2006	6515222.728500	6515222.728500	1793830.999240	246077	1032	sf	64	cf
Infiltration BMP	Existing	7130 PELLET	1/27/2005	6515276.387650	6515276.387650	1804845.311440	246104	1032	sf	64	cf
Infiltration BMP	Existing	7323 PELLET	1/1/2005	6516571.171210	6516571.171210	1804327.110650	246104	1032	sf	64	cf
Infiltration BMP	Existing	7354 PELLET	1/1/2006	6516665.448760	6516665.448760	1803945.359790	246102	1032	sf	64	cf
Infiltration BMP	Existing	7861 PHLOX	9/17/2007	6518688.116640	6518688.116640	1801430.417420	246079	1032	sf	64	cf
Infiltration BMP	Existing	10620 PICO VISTA	3/7/2007	6529428.403390	6529428.403390	1798283.402620	245126	1032	sf	64	cf
Infiltration BMP	Existing	10635 PICO VISTA	8/28/2007	6529197.816790	6529197.816790	1798270.093070	245126	1032	sf	64	cf
Infiltration BMP	Existing	7530 PIVOT	11/23/2005	6516899.016370	6516899.016370	1802660.318910	246079	1032	sf	64	cf
Infiltration BMP	Existing	7709 PIVOT	10/11/2005	6517859.569570	6517859.569570	1802212.124870	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 PIVOT	6/14/2005	6518241.212950	6518241.212950	1801966.921690	246079	1032	sf	64	cf
Infiltration BMP	Existing	11974 POMERING	6/18/2010	6515116.938670	6515116.938670	1799645.797070	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8732 PRICHARD ST	1/12/2009	6516786.371080	6516786.371080	1788406.289900	245524	1032	sf	64	cf
Infiltration BMP	Existing	8734 PRICHARD ST	1/12/2009	6516831.574810	6516831.574810	1788380.860770	245524	1032	sf	64	cf
Infiltration BMP	Existing	8738 PRICHARD ST	1/12/2009	6516876.454020	6516876.454020	1788355.597890	245524	1032	sf	64	cf
Infiltration BMP	Existing	8740 PRICHARD ST	1/12/2009	6516921.333860	6516921.333860	1788330.343610	245524	1032	sf	64	cf
Infiltration BMP	Existing	8240 PRISCILLA	9/13/2007	6515555.844810	6515555.844810	1791697.292180	246077	1032	sf	64	cf
Infiltration BMP	Existing	9044 PRISCILLA	8/18/2005	6519169.042140	6519169.042140	1790017.667840	245115	1032	sf	64	cf
Infiltration BMP	Existing	9060 PRISCILLA	6/21/2010	6519318.719160	6519318.719160	1790008.270400	245115	1032	sf	64	cf
Infiltration BMP	Existing	11448 PRUESS	1/1/2006	6518742.114860	6518742.114860	1801046.878700	246077	1032	sf	64	cf
Infiltration BMP	Existing	11609 PRUESS	11/16/2006	6518299.675980	6518299.675980	1800455.121300	246077	1032	sf	64	cf
Infiltration BMP	Existing	11619 PRUESS	6/10/2005	6518270.484730	6518270.484730	1800355.677990	246077	1032	sf	64	cf
Infiltration BMP	Existing	11708 PRUESS	1/18/2005	6518033.994760	6518033.994760	1799832.073440	246077	1032	sf	64	cf
Infiltration BMP	Existing	8121 PURITAN	6/5/2006	6515245.448070	6515245.448070	1792698.037730	246077	1032	sf	64	cf
Infiltration BMP	Existing	7707 QUILL	6/1/2007	6514508.683200	6514508.683200	1796937.770200	246079	1032	sf	64	cf
Infiltration BMP	Existing	8108 QUOIT	6/5/2008	6516594.034560	6516594.034560	1795288.918170	246077	1032	sf	64	cf
Infiltration BMP	Existing	9109 RAVILLER	2/6/2007	6527953.464140	6527953.464140	1804924.402110	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9367 RAVILLER	1/1/2006	6529435.914270	6529435.914270	1803746.913820	245125	1032	sf	64	cf
Infiltration BMP	Existing	9728 RICHEON	6/18/2010	6521201.804800	6521201.804800	1807962.626360	246106	1032	sf	64	cf
Infiltration BMP	Existing	12217 RICHEON	1/1/2005	6514937.033870	6514937.033870	1797986.477150	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 RICHEON	1/10/2007	6514721.816510	6514721.816510	1797298.695230	246079	1032	sf	64	cf
Infiltration BMP	Existing	12342 RICHEON	1/1/2005	6514694.932100	6514694.932100	1797256.523880	246079	1032	sf	64	cf
Infiltration BMP	Existing	12352 RICHEON	10/30/2008	6514641.834370	6514641.834370	1797172.034360	246079	1032	sf	64	cf
Infiltration BMP	Existing	11010 RIO HONDO	2/6/2006	6514511.989690	6514511.989690	1805412.886430	246104	1032	sf	64	cf
Infiltration BMP	Existing	8515 RIVES	2/6/2006	6524958.575190	6524958.575190	1811619.081610	246111	1032	sf	64	cf
Infiltration BMP	Existing	8546 RIVES	6/14/2010	6524726.063490	6524726.063490	1811337.492550	246106	1032	sf	64	cf
Infiltration BMP	Existing	11828 RIVES	1/1/2006	6517020.372820	6517020.372820	1799741.223590	246079	1032	sf	64	cf
Infiltration BMP	Existing	12056 RIVES	10/7/2005	6516252.097820	6516252.097820	1798479.870770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12213 RIVES	6/7/2007	6515544.034920	6515544.034920	1797794.303030	246079	1032	sf	64	cf
Infiltration BMP	Existing	12301 RIVES	1/27/2006	6515274.134590	6515274.134590	1797373.251430	246079	1032	sf	64	cf
Infiltration BMP	Existing	12542 ROSE	6/18/2010	6520775.320830	6520775.320830	1792425.734550	245115	1032	sf	64	cf
Infiltration BMP	Existing	7444 RUNDELL	9/28/2006	6514195.392880	6514195.392880	1798477.819400	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7458 RUNDELL	1/1/2006	6514328.036950	6514328.036950	1798395.544300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8734 RUPP	5/24/2007	6518769.625610	6518769.625610	1791861.464390	245115	1032	sf	64	cf
Infiltration BMP	Existing	9206 SAMOLINE	9/20/2006	6524105.922670	6524105.922670	1808777.784250	246106	1032	sf	64	cf
Infiltration BMP	Existing	9363 SAMOLINE	2/12/2009	6523342.697990	6523342.697990	1808041.206940	246106	1032	sf	64	cf
Infiltration BMP	Existing	9630 SAMOLINE	1/1/2006	6523000.405210	6523000.405210	1807164.143360	246103	1032	sf	64	cf
Infiltration BMP	Existing	12041 SAMOLINE	6/23/2010	6516971.702030	6516971.702030	1798170.274910	246079	1032	sf	64	cf
Infiltration BMP	Existing	10629 SHELLEYFIELD	6/21/2010	6525284.582980	6525284.582980	1800508.363190	245119	1032	sf	64	cf
Infiltration BMP	Existing	9118 SHERIDELL	6/22/2010	6528683.896100	6528683.896100	1805941.227670	245125	1032	sf	64	cf
Infiltration BMP	Existing	10042 SIDEVIEW	6/21/2010	6529464.806690	6529464.806690	1801729.923910	245125	1032	sf	64	cf
Infiltration BMP	Existing	8349 SIXTH	6/21/2010	6522706.066860	6522706.066860	1802231.249170	245114	1032	sf	64	cf
Infiltration BMP	Existing	8363 SIXTH	6/18/2010	6522832.335670	6522832.335670	1802150.209500	245114	1032	sf	64	cf
Infiltration BMP	Existing	8532 SIXTH	6/23/2010	6523697.106090	6523697.106090	1801388.440460	245119	1032	sf	64	cf
Infiltration BMP	Existing	8514 SMALLWOOD	8/24/2006	6525167.581560	6525167.581560	1811228.866910	246106	1032	sf	64	cf
Infiltration BMP	Existing	12007 SMALLWOOD	1/1/2005	6516682.861570	6516682.861570	1798786.226940	246079	1032	sf	64	cf
Infiltration BMP	Existing	12936 SMALLWOOD	7/31/2006	6513688.714060	6513688.714060	1793540.982580	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9235 SONGFEST	6/14/2006	6531351.855720	6531351.855720	1804709.858310	245127	1032	sf	64	cf
Infiltration BMP	Existing	7939 SPRINGER	10/6/2006	6516193.792450	6516193.792450	1796630.732180	246079	1032	sf	64	cf
Infiltration BMP	Existing	9306 STAMPS	6/21/2010	6525546.826990	6525546.826990	1807197.501010	246103	1032	sf	64	cf
Infiltration BMP	Existing	10446 STAMPS	1/1/2005	6523214.650320	6523214.650320	1803242.228000	246103	1032	sf	64	cf
Infiltration BMP	Existing	10536 STAMPS	6/1/2006	6522871.528480	6522871.528480	1802783.838380	246103	1032	sf	64	cf
Infiltration BMP	Existing	13219 STANBRIDGE	9/17/2007	6522806.618420	6522806.618420	1790045.381220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8723 STEWART & GRAY	2/11/2009	6522100.372490	6522100.372490	1796545.507760	245114	1032	sf	64	cf
Infiltration BMP	Existing	9028 STOAKES	8/17/2007	6527221.634250	6527221.634250	1807951.198320	246103	1032	sf	64	cf
Infiltration BMP	Existing	7809 SUVA	1/13/2009	6522703.875430	6522703.875430	1808490.998990	246106	1032	sf	64	cf
Infiltration BMP	Existing	7827 SUVA	1/1/2006	6522849.829890	6522849.829890	1808368.560310	246106	1032	sf	64	cf
Infiltration BMP	Existing	8564 SUVA	1/1/2006	6526403.328390	6526403.328390	1805373.281490	245125	1032	sf	64	cf
Infiltration BMP	Existing	9943 TECUM	4/11/2008	6519363.349470	6519363.349470	1808047.658450	246111	1032	sf	64	cf
Infiltration BMP	Existing	9636 TELEGRAPH	5/8/2006	6531995.042290	6531995.042290	1804929.677680	245128	1032	sf	64	cf
Infiltration BMP	Existing	7968 THIRD	6/21/2005	6519929.169700	6519929.169700	1802199.016820	246102	1032	sf	64	cf
Infiltration BMP	Existing	9819 TRISTAN	10/7/2005	6526302.584780	6526302.584780	1804524.383680	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9253 TRUE	1/1/2005	6531891.994890	6531891.994890	1804462.821310	245127	1032	sf	64	cf
Infiltration BMP	Existing	8843 TWEEDY	9/12/2006	6524140.679400	6524140.679400	1809940.135780	246106	1032	sf	64	cf
Infiltration BMP	Existing	9012 TWEEDY	1/1/2005	6523977.735950	6523977.735950	1809300.273240	246106	1032	sf	64	cf
Infiltration BMP	Existing	9029 TWEEDY	1/1/2006	6523763.012330	6523763.012330	1809288.681880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9612 TWEEDY	6/22/2010	6522847.016620	6522847.016620	1807449.028980	246106	1032	sf	64	cf
Infiltration BMP	Existing	9636 TWEEDY	10/11/2005	6522732.626430	6522732.626430	1807259.266340	246103	1032	sf	64	cf
Infiltration BMP	Existing	9714 TWEEDY	7/24/2006	6522647.237500	6522647.237500	1807116.822930	246103	1032	sf	64	cf
Infiltration BMP	Existing	9718 TWEEDY	9/22/2008	6522619.325230	6522619.325230	1807068.990310	246103	1032	sf	64	cf
Infiltration BMP	Existing	9730 TWEEDY	6/18/2010	6522565.360970	6522565.360970	1806976.155270	246103	1032	sf	64	cf
Infiltration BMP	Existing	13409 VERDURA	1/1/2006	6516484.588360	6516484.588360	1789346.159960	245524	1032	sf	64	cf
Infiltration BMP	Existing	8607 VIA AMORITA	1/19/2006	6524994.226680	6524994.226680	1803003.226520	245119	1032	sf	64	cf
Infiltration BMP	Existing	9356 VIA AMORITA	4/27/2005	6528170.664540	6528170.664540	1800850.979140	245126	1032	sf	64	cf
Infiltration BMP	Existing	7402 VIA RIO NIDO	2/10/2005	6518371.376580	6518371.376580	1806186.704160	246102	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL RIO	5/1/2007	6526003.249760	6526003.249760	1808077.011440	246103	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL ROSA	4/26/2007	6526763.242710	6526763.242710	1809159.607970	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8351 VISTA DEL ROSA	12/19/2005	6527091.635630	6527091.635630	1808824.632820	246106	2063	sf	129	cf
Infiltration BMP	Existing	10265 VULTEE	4/24/2006	6525980.530560	6525980.530560	1802568.772980	245119	1032	sf	64	cf
Infiltration BMP	Existing	10339 VULTEE	6/18/2010	6525804.209560	6525804.209560	1802209.879860	245119	1032	sf	64	cf
Infiltration BMP	Existing	12709 VULTEE	3/9/2007	6519587.948000	6519587.948000	1791264.714830	245115	1032	sf	64	cf
Infiltration BMP	Existing	12725 WHITEWOOD	7/26/2005	6520341.668580	6520341.668580	1791179.460770	245115	1032	sf	64	cf
Infiltration BMP	Existing	9702 WILEY BURKE	6/21/2010	6521126.099980	6521126.099980	1808337.656530	246106	1032	sf	64	cf
Infiltration BMP	Existing	9750 WILEY BURKE	12/11/2006	6520822.729060	6520822.729060	1807995.132410	246106	1032	sf	64	cf
Infiltration BMP	Existing	9925 WILEY BURKE	1/10/2007	6520271.299840	6520271.299840	1807447.007570	246106	1032	sf	64	cf
Infiltration BMP	Existing	10540 WILEY BURKE	6/21/2007	6519089.326110	6519089.326110	1805048.306870	246102	1032	sf	64	cf
Infiltration BMP	Existing	10643 WOODRUFF	1/1/2006	6526887.322420	6526887.322420	1799535.375650	245119	1032	sf	64	cf
Infiltration BMP	Existing	7515 YANKEY	10/24/2006	6515115.108440	6515115.108440	1798924.389740	246079	1032	sf	64	cf
Infiltration BMP	Existing	10047 CASANES	1/1/2006	6529512.635540	6529512.635540	1801587.658100	245125	1032	sf	64	cf
Infiltration BMP	Existing	9220 CORD	1/1/2004	6530296.778820	6530296.778820	1804178.901350	245125	1032	sf	64	cf
Infiltration BMP	Existing	10040 MATTOCK	1/1/2006	6530247.042350	6530247.042350	1801200.601240	245125	1032	sf	64	cf
Infiltration BMP	Existing	10018 PANGBORN	1/1/2006	6530084.251260	6530084.251260	1801567.525640	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12053 PATTON	10/19/2004	6520642.037410	6520642.037410	1796050.004800	245115	1032	sf	64	cf
Infiltration BMP	Existing	12048 SAMOLINE	3/20/2007	6517021.712450	6517021.712450	1798014.455830	246079	2063	sf	129	cf
Infiltration BMP	Existing	7879 FLORENCE	2/14/2014	6521700.000000	6521700.000000	1806100.000000	246103	16504	sf	1032	cf
Infiltration BMP	Existing	9020 FIRESTONE	9/12/2008	6524113.023390	6524113.023390	1798572.164290	245119	70288	sf	4393	cf
Infiltration BMP	Existing	7910 FIRESTONE	6/28/2005	6519165.968790	6519165.968790	1801736.513180	246102	55686	sf	3480	cf
Infiltration BMP	Existing	7252 FIRESTONE	5/19/2004	6515489.000650	6515489.000650	1803082.633110	246079	36224	sf	2264	cf
Infiltration BMP	Existing	12256 PARAMOUNT	3/13/2006	6516813.225030	6516813.225030	1796497.685630	246077	34112	sf	2132	cf
Infiltration BMP	Existing	9462 FIRESTONE BL	2/14/2014	6526885.862260	6526885.862260	1797100.585140	245119	35437	sf	2215	cf
Infiltration BMP	Existing	8250 FIRESTONE BLVD	2/14/2014	6521000.000000	6521000.000000	1800300.000000	245115	59085	sf	3693	cf
Infiltration BMP	Existing	8018 TELEGRAPH	8/20/2004	6526800.000000	6526800.000000	1809400.000000	246106	35437	sf	2215	cf
Infiltration BMP	Existing	7447 FIRESTONE BLVD	7/9/2009	6516971.590923	6516971.590923	1803474.089243	246102	43124	sf	2192	cf
Infiltration BMP	Existing	9126 FLORENCE	4/25/2008	6526980.883730	6526980.883730	1802613.015890	245119	29248	sf	1828	cf
Infiltration BMP	Existing	11111 OLD RIVER SCHOOL	6/15/2004	6515500.000000	6515500.000000	1803800.000000	246102	27843	sf	1740	cf
Infiltration BMP	Existing	9634 WASHBURN	5/25/2004	6526574.558590	6526574.558590	1794738.334020	245118	35712	sf	2232	cf
Infiltration BMP	Existing	9475 FIRESTONE	9/20/2004	6527102.470060	6527102.470060	1797292.175990	245119	25078	sf	1567	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9125 IMPERIAL	9/17/2007	6520700.000000	6520700.000000	1792100.000000	245115	53104	sf	3319	cf
Infiltration BMP	Existing	11231 RIVES	4/25/2006	6518392.506170	6518392.506170	1802335.247680	246102	20250	sf	1266	cf
Infiltration BMP	Existing	7936 QUILL	8/23/2006	6515830.400000	6515830.400000	1795880.196930	246079	18984	sf	1187	cf
Infiltration BMP	Existing	8337 FONTANA	8/11/2005	6520206.194620	6520206.194620	1797870.434810	245114	36672	sf	2292	cf
Infiltration BMP	Existing	10225 LESTERFORD	6/22/2010	6530244.844140	6530244.844140	1800567.187010	245126	17718	sf	1107	cf
Infiltration BMP	Existing	7915 FLORENCE	8/11/2009	6522019.025220	6522019.025220	1805973.779210	246103	20192	sf	1262	cf
Infiltration BMP	Existing	11229 PARAMOUNT	3/16/2004	6519482.925030	6519482.925030	1801457.806750	246102	16453	sf	1028	cf
Infiltration BMP	Existing	8103 COLE	5/1/2007	6518213.448370	6518213.448370	1798049.118910	246077	0	sf	0	cf
Infiltration BMP	Existing	8722 BOYNE	7/1/2008	6521213.643060	6521213.643060	1795216.473800	245115	11390	sf	712	cf
Infiltration BMP	Existing	10612 LESTERFORD	6/14/2006	6529218.389270	6529218.389270	1798513.115960	245126	11390	sf	712	cf
Infiltration BMP	Existing	8444 LEXINGTON	4/24/2006	6524361.433930	6524361.433930	1803767.599820	246103	11390	sf	712	cf
Infiltration BMP	Existing	13221 BARLIN	10/10/2006	6516992.431610	6516992.431610	1789646.610200	245524	10125	sf	633	cf
Infiltration BMP	Existing	9611 GARNISH	6/7/2007	6529217.309540	6529217.309540	1803965.758960	245125	10125	sf	633	cf
Infiltration BMP	Existing	7118 PELLET	12/3/2008	6515184.074160	6515184.074160	1804905.113850	246104	10125	sf	633	cf
Infiltration BMP	Existing	9325 RIVES AM	2/14/2014	6522517.375370	6522517.375370	1808878.723180	246111	10125	sf	633	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9371 SUVA	3/13/2007	6529247.009310	6529247.009310	1803484.685240	245125	10125	sf	633	cf
Infiltration BMP	Existing	8556 FLORENCE	1/1/2006	6525137.675720	6525137.675720	1803770.147850	245125	8859	sf	554	cf
Infiltration BMP	Existing	9755 IMPERIAL	3/29/2006	6525700.000000	6525700.000000	1792200.000000	245114	8859	sf	554	cf
Infiltration BMP	Existing	10000 IMPERIAL	3/29/2006	6527246.839530	6527246.839530	1791706.604350	245118	8859	sf	554	cf
Infiltration BMP	Existing	10030 LESTERFORD	6/21/2010	6530953.991420	6530953.991420	1801165.004470	245125	8859	sf	554	cf
Infiltration BMP	Existing	7235 LUXOR	12/12/2005	6514593.326010	6514593.326010	1801941.887350	246079	8859	sf	554	cf
Infiltration BMP	Existing	8115 STEWART & GRAY	3/25/2009	6518648.406750	6518648.406750	1798495.150040	246077	11760	sf	735	cf
Infiltration BMP	Existing	9804 BROOKSHIRE	5/2/2007	6525737.765210	6525737.765210	1805415.750650	246103	7594	sf	475	cf
Infiltration BMP	Existing	7830 DANVERS	12/18/2008	6523967.248740	6523967.248740	1810379.348050	246106	7594	sf	475	cf
Infiltration BMP	Existing	8357 FLORENCE	11/29/2005	6524137.162990	6524137.162990	1804589.285090	246103	7594	sf	475	cf
Infiltration BMP	Existing	8562 FLORENCE	1/1/2006	6525210.620820	6525210.620820	1803736.004200	245125	7594	sf	475	cf
Infiltration BMP	Existing	10735 LAKEWOOD	1/19/2007	6524698.379320	6524698.379320	1800460.893140	245119	8640	sf	540	cf
Infiltration BMP	Existing	9732 ORIZABA	6/5/2008	6523842.356050	6523842.356050	1806158.297200	246103	7594	sf	475	cf
Infiltration BMP	Existing	12066 SAMOLINE	6/18/2010	6517119.562750	6517119.562750	1797806.070750	246079	7594	sf	475	cf
Infiltration BMP	Existing	7711 SECOND	6/21/2010	6518493.103400	6518493.103400	1802942.740750	246102	7594	sf	475	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9517 STOAKES	6/21/2010	6525287.319840	6525287.319840	1806612.266920	246103	7594	sf	475	cf
Infiltration BMP	Existing	12133 ANDERBERG	6/26/2009	6518010.879310	6518010.879310	1796818.463370	245115	6328	sf	396	cf
Infiltration BMP	Existing	9115 BROCK	6/21/2010	6524898.717190	6524898.717190	1808433.166330	246106	6328	sf	396	cf
Infiltration BMP	Existing	9541 CECILIA	6/23/2010	6528302.087900	6528302.087900	1798262.111790	245126	6328	sf	396	cf
Infiltration BMP	Existing	10243 CORD	11/4/2008	6528334.164460	6528334.164460	1801344.678940	245126	6328	sf	396	cf
Infiltration BMP	Existing	13108 CORNUTA	6/21/2010	6525701.475550	6525701.475550	1790449.882450	245113	6328	sf	396	cf
Infiltration BMP	Existing	8129 DACOSTA	8/5/2008	6523736.839560	6523736.839560	1805716.362640	246103	6328	sf	396	cf
Infiltration BMP	Existing	7247 DINWIDDIE	6/22/2010	6515896.418780	6515896.418780	1804170.223670	246104	6328	sf	396	cf
Infiltration BMP	Existing	12002A DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	12002C DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	8529 EUCALYPTUS	6/18/2010	6519136.171020	6519136.171020	1794210.333930	245115	6328	sf	396	cf
Infiltration BMP	Existing	9204 LA REINA	6/22/2010	6525799.255250	6525799.255250	1808110.827020	246103	6328	sf	396	cf
Infiltration BMP	Existing	9241 LUBEC	6/21/2010	6528410.398740	6528410.398740	1803633.947240	245125	6328	sf	396	cf
Infiltration BMP	Existing	10051 MATTOCK	9/25/2008	6530040.953970	6530040.953970	1801237.222590	245125	6328	sf	396	cf
Infiltration BMP	Existing	12273 PLANETT	6/21/2010	6518942.439290	6518942.439290	1795136.426680	245115	6328	sf	396	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9075 RAVILLER	4/9/2007	6527819.498980	6527819.498980	1805031.907810	245125	6328	sf	396	cf
Infiltration BMP	Existing	7149 ADWEN	5/31/2006	6514275.907390	6514275.907390	1803122.312290	246079	5062	sf	316	cf
Infiltration BMP	Existing	8703 ALAMEDA	9/14/2005	6520830.700880	6520830.700880	1795016.469260	245115	4594	sf	287	cf
Infiltration BMP	Existing	9242 APPLEBY	11/21/2008	6528866.478730	6528866.478730	1804798.824690	245125	5062	sf	316	cf
Infiltration BMP	Existing	9926 BELLDER	3/19/2007	6525715.329050	6525715.329050	1804487.716960	245125	5062	sf	316	cf
Infiltration BMP	Existing	11715 BELLFLOWER	6/15/2009	6523530.688010	6523530.688010	1796655.823230	245114	5062	sf	316	cf
Infiltration BMP	Existing	8019 BERGMAN	10/22/2008	6517711.829130	6517711.829130	1797726.503570	246077	5062	sf	316	cf
Infiltration BMP	Existing	8417 BIGBY	7/23/2007	6523908.146010	6523908.146010	1803525.055670	245119	5062	sf	316	cf
Infiltration BMP	Existing	10004 BIRCHDALE	1/23/2006	6525798.638290	6525798.638290	1803985.957400	245125	5062	sf	316	cf
Infiltration BMP	Existing	9951 BROOKSHIRE	6/18/2010	6525004.036100	6525004.036100	1804835.952720	246103	5062	sf	316	cf
Infiltration BMP	Existing	10927 BROOKSHIRE AV	2/14/2014	6522640.981090	6522640.981090	1800949.695110	245114	5062	sf	316	cf
Infiltration BMP	Existing	10304 CLANCEY	9/19/2008	6526762.243870	6526762.243870	1802017.295250	245119	5062	sf	316	cf
Infiltration BMP	Existing	7213 DINWIDDIE	6/21/2010	6515644.523280	6515644.523280	1804333.457340	246104	5062	sf	316	cf
Infiltration BMP	Existing	9245 DOWNEY	9/19/2007	6525582.317560	6525582.317560	1807792.114420	246103	5062	sf	316	cf
Infiltration BMP	Existing	12002B DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12002D DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf
Infiltration BMP	Existing	10250 EGLISE AV	2/14/2014	6528202.138900	6528202.138900	1801366.096440	245126	5062	sf	316	cf
Infiltration BMP	Existing	8719 ELMONT	6/18/2010	6526144.563940	6526144.563940	1809393.110180	246106	5062	sf	316	cf
Infiltration BMP	Existing	9355 FLORENCE	7/30/2007	6528769.559400	6528769.559400	1801814.385750	245125	5062	sf	316	cf
Infiltration BMP	Existing	9252 GALLATIN	3/29/2006	6528859.757520	6528859.757520	1804394.594600	245125	5062	sf	316	cf
Infiltration BMP	Existing	9553 GALLATIN	7/28/2004	6530910.776140	6530910.776140	1803037.898220	245125	5062	sf	316	cf
Infiltration BMP	Existing	9724 GARNISH	1/14/2008	6529062.109120	6529062.109120	1803453.035240	245125	5062	sf	316	cf
Infiltration BMP	Existing	8610 GUATEMALA	10/24/2006	6524386.905480	6524386.905480	1811339.167280	246106	5062	sf	316	cf
Infiltration BMP	Existing	10214 HORLEY	8/14/2007	6520372.544870	6520372.544870	1806355.591210	246102	5062	sf	316	cf
Infiltration BMP	Existing	10513 JULIUS	1/22/2009	6518877.932890	6518877.932890	1805532.376750	246102	5062	sf	316	cf
Infiltration BMP	Existing	9204 LA REINA	4/18/2007	6525799.255250	6525799.255250	1808110.827020	246103	5062	sf	316	cf
Infiltration BMP	Existing	9528 LEMORAN	8/29/2008	6529000.799820	6529000.799820	1804066.473220	245125	5062	sf	316	cf
Infiltration BMP	Existing	7334 LUXOR	4/25/2007	6514999.892740	6514999.892740	1801407.207050	246079	5062	sf	316	cf
Infiltration BMP	Existing	9226 MANZANAR	7/8/2005	6526470.419470	6526470.419470	1806685.422630	246103	5062	sf	316	cf
Infiltration BMP	Existing	10524 MATTOCK	2/5/2009	6528788.349750	6528788.349750	1799096.345380	245126	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12123 ORIZABA	12/28/2005	6517943.193960	6517943.193960	1797041.752750	245115	5062	sf	316	cf
Infiltration BMP	Existing	7130 PELLET	6/4/2008	6515276.387650	6515276.387650	1804845.311440	246104	5062	sf	316	cf
Infiltration BMP	Existing	8322 PURITAN	6/14/2007	6516164.281440	6516164.281440	1791774.558840	245524	5062	sf	316	cf
Infiltration BMP	Existing	7312 RIO FLORA	6/18/2010	6516577.089870	6516577.089870	1804589.040390	246104	5062	sf	316	cf
Infiltration BMP	Existing	9331 SAMOLINE	2/17/2006	6523511.819100	6523511.819100	1808307.819060	246106	5062	sf	316	cf
Infiltration BMP	Existing	8015 SEVENTH	8/16/2005	6521322.893520	6521322.893520	1803640.949260	246103	5062	sf	316	cf
Infiltration BMP	Existing	7821 SIXTH	12/6/2005	6519846.881130	6519846.881130	1804004.436800	246102	5062	sf	316	cf
Infiltration BMP	Existing	8409 SIXTH	12/10/2008	6523050.669740	6523050.669740	1802016.668700	245114	5062	sf	316	cf
Infiltration BMP	Existing	9317 STAMPS	1/30/2007	6525356.702810	6525356.702810	1807182.805460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9322 STAMPS	3/16/2006	6525453.602600	6525453.602600	1807062.934260	246103	5062	sf	316	cf
Infiltration BMP	Existing	10443 STAMPS	5/21/2008	6523061.022110	6523061.022110	1803394.248860	246103	5062	sf	316	cf
Infiltration BMP	Existing	10517 STAMPS	6/18/2010	6522812.240000	6522812.240000	1803043.757460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9444 STOAKES	5/22/2007	6525587.983230	6525587.983230	1806625.551490	246103	5062	sf	316	cf
Infiltration BMP	Existing	8329 VISTA DEL RIO	6/18/2010	6526300.133280	6526300.133280	1808123.116520	246103	5062	sf	316	cf
Infiltration BMP	Existing	8368 VISTA DEL RIO	6/1/2007	6526427.553640	6526427.553640	1807729.596630	246103	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8543 ALBIA	1/1/2006	6520215.566510	6520215.566510	1795689.212970	245115	3797	sf	237	cf
Infiltration BMP	Existing	7162 BENARES	1/1/2008	6514067.610360	6514067.610360	1802493.217160	246079	3797	sf	237	cf
Infiltration BMP	Existing	12812 BLODGETT	6/8/2009	6518629.647540	6518629.647540	1791208.759970	245115	3797	sf	237	cf
Infiltration BMP	Existing	9503 BROCK AV	2/14/2014	6524115.247920	6524115.247920	1807488.010330	246106	3797	sf	237	cf
Infiltration BMP	Existing	9045 BUCKLES	12/11/2008	6523278.581350	6523278.581350	1796905.300470	245114	3797	sf	237	cf
Infiltration BMP	Existing	10045 CHANEY	7/5/2007	6527656.534860	6527656.534860	1802672.871800	245125	3797	sf	237	cf
Infiltration BMP	Existing	8714 CHEROKEE	5/1/2007	6525056.428300	6525056.428300	1801833.489170	245119	3797	sf	237	cf
Infiltration BMP	Existing	10729 CLANCEY	7/5/2007	6525292.127080	6525292.127080	1799996.460370	245119	3797	sf	237	cf
Infiltration BMP	Existing	8215 COMOLETTE	5/18/2006	6516024.585540	6516024.585540	1792904.896040	246077	3563	sf	223	cf
Infiltration BMP	Existing	7809 DACOSTA	10/5/2007	6521756.096640	6521756.096640	1806979.884160	246106	3797	sf	237	cf
Infiltration BMP	Existing	10424 DOLAN AV	2/14/2014	6523609.999510	6523609.999510	1803226.099470	245119	3797	sf	237	cf
Infiltration BMP	Existing	12337 DUNROBIN	6/21/2010	6524854.924990	6524854.924990	1793158.910710	245114	3797	sf	237	cf
Infiltration BMP	Existing	13234 DUNROBIN	9/30/2005	6525046.618370	6525046.618370	1789885.630870	245114	3797	sf	237	cf
Infiltration BMP	Existing	12612 EASTBROOK	5/30/2006	6525374.680490	6525374.680490	1791988.629320	245114	3797	sf	237	cf
Infiltration BMP	Existing	9400 FLORENCE	7/8/2005	6528900.299250	6528900.299250	1801380.002980	245126	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7823 FOURTH PL	9/16/2005	6519381.530610	6519381.530610	1803107.418050	246102	3797	sf	237	cf
Infiltration BMP	Existing	7826 GAINFORD	10/13/2005	6521963.408230	6521963.408230	1806968.662960	246106	3797	sf	237	cf
Infiltration BMP	Existing	7909 GALLATIN	4/27/2006	6523955.572760	6523955.572760	1809190.106160	246106	3797	sf	237	cf
Infiltration BMP	Existing	9118 GARNISH	6/21/2010	6529677.777690	6529677.777690	1805040.238300	245125	3797	sf	237	cf
Infiltration BMP	Existing	12752 GLYNN	6/18/2010	6516929.257070	6516929.257070	1792615.717350	245524	3797	sf	237	cf
Infiltration BMP	Existing	9116 HALEDON	3/2/2006	6528925.738880	6528925.738880	1805732.953010	245125	3797	sf	237	cf
Infiltration BMP	Existing	12819 IBBETSON	11/23/2005	6525827.025010	6525827.025010	1791350.711010	245114	3797	sf	237	cf
Infiltration BMP	Existing	9528 LEMORAN	8/26/2008	6528914.390000	6528914.390000	1804053.870620	245125	3797	sf	237	cf
Infiltration BMP	Existing	10514 LESTERFORD	2/14/2006	6529382.491640	6529382.491640	1798787.162960	245126	3797	sf	237	cf
Infiltration BMP	Existing	9030 LUBEC	2/9/2006	6526996.357320	6526996.357320	1804242.372880	245125	3797	sf	237	cf
Infiltration BMP	Existing	9264 LUBEC	4/19/2006	6528519.099740	6528519.099740	1803331.221940	245125	3797	sf	237	cf
Infiltration BMP	Existing	8545 LUBEC ST	2/14/2014	6525866.355120	6525866.355120	1805123.134500	246103	3797	sf	237	cf
Infiltration BMP	Existing	9247 MANZANAR	10/30/2006	6526227.935330	6526227.935330	1806695.994430	246103	3797	sf	237	cf
Infiltration BMP	Existing	7866 MELVA	6/20/2006	6516126.027390	6516126.027390	1797191.628010	246079	3797	sf	237	cf
Infiltration BMP	Existing	12109 MORNING	5/16/2006	6516408.716280	6516408.716280	1797765.727430	246079	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7332 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	7334 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	9821 NEWVILLE	7/30/2007	6530987.438110	6530987.438110	1802116.080780	245125	3797	sf	237	cf
Infiltration BMP	Existing	10268 NEWVILLE	4/24/2007	6529747.604150	6529747.604150	1800228.046080	245126	3797	sf	237	cf
Infiltration BMP	Existing	12280 ORIZABA	6/18/2010	6517505.248620	6517505.248620	1795784.740290	246077	3797	sf	237	cf
Infiltration BMP	Existing	10404 PANGBORN	6/18/2010	6528952.556500	6528952.556500	1800031.154520	245126	3797	sf	237	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	11994 POMERING	2/23/2005	6514993.390330	6514993.390330	1799517.781680	246079	3797	sf	237	cf
Infiltration BMP	Existing	9525 QUINN	2/8/2007	6528803.711540	6528803.711540	1799421.544220	245126	3797	sf	237	cf
Infiltration BMP	Existing	8048 QUOIT	1/21/2009	6516443.407630	6516443.407630	1795348.218010	246077	3797	sf	237	cf
Infiltration BMP	Existing	12326 SAMOLINE	8/29/2008	6516269.535370	6516269.535370	1796118.615320	246077	3797	sf	237	cf
Infiltration BMP	Existing	12504 SMALLWOOD	9/30/2008	6515227.996100	6515227.996100	1795705.820110	246079	3797	sf	237	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	4/10/2008	6526628.650930	6526628.650930	1796061.800920	245118	3797	sf	237	cf
Infiltration BMP	Existing	7411 THIRD	6/2/2006	6517216.302090	6517216.302090	1804140.837740	246102	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12706 WHITEWOOD	9/20/2007	6520505.791550	6520505.791550	1791390.733010	245115	3797	sf	237	cf
Infiltration BMP	Existing	9049 HALL ROAD	2/9/2007	6523684.587500	6523684.587500	1797586.831540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7118 ADWEN	1/27/2006	6513895.884030	6513895.884030	1803086.756410	246100	2531	sf	158	cf
Infiltration BMP	Existing	13202 BARLIN	2/14/2007	6517303.317510	6517303.317510	1789688.349400	245524	2531	sf	158	cf
Infiltration BMP	Existing	10216 BELLMAN	1/5/2009	6525703.110200	6525703.110200	1803293.056930	245119	2531	sf	158	cf
Infiltration BMP	Existing	11809 BELLMAN	2/8/2006	6521732.804620	6521732.804620	1797303.369450	245114	2531	sf	158	cf
Infiltration BMP	Existing	7117 BENARES	8/10/2006	6513814.981610	6513814.981610	1802936.506930	246079	2531	sf	158	cf
Infiltration BMP	Existing	9108 BIGBY	11/23/2005	6526215.785230	6526215.785230	1801649.270450	245119	2531	sf	158	cf
Infiltration BMP	Existing	10213 BIRCHDALE	4/19/2006	6525304.414970	6525304.414970	1803562.084330	245119	2531	sf	158	cf
Infiltration BMP	Existing	9004 BIRCHLEAF	3/7/2007	6527047.235450	6527047.235450	1808159.837050	246103	2531	sf	158	cf
Infiltration BMP	Existing	13126 BLODGETT	8/18/2005	6517829.686700	6517829.686700	1789824.186060	245115	2531	sf	158	cf
Infiltration BMP	Existing	9508 BROCK	2/27/2006	6524228.012180	6524228.012180	1807355.118100	246103	2531	sf	158	cf
Infiltration BMP	Existing	7418 BROOKMILL	7/25/2008	6515791.043440	6515791.043440	1801624.672750	246079	2531	sf	158	cf
Infiltration BMP	Existing	12201 BROOKSHIRE	6/22/2010	6519506.452440	6519506.452440	1795585.950880	245115	2531	sf	158	cf
Infiltration BMP	Existing	7942 BRUNACHE	11/28/2005	6517219.149000	6517219.149000	1798061.073260	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9349 CECILIA	9/25/2008	6527282.306940	6527282.306940	1798988.874460	245126	2531	sf	158	cf
Infiltration BMP	Existing	9365 CECILIA	6/18/2010	6527411.791310	6527411.791310	1798910.665650	245126	2531	sf	158	cf
Infiltration BMP	Existing	9608 CECILIA	1/1/2007	6528406.351870	6528406.351870	1798010.127160	245126	2531	sf	158	cf
Infiltration BMP	Existing	9624 CEDARTREE	8/8/2005	6531911.946630	6531911.946630	1804673.812930	245127	2531	sf	158	cf
Infiltration BMP	Existing	8519 CLETA	9/10/2007	6521470.081710	6521470.081710	1798172.541560	245114	2531	sf	158	cf
Infiltration BMP	Existing	7803 CONKLIN	9/2/2005	6513317.560580	6513317.560580	1793980.901190	246077	2297	sf	144	cf
Infiltration BMP	Existing	12816 CORNUTA	10/9/2006	6525701.592160	6525701.592160	1791350.505200	245114	2531	sf	158	cf
Infiltration BMP	Existing	8018 DANVERS	1/26/2009	6524882.345060	6524882.345060	1809453.159850	246106	2531	sf	158	cf
Infiltration BMP	Existing	8517 DEVENIR	10/11/2005	6517399.640210	6517399.640210	1791811.493450	245115	2531	sf	158	cf
Infiltration BMP	Existing	8049 DINSDALE	6/15/2006	6522974.989820	6522974.989820	1805624.556380	246103	2531	sf	158	cf
Infiltration BMP	Existing	9317 DINSDALE	11/5/2008	6528560.545810	6528560.545810	1802232.852640	245125	2531	sf	158	cf
Infiltration BMP	Existing	8510 DONOVAN	7/5/2005	6519046.837890	6519046.837890	1794446.597550	245115	2531	sf	158	cf
Infiltration BMP	Existing	8415 DONOVAN ST	2/14/2014	6518508.946270	6518508.946270	1795018.898890	245115	2531	sf	158	cf
Infiltration BMP	Existing	9635 DOWNEY	7/15/2004	6524420.085960	6524420.085960	1806308.452290	246103	2531	sf	158	cf
Infiltration BMP	Existing	9830 DOWNEY	1/1/2006	6524176.121770	6524176.121770	1805651.929490	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12718 DOWNEY	8/30/2007	6516814.229160	6516814.229160	1793075.140590	245524	2531	sf	158	cf
Infiltration BMP	Existing	12650 DUNROBIN	7/27/2007	6525045.587920	6525045.587920	1791614.482510	245114	2531	sf	158	cf
Infiltration BMP	Existing	9067 EGLISE	9/30/2005	6530265.716940	6530265.716940	1805184.414240	245127	2531	sf	158	cf
Infiltration BMP	Existing	9131 EGLISE	1/16/2009	6529904.336320	6529904.336320	1804464.041860	245125	2531	sf	158	cf
Infiltration BMP	Existing	8573 ELEVENTH	4/24/2006	6525253.900610	6525253.900610	1803595.328980	245119	2531	sf	158	cf
Infiltration BMP	Existing	9061 FARM ST	2/14/2014	6526099.027600	6526099.027600	1801582.141470	245119	2531	sf	158	cf
Infiltration BMP	Existing	7936 FOURTH	1/26/2006	6520005.666040	6520005.666040	1802880.634680	246103	2531	sf	158	cf
Infiltration BMP	Existing	7829 FOURTH PL	2/14/2014	6519381.530610	6519381.530610	1803107.418050	246102	2531	sf	158	cf
Infiltration BMP	Existing	7528 GAINFORD	6/18/2010	6520331.076350	6520331.076350	1807734.704270	246106	1266	sf	79	cf
Infiltration BMP	Existing	8150 GALLATIN	1/14/2008	6524851.065410	6524851.065410	1807922.731550	246103	2531	sf	158	cf
Infiltration BMP	Existing	9068 GALLATIN	7/18/2005	6527754.167230	6527754.167230	1805244.499940	245125	2531	sf	158	cf
Infiltration BMP	Existing	12703 GLENSHIRE	8/18/2006	6520090.968440	6520090.968440	1791341.816710	245115	2531	sf	158	cf
Infiltration BMP	Existing	8703 GUATEMALA	6/18/2010	6523747.929510	6523747.929510	1811239.685330	246111	2531	sf	158	cf
Infiltration BMP	Existing	9903 GUATEMALA	6/21/2010	6519189.043810	6519189.043810	1808530.913060	246111	2531	sf	158	cf
Infiltration BMP	Existing	9208 HALEDON	3/29/2007	6528788.981770	6528788.981770	1805412.621690	245125	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9083 HALL	12/8/2005	6524025.781090	6524025.781090	1797583.104370	245114	2531	sf	158	cf
Infiltration BMP	Existing	10348 HASTY	9/14/2006	6528480.545700	6528480.545700	1800482.839460	245126	2531	sf	158	cf
Infiltration BMP	Existing	7844 HONDO	7/8/2005	6515417.898670	6515417.898670	1796530.778030	246079	2531	sf	158	cf
Infiltration BMP	Existing	9244 HORLEY	6/22/2006	6522498.248530	6522498.248530	1809199.750130	246111	2531	sf	158	cf
Infiltration BMP	Existing	12612 IBBETSON	2/9/2007	6526008.655610	6526008.655610	1792000.536540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7214 IRWINGROVE	8/17/2007	6517736.835580	6517736.835580	1807424.228480	246104	2531	sf	158	cf
Infiltration BMP	Existing	10209 JULIUS	6/21/2010	6519702.452650	6519702.452650	1806880.883230	246102	2531	sf	158	cf
Infiltration BMP	Existing	10341 JULIUS	6/4/2008	6519700.000000	6519700.000000	1806100.000000	246102	2531	sf	158	cf
Infiltration BMP	Existing	12313 JULIUS	6/21/2010	6514155.209020	6514155.209020	1797936.932020	246079	2531	sf	158	cf
Infiltration BMP	Existing	7944 KINGBEE	5/31/2007	6516311.045420	6516311.045420	1796702.710410	246079	2531	sf	158	cf
Infiltration BMP	Existing	9605 LA REINA	6/18/2010	6524325.141120	6524325.141120	1806744.664340	246103	2531	sf	158	cf
Infiltration BMP	Existing	10074 LESTERFORD	4/12/2006	6530716.286370	6530716.286370	1800772.683680	245125	2531	sf	158	cf
Infiltration BMP	Existing	9626 LUBEC	6/21/2005	6530889.535260	6530889.535260	1801910.718740	245125	2531	sf	158	cf
Infiltration BMP	Existing	7156 LUXOR	10/28/2005	6513800.826420	6513800.826420	1802169.595300	246100	2531	sf	158	cf
Infiltration BMP	Existing	9202 MANZANAR	4/13/2004	6526663.177850	6526663.177850	1806830.315690	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9020 MARGARET	10/2/2006	6523822.925930	6523822.925930	1798066.530690	245114	2531	sf	158	cf
Infiltration BMP	Existing	9127 MELDAR	4/29/2004	6526710.714590	6526710.714590	1807437.827920	246103	2531	sf	158	cf
Infiltration BMP	Existing	11814 MORNING	9/2/2005	6517648.916460	6517648.916460	1799680.107480	246077	2531	sf	158	cf
Infiltration BMP	Existing	7440 MULLER	11/7/2006	6518162.654940	6518162.654940	1805120.460880	246102	2531	sf	158	cf
Infiltration BMP	Existing	12334 ORIZABA	5/5/2005	6517231.678930	6517231.678930	1795384.927500	246077	2531	sf	158	cf
Infiltration BMP	Existing	9311 OTTO	2/2/2008	6528809.245500	6528809.245500	1802513.951810	245125	2531	sf	158	cf
Infiltration BMP	Existing	10436 PANGBORN	7/6/2006	6528781.443840	6528781.443840	1799746.387720	245126	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	9008 PARROT	6/22/2010	6524997.125330	6524997.125330	1808680.720210	246106	2531	sf	158	cf
Infiltration BMP	Existing	9530 PARROT	10/11/2006	6523866.950960	6523866.950960	1807305.627380	246103	2531	sf	158	cf
Infiltration BMP	Existing	7125 PELLET	11/21/2005	6515366.521160	6515366.521160	1805107.133170	246104	2531	sf	158	cf
Infiltration BMP	Existing	7335 PELLET	2/15/2007	6516661.302200	6516661.302200	1804268.401510	246104	2531	sf	158	cf
Infiltration BMP	Existing	7348 PELLET	6/22/2010	6516619.400060	6516619.400060	1803975.379460	246102	2531	sf	158	cf
Infiltration BMP	Existing	10433 PICO VISTA	6/21/2010	6529704.381130	6529704.381130	1799155.408730	245126	2531	sf	158	cf
Infiltration BMP	Existing	7629 PIVOT	6/4/2008	6517523.064870	6517523.064870	1802428.507060	246079	2531	sf	158	cf
Infiltration BMP	Existing	11962 POMERING	2/24/2006	6515175.131420	6515175.131420	1799743.806870	246079	2531	sf	158	cf
Infiltration BMP	Existing	8133 PRISCILLA	6/22/2010	6515078.400000	6515078.400000	1792153.440000	246077	2531	sf	158	cf
Infiltration BMP	Existing	7603 QUILL	2/28/2007	6514155.935840	6514155.935840	1797151.984960	246079	2531	sf	158	cf
Infiltration BMP	Existing	11539 RICHEON	7/8/2005	6517174.382020	6517174.382020	1801464.078770	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6545 RIVERGROVE	10/11/2005	6520696.757140	6520696.757140	1811248.378990	246111	2531	sf	158	cf
Infiltration BMP	Existing	9320 SAMOLINE	11/3/2006	6523716.410960	6523716.410960	1808296.703240	246106	2531	sf	158	cf
Infiltration BMP	Existing	9602 SAMOLINE	11/23/2005	6523146.135200	6523146.135200	1807399.732010	246103	2531	sf	158	cf
Infiltration BMP	Existing	12015 SAMOLINE	9/29/2008	6517129.601540	6517129.601540	1798409.043860	246079	2531	sf	158	cf
Infiltration BMP	Existing	12048 SAMOLINE	6/22/2010	6517021.712450	6517021.712450	1798014.455830	246079	2531	sf	158	cf
Infiltration BMP	Existing	7962 SECOND	10/3/2007	6519694.108620	6519694.108620	1801968.426700	246102	2531	sf	158	cf
Infiltration BMP	Existing	7712 SEVERY ST	1/1/2008	6524575.222650	6524575.222650	1807124.160130	246103	2531	sf	158	cf
Infiltration BMP	Existing	7331 SHADYOAK	1/16/2009	6521597.847660	6521597.847660	1810725.646550	246111	2531	sf	158	cf
Infiltration BMP	Existing	9103 SHERIDELL	10/29/2007	6528594.889520	6528594.889520	1806159.584670	245125	2531	sf	158	cf
Infiltration BMP	Existing	8345 SIXTH	4/23/2008	6522663.428460	6522663.428460	1802257.170290	245114	2531	sf	158	cf
Infiltration BMP	Existing	9124 STOAKES	4/29/2004	6526659.033140	6526659.033140	1807538.875170	246103	2531	sf	158	cf
Infiltration BMP	Existing	9906 TECUM	8/26/2008	6519710.324270	6519710.324270	1808196.223590	246111	2531	sf	158	cf
Infiltration BMP	Existing	9520 TELEGRAPH	12/4/2008	6531301.476840	6531301.476840	1805512.099740	245127	2531	sf	158	cf
Infiltration BMP	Existing	8302 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1840	sf	115	cf
Infiltration BMP	Existing	8304 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8306 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8308 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8310 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8312 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8314 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8316 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8318 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8320 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8322 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8324 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8326 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8328 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8330 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8332 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8334 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8336 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8338 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8340 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8342 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8344 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8346 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8348 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8350 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8352 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	7438 THIRD	11/10/2005	6517353.808450	6517353.808450	1803828.489190	246102	2531	sf	158	cf
Infiltration BMP	Existing	7955 THIRD	1/30/2006	6519871.299810	6519871.299810	1802440.525110	246103	2531	sf	158	cf
Infiltration BMP	Existing	9819 TRISTAN	11/19/2007	6526302.584780	6526302.584780	1804524.383680	245125	2531	sf	158	cf
Infiltration BMP	Existing	8555 VIA AMORITA	10/27/2008	6524751.467620	6524751.467620	1803150.610950	245119	2531	sf	158	cf
Infiltration BMP	Existing	9631 WILEY BURKE	3/27/2006	6521095.475640	6521095.475640	1808618.175130	246106	2531	sf	158	cf
Infiltration BMP	Existing	10419 WILEY BURKE	3/7/2008	6519382.492080	6519382.492080	1805731.311650	246102	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7319 ADWEN	2/22/2006	6515346.754980	6515346.754980	1802425.342900	246079	1266	sf	79	cf
Infiltration BMP	Existing	13033 AIRPOINT	6/14/2010	6517837.198260	6517837.198260	1790420.981040	245115	1266	sf	79	cf
Infiltration BMP	Existing	8446 ALAMEDA	6/24/2005	6519341.878190	6519341.878190	1795502.737620	245115	1266	sf	79	cf
Infiltration BMP	Existing	9336 APPLEBY	3/9/2006	6529377.514420	6529377.514420	1804389.744220	245125	1266	sf	79	cf
Infiltration BMP	Existing	9540 ARDINE	1/1/2006	6527800.346060	6527800.346060	1797420.079620	245119	1266	sf	79	cf
Infiltration BMP	Existing	7849 ARNETT	7/8/2005	6518395.700160	6518395.700160	1801138.921810	246079	1266	sf	79	cf
Infiltration BMP	Existing	8645 BAYSINGER	11/10/2005	6525612.031290	6525612.031290	1803108.706240	245119	1266	sf	79	cf
Infiltration BMP	Existing	9210 BELCHER	10/12/2006	6519891.840050	6519891.840050	1789806.904790	245115	1266	sf	79	cf
Infiltration BMP	Existing	9245 BELCHER	9/4/2007	6520247.532430	6520247.532430	1789967.036150	245115	1266	sf	79	cf
Infiltration BMP	Existing	10234 BELCHER	6/18/2010	6527119.239350	6527119.239350	1789810.183210	245113	1266	sf	79	cf
Infiltration BMP	Existing	10285 BELCHER	6/21/2010	6527612.081010	6527612.081010	1789959.646450	245118	1266	sf	79	cf
Infiltration BMP	Existing	10028 BELLDER	1/1/2006	6525360.965940	6525360.965940	1803913.208580	245125	1266	sf	79	cf
Infiltration BMP	Existing	10304 BELLMAN	6/1/2005	6525418.498520	6525418.498520	1803041.069680	245119	1266	sf	79	cf
Infiltration BMP	Existing	11014 BENFIELD	6/24/2008	6531918.630750	6531918.630750	1797937.959120	245122	1266	sf	79	cf
Infiltration BMP	Existing	9324 BIRCHBARK	10/7/2005	6524879.129350	6524879.129350	1807661.831210	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BLANDWOOD	6/29/2006	6525016.522210	6525016.522210	1811074.341940	246106	1266	sf	79	cf
Infiltration BMP	Existing	8415 BORSON	10/9/2006	6517421.536650	6517421.536650	1792735.849280	245115	1266	sf	79	cf
Infiltration BMP	Existing	8710 BOYNE	6/29/2006	6521119.595500	6521119.595500	1795272.757840	245115	1266	sf	79	cf
Infiltration BMP	Existing	8910 BROCK	2/3/2009	6525582.226600	6525582.226600	1808734.892600	246106	1266	sf	79	cf
Infiltration BMP	Existing	9702 BROCK	9/25/2006	6523765.203820	6523765.203820	1806580.253440	246103	1266	sf	79	cf
Infiltration BMP	Existing	9730 BROCK	10/16/2009	6523625.354460	6523625.354460	1806340.478590	246103	1266	sf	79	cf
Infiltration BMP	Existing	7550 BROOKMILL	9/25/2006	6516432.435790	6516432.435790	1801137.496710	246079	1266	sf	79	cf
Infiltration BMP	Existing	10360 BROOKSHIRE	8/2/2005	6524254.056510	6524254.056510	1803200.425100	245119	1266	sf	79	cf
Infiltration BMP	Existing	9336 BUELL	5/4/2007	6527241.052050	6527241.052050	1799190.479610	245126	1266	sf	79	cf
Infiltration BMP	Existing	9408 BUELL	1/1/2007	6527563.840160	6527563.840160	1798993.546660	245126	1266	sf	79	cf
Infiltration BMP	Existing	10210 CASANES	7/20/2005	6529273.829610	6529273.829610	1801143.143100	245125	1266	sf	79	cf
Infiltration BMP	Existing	10308 CASANES	6/9/2005	6528827.020030	6528827.020030	1800415.364480	245126	1266	sf	79	cf
Infiltration BMP	Existing	10845 CASANES	12/4/2007	6527288.943480	6527288.943480	1798213.890680	245119	1266	sf	79	cf
Infiltration BMP	Existing	10922 CASANES	8/3/2005	6527279.490710	6527279.490710	1797849.792160	245119	1266	sf	79	cf
Infiltration BMP	Existing	8715 CAVEL	6/22/2010	6521261.550160	6521261.550160	1795688.489420	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9707 CEDARTREE	5/25/2006	6532283.863380	6532283.863380	1804587.051690	245127	1266	sf	79	cf
Infiltration BMP	Existing	10260 CHANEY	6/21/2010	6527337.911630	6527337.911630	1801874.691650	245119	1266	sf	79	cf
Infiltration BMP	Existing	10362 CHANEY	9/4/2007	6526983.558290	6526983.558290	1801306.071650	245119	1266	sf	79	cf
Infiltration BMP	Existing	9246 CLANCEY	5/1/2007	6528479.118010	6528479.118010	1805448.947460	245125	1266	sf	79	cf
Infiltration BMP	Existing	10546 CLANCEY	5/26/2005	6525904.831900	6525904.831900	1800674.595520	245119	1266	sf	79	cf
Infiltration BMP	Existing	12658 COLDBROOK	6/25/2009	6524501.637760	6524501.637760	1791525.543010	245114	1266	sf	79	cf
Infiltration BMP	Existing	8111 COMOLETTE	12/18/2006	6515465.796840	6515465.796840	1793242.397990	246077	1266	sf	79	cf
Infiltration BMP	Existing	8140 COMOLETTE	12/2/2008	6515640.775000	6515640.775000	1792943.865000	246077	1266	sf	79	cf
Infiltration BMP	Existing	8316 COMOLETTE	5/23/2005	6516475.681440	6516475.681440	1792370.081790	245524	1266	sf	79	cf
Infiltration BMP	Existing	9325 CORD	3/21/2008	6529940.912480	6529940.912480	1803762.584020	245125	1266	sf	79	cf
Infiltration BMP	Existing	7732 COREY	1/8/2009	6515481.796500	6515481.796500	1798137.416600	246079	1266	sf	79	cf
Infiltration BMP	Existing	11810 CORRIGAN	3/4/2009	6523411.287590	6523411.287590	1796210.739300	245114	1266	sf	79	cf
Infiltration BMP	Existing	10925 CROSSDALE	6/9/2005	6532012.125130	6532012.125130	1798163.740010	245122	1266	sf	79	cf
Infiltration BMP	Existing	7757 DACOSTA	6/7/2005	6521506.383470	6521506.383470	1807138.583520	246106	1266	sf	79	cf
Infiltration BMP	Existing	8324 DAVIS	6/15/2005	6520852.481770	6520852.481770	1799213.987880	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8517 DEVENIR	2/19/2008	6517399.640210	6517399.640210	1791811.493450	245115	1266	sf	79	cf
Infiltration BMP	Existing	7345 DINSDALE	9/29/2005	6519203.299320	6519203.299320	1808002.090250	246111	1266	sf	79	cf
Infiltration BMP	Existing	8330 DINSDALE	6/21/2010	6524002.238290	6524002.238290	1804838.107610	246103	1266	sf	79	cf
Infiltration BMP	Existing	10340 DOLAN	8/15/2007	6523856.967630	6523856.967630	1803630.622810	245119	1266	sf	79	cf
Infiltration BMP	Existing	12260 DOLAN	4/5/2006	6518910.565000	6518910.565000	1795264.305000	245115	1266	sf	79	cf
Infiltration BMP	Existing	12521 DOLAN	7/19/2007	6517914.404040	6517914.404040	1794175.419610	245115	1266	sf	79	cf
Infiltration BMP	Existing	12621 DOLAN	8/17/2007	6517501.190610	6517501.190610	1793293.644730	245115	1266	sf	79	cf
Infiltration BMP	Existing	12308 DOWNEY	4/19/2007	6518251.608680	6518251.608680	1795363.261670	245115	1266	sf	79	cf
Infiltration BMP	Existing	12532 DOWNEY	10/11/2005	6517442.718730	6517442.718730	1794104.887260	245115	1266	sf	79	cf
Infiltration BMP	Existing	12820 DOWNEY	5/17/2007	6516486.923440	6516486.923440	1792584.707230	245524	1266	sf	79	cf
Infiltration BMP	Existing	12603 DUNROBIN	6/22/2010	6524864.880980	6524864.880980	1792095.613000	245114	1266	sf	79	cf
Infiltration BMP	Existing	12643 DUNROBIN	11/21/2006	6524865.889210	6524865.889210	1791696.268120	245114	1266	sf	79	cf
Infiltration BMP	Existing	12818 DUNROBIN	12/15/2006	6525044.191110	6525044.191110	1791331.787300	245114	1266	sf	79	cf
Infiltration BMP	Existing	12823 DUNROBIN	2/12/2008	6524866.593650	6524866.593650	1791299.463030	245114	1266	sf	79	cf
Infiltration BMP	Existing	13024 DUNROBIN	5/24/2005	6525048.058670	6525048.058670	1790633.750860	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DUNROBIN	10/1/2008	6525046.731200	6525046.731200	1789833.348360	245114	1266	sf	79	cf
Infiltration BMP	Existing	13638 EARNSHAW	9/16/2005	6516330.576340	6516330.576340	1788317.037630	245524	1266	sf	79	cf
Infiltration BMP	Existing	12155 EASTBROOK	9/16/2005	6525128.882510	6525128.882510	1794289.182720	245114	2297	sf	144	cf
Infiltration BMP	Existing	9125 EGLISE	1/24/2007	6529928.564580	6529928.564580	1804520.963270	245125	1266	sf	79	cf
Infiltration BMP	Existing	10213 EGLISE	10/14/2008	6528271.447820	6528271.447820	1801803.093100	245126	1266	sf	79	cf
Infiltration BMP	Existing	8331 EVEREST	2/21/2007	6517984.856770	6517984.856770	1794526.994330	245115	1266	sf	79	cf
Infiltration BMP	Existing	9037 FARM	6/18/2010	6525882.141210	6525882.141210	1801714.480720	245119	1266	sf	79	cf
Infiltration BMP	Existing	9542 FARM	11/15/2005	6529019.221950	6529019.221950	1799423.700160	245126	1266	sf	79	cf
Infiltration BMP	Existing	8445 FIFTH	6/24/2005	6523180.907390	6523180.907390	1801530.163340	245114	1266	sf	79	cf
Infiltration BMP	Existing	8529 FIFTH	9/23/2005	6523578.003250	6523578.003250	1801288.543780	245114	1266	sf	79	cf
Infiltration BMP	Existing	9221 FOSTER	2/16/2008	6519835.324440	6519835.324440	1789377.664880	245115	1266	sf	79	cf
Infiltration BMP	Existing	9303 FOSTER	8/9/2006	6520280.515660	6520280.515660	1789513.941670	245115	1266	sf	79	cf
Infiltration BMP	Existing	9536 FOSTORIA	10/13/2005	6527900.524680	6527900.524680	1797686.001250	245119	1266	sf	79	cf
Infiltration BMP	Existing	7339 GAINFORD	11/5/2007	6519739.997490	6519739.997490	1808338.936030	246111	1266	sf	79	cf
Infiltration BMP	Existing	8426 GAINFORD	1/7/2008	6524961.213810	6524961.213810	1805124.602410	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9315 GAINFORD	7/5/2005	6528715.710300	6528715.710300	1803034.881460	245125	1266	sf	79	cf
Infiltration BMP	Existing	9641 GAINFORD	10/16/2006	6530976.949360	6530976.949360	1801752.372100	245125	1266	sf	79	cf
Infiltration BMP	Existing	9357 GALLATIN	4/17/2006	6529509.957360	6529509.957360	1804133.004270	245125	1266	sf	79	cf
Infiltration BMP	Existing	8411 GALT	7/18/2007	6520931.662600	6520931.662600	1798681.676310	245114	1266	sf	79	cf
Infiltration BMP	Existing	8125 GARDENDALE	10/3/2007	6514840.842010	6514840.842010	1791988.219650	246077	1266	sf	79	cf
Infiltration BMP	Existing	7553 GLENCLIFF	11/5/2008	6521939.189570	6521939.189570	1809565.009220	246111	1266	sf	79	cf
Infiltration BMP	Existing	12615 GURLEY	9/8/2008	6516705.632650	6516705.632650	1793818.816440	246077	1266	sf	79	cf
Infiltration BMP	Existing	10557 HALEDON	3/22/2006	6525946.687500	6525946.687500	1800529.637640	245119	1266	sf	79	cf
Infiltration BMP	Existing	10714 HALEDON	7/11/2008	6525734.412480	6525734.412480	1799854.605530	245119	1266	sf	79	cf
Infiltration BMP	Existing	9101 HALL	7/19/2007	6524088.768660	6524088.768660	1797585.986810	245114	1266	sf	79	cf
Infiltration BMP	Existing	7416 HONDO	11/21/2007	6513414.170490	6513414.170490	1797767.919490	246079	1266	sf	79	cf
Infiltration BMP	Existing	7927 HONDO	1/8/2007	6515926.722240	6515926.722240	1796435.751150	246079	1266	sf	79	cf
Infiltration BMP	Existing	9228 HORLEY	7/20/2005	6522584.029360	6522584.029360	1809343.702000	246111	1266	sf	79	cf
Infiltration BMP	Existing	9929 HORLEY	6/23/2005	6520827.895940	6520827.895940	1807104.698370	246106	1266	sf	79	cf
Infiltration BMP	Existing	12316 HORLEY	1/1/2007	6515085.680000	6515085.680000	1797312.060000	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11544 HORTON	5/1/2006	6517050.314050	6517050.314050	1801482.158860	246079	1266	sf	79	cf
Infiltration BMP	Existing	12619 IBBETSON	12/26/2007	6525826.717640	6525826.717640	1791950.694670	245114	1266	sf	79	cf
Infiltration BMP	Existing	12816 IBBETSON	11/23/2005	6526008.922590	6526008.922590	1791350.504040	245114	1266	sf	79	cf
Infiltration BMP	Existing	9030 IOWA	8/29/2007	6523719.000250	6523719.000250	1797706.215730	245114	1266	sf	79	cf
Infiltration BMP	Existing	9036 IOWA	1/23/2006	6523761.535660	6523761.535660	1797679.990250	245114	1266	sf	79	cf
Infiltration BMP	Existing	7214 IRWINGROVE	2/7/2008	6517736.835580	6517736.835580	1807424.228480	246104	1266	sf	79	cf
Infiltration BMP	Existing	7425 IRWINGROVE	11/22/2005	6519037.305040	6519037.305040	1806826.286520	246102	1266	sf	79	cf
Infiltration BMP	Existing	7431 IVO	5/23/2005	6520452.019960	6520452.019960	1808862.657860	246106	1266	sf	79	cf
Infiltration BMP	Existing	12258 IZETTA	11/19/2008	6524718.529730	6524718.529730	1793607.751080	245114	1266	sf	79	cf
Infiltration BMP	Existing	11427 JULIUS	10/6/2005	6517068.729490	6517068.729490	1802337.821610	246079	1266	sf	79	cf
Infiltration BMP	Existing	7863 KINGBEE	6/2/2005	6515998.395150	6515998.395150	1797104.463380	246079	1266	sf	79	cf
Infiltration BMP	Existing	10633 LA REINA	6/7/2005	6521844.406030	6521844.406030	1802801.159980	246103	1266	sf	79	cf
Infiltration BMP	Existing	10726 LA REINA	9/20/2005	6521763.725850	6521763.725850	1802369.001800	246103	1266	sf	79	cf
Infiltration BMP	Existing	10717 LAKEWOOD	1/1/2005	6524762.764130	6524762.764130	1800632.321080	245119	1266	sf	79	cf
Infiltration BMP	Existing	13229 LAKEWOOD	8/30/2005	6518145.854860	6518145.854860	1789091.323220	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8248 LANKIN	5/16/2007	6517152.534650	6517152.534650	1794608.293130	246077	1266	sf	79	cf
Infiltration BMP	Existing	13413 LAURELDALE	9/4/2007	6516097.983610	6516097.983610	1789503.029570	245524	1266	sf	79	cf
Infiltration BMP	Existing	9040 LEMORAN	9/16/2005	6529896.207920	6529896.207920	1805874.052840	245125	1266	sf	79	cf
Infiltration BMP	Existing	10225 LESTERFORD	12/22/2005	6530244.844140	6530244.844140	1800567.187010	245126	1266	sf	79	cf
Infiltration BMP	Existing	10415 LESTERFORD	6/22/2010	6529502.521580	6529502.521580	1799500.525910	245126	1266	sf	79	cf
Infiltration BMP	Existing	10730 LESTERFORD	6/8/2005	6528927.837490	6528927.837490	1798058.051080	245126	1266	sf	79	cf
Infiltration BMP	Existing	8020 LUBEC	3/8/2007	6523117.786070	6523117.786070	1806398.918760	246103	1266	sf	79	cf
Infiltration BMP	Existing	9230 LUBEC	9/30/2005	6528205.943320	6528205.943320	1803519.420650	245125	1266	sf	79	cf
Infiltration BMP	Existing	7259 LUXOR	1/1/2007	6514801.884280	6514801.884280	1801808.218080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7315 LUXOR	3/16/2006	6514953.117040	6514953.117040	1801695.155730	246079	1266	sf	79	cf
Infiltration BMP	Existing	8444 LUXOR	11/10/2005	6520775.356850	6520775.356850	1797851.842110	245114	1266	sf	79	cf
Infiltration BMP	Existing	9102 MANZANAR	7/20/2005	6527192.246670	6527192.246670	1807219.965690	246103	1266	sf	79	cf
Infiltration BMP	Existing	10434 MANZANAR	6/7/2005	6523771.930100	6523771.930100	1803007.033470	245119	1266	sf	79	cf
Infiltration BMP	Existing	11109 MARBEL	7/20/2006	6523692.717760	6523692.717760	1799490.635090	245119	1266	sf	79	cf
Infiltration BMP	Existing	12108 MARBEL	1/31/2006	6521445.538760	6521445.538760	1795214.942010	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7830 MELVA	1/1/2006	6515802.415360	6515802.415360	1797387.108860	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 MELVA	1/5/2006	6515910.196660	6515910.196660	1797321.983490	246079	1266	sf	79	cf
Infiltration BMP	Existing	12120 MORNING	8/14/2008	6516533.621320	6516533.621320	1797558.681060	246079	1266	sf	79	cf
Infiltration BMP	Existing	7339 NADA	7/8/2005	6514489.286480	6514489.286480	1800567.411080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7351 NADA	6/23/2008	6514590.536380	6514590.536380	1800503.774190	246079	1266	sf	79	cf
Infiltration BMP	Existing	8202 NADA	1/9/2006	6518631.371590	6518631.371590	1797835.542430	245115	1266	sf	79	cf
Infiltration BMP	Existing	7415 NOREN	7/26/2005	6520794.671000	6520794.671000	1809286.272790	246111	1266	sf	79	cf
Infiltration BMP	Existing	9921 NORLAIN	11/3/2008	6519614.140210	6519614.140210	1807835.435830	246111	1266	sf	79	cf
Infiltration BMP	Existing	8127 ORANGE	6/23/2010	6517401.744430	6517401.744430	1796403.841780	246077	1266	sf	79	cf
Infiltration BMP	Existing	9554 ORIZABA	8/19/2005	6524235.753500	6524235.753500	1806817.618650	246103	1266	sf	79	cf
Infiltration BMP	Existing	12333 ORIZABA	1/23/2006	6517077.475660	6517077.475660	1795538.435260	246077	1266	sf	79	cf
Infiltration BMP	Existing	10834 PANGBORN	9/17/2007	6527760.431910	6527760.431910	1798051.772160	245119	1266	sf	79	cf
Infiltration BMP	Existing	7156 PELLET	6/22/2010	6515507.126970	6515507.126970	1804695.751890	246104	1266	sf	79	cf
Infiltration BMP	Existing	9466 PELLET	5/26/2005	6527082.799410	6527082.799410	1797550.782940	245119	1266	sf	79	cf
Infiltration BMP	Existing	10238 PICO VISTA	7/22/2008	6530559.495000	6530559.495000	1800212.246520	245126	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7706 PIVOT	6/18/2010	6517776.543940	6517776.543940	1802077.153370	246079	1266	sf	79	cf
Infiltration BMP	Existing	11951 POMERING	6/18/2010	6515072.562230	6515072.562230	1799936.867790	246079	1266	sf	79	cf
Infiltration BMP	Existing	12010 POMERING	9/20/2005	6514897.027930	6514897.027930	1799318.472210	246079	1266	sf	79	cf
Infiltration BMP	Existing	7803 PURITAN	6/22/2010	6513186.710850	6513186.710850	1793767.422040	246077	1266	sf	79	cf
Infiltration BMP	Existing	8249 QUOIT	5/17/2007	6517406.484080	6517406.484080	1795006.472870	246077	1266	sf	79	cf
Infiltration BMP	Existing	8506 RAVILLER	6/22/2010	6526200.032280	6526200.032280	1805944.598850	246103	1266	sf	79	cf
Infiltration BMP	Existing	9441 RAVILLER	10/7/2005	6529831.524430	6529831.524430	1803323.207760	245125	1266	sf	79	cf
Infiltration BMP	Existing	7110 RIO FLORA	6/1/2010	6515643.202310	6515643.202310	1805187.382260	246104	1266	sf	79	cf
Infiltration BMP	Existing	7371 RIO HONDO PL	7/11/2005	6517283.740950	6517283.740950	1804924.767440	246104	1266	sf	79	cf
Infiltration BMP	Existing	10802 RIVES	3/23/2007	6519422.470020	6519422.470020	1803623.413330	246102	1266	sf	79	cf
Infiltration BMP	Existing	11916 RIVES	2/6/2007	6516737.168290	6516737.168290	1799258.165990	246079	1266	sf	79	cf
Infiltration BMP	Existing	10912 RYERSON	7/14/2005	6515882.754330	6515882.754330	1804962.955590	246104	1266	sf	79	cf
Infiltration BMP	Existing	9505 SAMOLINE	6/21/2010	6523279.038200	6523279.038200	1807936.970620	246106	1266	sf	79	cf
Infiltration BMP	Existing	9631 SAMOLINE	9/4/2007	6522855.010000	6522855.010000	1807250.890000	246103	1266	sf	79	cf
Infiltration BMP	Existing	12030 SAMOLINE	9/23/2005	6517133.868790	6517133.868790	1798177.361600	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12238 SAMOLINE	9/8/2006	6516738.176240	6516738.176240	1796883.684630	246079	1266	sf	79	cf
Infiltration BMP	Existing	7915 SECOND	3/23/2006	6519374.854020	6519374.854020	1802382.905560	246102	1266	sf	79	cf
Infiltration BMP	Existing	7816 SEVENTH	3/27/2007	6519884.790380	6519884.790380	1804163.292550	246102	1266	sf	79	cf
Infiltration BMP	Existing	8646 SEVENTH	1/3/2006	6524439.566780	6524439.566780	1801605.289810	245119	1266	sf	79	cf
Infiltration BMP	Existing	9225 SIDEVIEW	4/24/2006	6531114.889310	6531114.889310	1804872.365930	245127	1266	sf	79	cf
Infiltration BMP	Existing	8810 SMALLWOOD	6/20/2005	6524153.815510	6524153.815510	1810188.858090	246106	1266	sf	79	cf
Infiltration BMP	Existing	9264 SONGFEST	6/10/2008	6531394.983570	6531394.983570	1804360.661210	245127	1266	sf	79	cf
Infiltration BMP	Existing	7838 SPRINGER	11/21/2006	6515530.871940	6515530.871940	1796818.950680	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 SPRINGER	3/18/2008	6515582.250000	6515582.250000	1796787.835000	246079	1266	sf	79	cf
Infiltration BMP	Existing	10517 STAMPS	8/18/2005	6522812.240000	6522812.240000	1803043.757460	246103	1266	sf	79	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	2/27/2009	6526628.650930	6526628.650930	1796061.800920	245118	1266	sf	79	cf
Infiltration BMP	Existing	8840 STOAKES	7/15/2005	6527643.045070	6527643.045070	1808263.273840	245125	1266	sf	79	cf
Infiltration BMP	Existing	11831 SUSAN	5/25/2006	6514568.915250	6514568.915250	1801466.560490	246079	1266	sf	79	cf
Infiltration BMP	Existing	8354 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8356 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8358 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8360 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8362 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8364 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8366 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8368 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	7420 THIRD	9/20/2007	6517202.761340	6517202.761340	1803926.714420	246102	1266	sf	79	cf
Infiltration BMP	Existing	7964 THIRD	2/21/2006	6519886.681280	6519886.681280	1802225.378910	246102	1266	sf	79	cf
Infiltration BMP	Existing	9532 TWEEDY	4/20/2007	6523025.939870	6523025.939870	1807743.953100	246106	1266	sf	79	cf
Infiltration BMP	Existing	7347 VIA RIO NIDO	8/1/2007	6518199.953350	6518199.953350	1806523.073370	246104	1266	sf	79	cf
Infiltration BMP	Existing	10419 WILEY BURKE	1/2/2008	6519382.492080	6519382.492080	1805731.311650	246102	1266	sf	79	cf
Infiltration BMP	Existing	10442 WILEY BURKE	1/1/2007	6519428.439440	6519428.439440	1805422.866650	246102	1266	sf	79	cf
Infiltration BMP	Existing	12639 WOODRUFF	12/22/2006	6526127.737740	6526127.737740	1791800.878460	245113	1266	sf	79	cf
Infiltration BMP	Existing	12356 DOWNEY	4/29/2004	6518006.757310	6518006.757310	1794978.083160	245115	5062	sf	316	cf
Infiltration BMP	Existing	10613 NEWVILLE	4/21/2004	6528761.027810	6528761.027810	1798786.621380	245126	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10627 OLD RIVER SCHOOL	7/24/2003	6515233.048270	6515233.048270	1805631.128330	246104	174752	sf	10922	cf
Infiltration BMP	Existing	9215 HALL	12/9/2002	6524758.793890	6524758.793890	1797647.866960	245113	74592	sf	4662	cf
Infiltration BMP	Existing	10933 LAKEWOOD BLVD	10/5/2005	6524600.000000	6524600.000000	1800100.000000	245119	6400	sf	400	cf
Infiltration BMP	Existing	12322 SAMOLINE	7/8/2005	6516301.814120	6516301.814120	1796169.128220	246077	4256	sf	266	cf
Infiltration BMP	Existing	12731 LAKEWOOD	9/17/2003	6519215.285000	6519215.285000	1791371.090000	245115	2128	sf	133	cf
Infiltration BMP	Existing	12739 LAKEWOOD	9/17/2003	6519200.000000	6519200.000000	1791100.000000	245115	2128	sf	133	cf
Infiltration BMP	Existing	8927 BIRCHLEAF	7/11/2006	6527008.160170	6527008.160170	1808327.449830	246103	1056	sf	66	cf
Infiltration BMP	Existing	11929 POMERING	5/1/2006	6515108.241040	6515108.241040	1800149.473170	246079	1056	sf	66	cf
Infiltration BMP	Existing	12240 WOODRUFF	3/19/2010	6526758.991120	6526758.991120	1793878.747920	245118	300224	sf	18764	cf
Infiltration BMP	Existing	12222 WOODRUFF	9/14/2009	6526625.121210	6526625.121210	1794009.479990	245118	70200	sf	4388	cf
Infiltration BMP	Existing	7624 FIRESTONE	1/1/2008	6517500.000000	6517500.000000	1802600.000000	246079	41632	sf	2602	cf
Infiltration BMP	Existing	7714 STEWART & GRAY	4/9/2007	6516397.756580	6516397.756580	1799563.749470	246079	30016	sf	1876	cf
Infiltration BMP	Existing	9637 LAKEWOOD	10/2/2008	6526780.802630	6526780.802630	1805111.536210	245125	15136	sf	946	cf
Infiltration BMP	Existing	12428 BENEDICT	6/14/2007	6525687.022380	6525687.022380	1792528.538110	245114	8080	sf	505	cf
Infiltration BMP	Existing	7774 DINSDALE	2/14/2014	6521332.495780	6521332.495780	1806385.183840	246103	4680	sf	293	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8030 IMPERIAL HWY	2/14/2014	6515729.368090	6515729.368090	1794471.493939	246077	41789	sf	2000	cf
Infiltration BMP	Existing	9623 IMPERIAL HWY	2/14/2014	6524482.209740	6524482.209740	1792569.983950	245114	35408	sf	2213	cf
Infiltration BMP	Existing	10531 LAKEWOOD BL	2/14/2014	6525178.634060	6525178.634060	1801497.338680	245119	5840	sf	365	cf
Infiltration BMP	Existing	8121 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8123 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8555 TENTH ST	2/14/2014	6524962.328390	6524962.328390	1803501.510410	245119	4680	sf	293	cf
Infiltration BMP	Existing	9356 BUELL ST	2/14/2014	6527425.774610	6527425.774610	1799078.145910	245126	3120	sf	195	cf
Infiltration BMP	Existing	8449 COLE ST	2/14/2014	6520362.597670	6520362.597670	1796910.373080	245115	1560	sf	98	cf

D1.3. City of Lakewood

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Filterra Tree Wells (2)		Paramount & Arbor	33.843398	-118.159673	445521				
Infiltration BMP	Existing	Retention Basin at Cherry Cove Park			33.850296	-118.165478	446014				

D1.4. City of Paramount

Type of BMP	Existing or Planned ?	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Landscape Swale	2012	Texaco/Alondra	33.889066	-118.171849	606071	37,500	sf	2109	cf
Bioswales	Existing	Landscape Swale	2012	Orange/Windmill	33.891602	-118.177436	606072	0.6	ac	1470	cf

D1.5. City of Pico Rivera

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Site-Scale Detention Basin	Existing	French drains at Smith Park	2013	6016 Rosemead Blvd				16	ac		
Site-Scale Detention Basin	Existing	French drains at Rio Vista	2013	Coffman Pico Road				7	ac		
Bioswales	Existing	Beverly Boulevard medians	2012	Beverly Blvd				5280	sf		
Permeable Pavement	Existing	Pico Park permeable pavement	2012	9528 Beverly Blvd				12	ac		
Bioswales	Existing	Telegraph Road medians	2013	Telegraph Rd from Rosemead Blvd to Eastside limit				5280	sf		
Bioswales	Planned	Paramount Blvd medians	2016	Paramount Blvd from Whittier Blvd to Mines Ave				5280	sf		
Infiltration BMPs	Planned	Two (2) Filterra Systems	2016	various				1	ac		
Infiltration BMPs	Existing	City of Pico Rivera City Hall	2011	8615 Passons Blvd				2.75	ac		
Infiltration BMPs	Existing	Rivera Park	2012	9530 Shade Lane				16	ac		

D1.6. City of Signal Hill

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Palm Drive Business Center	2/19/2008	2445 N Palm Drive	33.801973	-118.157962	775510	1	ac		
Bioretention / Biofiltration		Aragon Townhomes & Duplexes (City View)	3/9/2007	1902 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2755 California Avenue	33.807881	-118.181769	776011	9,583	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2756 California Avenue	33.807881	-118.181769	776011	17,424	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2757 California Avenue	33.807881	-118.181769	776011	33,106	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2758 California Avenue	33.807881	-118.181769	776011	10,454	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2759 California Avenue	33.807881	-118.181769	776011	78,486	sf		
Bioretention / Biofiltration		2-Story Building and Parking Lot	12/28/2010	2653 Walnut Avenue	33.805754	-118.171978	776012	0.51	ac		
Bioretention / Biofiltration		EDCO Administrative Terminal	8/1/2011	950 27th Street	33.806179	-118.1812	776012	9583	sf	0.06	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/2/2011	951 27th Street	33.806179	-118.1812	776012	17424	sf	0.08	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/3/2011	952 27th Street	33.806179	-118.1812	776012	33106	sf	0.14	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/4/2011	953 27th Street	33.806179	-118.1812	776012	10454	sf	0.08	cfs
Bioretention / Biofiltration		Fantasy Castle	6/30/2009	2801 Walnut Ave	33.808289	118.171777		1,584	sf		
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/16/2010	3300 Atlantic Avenue	33.817504	-118.184643	485510	18,000	sf	931	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/17/2010	3301 Atlantic Avenue	33.817504	-118.184643	485510	120	sf	7	cf
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/18/2010	3302 Atlantic Avenue	33.817504	-118.184643	485510	10,904	sf	542	cf
Bioswales	Existing	Signal Hill Police Station and Emergency Operation	5/26/2011	2745 Walnut Avenue	33.807067	-118.171984	775510	115,870	sf		
Bioswales	Existing	Jack in the Box	10/21/2008	802 Spring Street	33.812049	-118.182595	775510	12,000	sf		
Bioswales		Boiler Tech Warehouse	10/2/2009	2503 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Bioswales		Aragon Townhomes & Duplexes (City View)	3/11/2007	1904 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,100	sf		
Bioswales		Fantasy Castle	6/29/2009	2800 Walnut Ave	33.808289	118.171777		32,883	sf		
Flow-Through Treatment BMP	Existing	Petco, Party City	3/3/2009	3100 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	Petco, Party City	3/4/2009	3101 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	The Home Depot		3100 Atlantic Avenue	33.813946	-118.184789	485510	3.65	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3101 Atlantic Avenue	33.813946	-118.184789	485510	7.99	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3102 Atlantic Avenue	33.813946	-118.184789	485510	3.28	ac		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	The Home Depot		3103 Atlantic Avenue	33.813946	-118.184789	485510	4.79	ac		
Flow-Through Treatment BMP		Palm Drive Business Center	2/20/2008	2446 N Palm Drive	33.801973	-118.157962	775510	7,000	sf		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/17/2009	2475 Cherry Avenue	33.802363	-118.168152	775510	0.68	ac		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/18/2009	2476 Cherry Avenue	33.802363	-118.168152	775510	0.58	ac		
Flow-Through Treatment BMP	Existing	US Bank	9/17/2008	2615 Cherry Ave	33.804856	-118.167999	775510	18732	sf		
Flow-Through Treatment BMP	Existing	Signal Hill Industrial Center		2665-2745 Temple Ave	33.80648	-118.159782	775510	143,312	sf		
Flow-Through Treatment BMP	Existing	Tanker Interior Washing Facility		1710 E 29th Street	33.80935	-118.170824	775510	10,000	sf		
Flow-Through Treatment BMP	Existing	Delius Restaurant	7/14/2006	2951 Cherry Ave	33.81111	-118.168077	775510	32,000	sf		
Flow-Through Treatment BMP	Existing	Jack in the Box	10/20/2008	801 Spring Street	33.812049	-118.182595	775510	12,000	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Target (T-2319)	2/13/2007	950 E 33rd Street	33.816767	-118.181488	775510	178,600	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/8/2007	1245 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/9/2007	1246 E. 23rd Street	33.799126	-118.17577	776002	1575	sf		
Flow-Through Treatment BMP		Boiler Tech Warehouse	9/30/2009	2501 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/11/2006	2400-2418 California Ave	33.803504	-118.180639	776002	16,247	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/12/2006	2400-2418 California Ave	33.803504	-118.180639	776002	25,047	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/5/2005	2550 Gundry Ave	33.803577	-118.173289	776002	61,000	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/6/2005	2551 Gundry Ave	33.803577	-118.173289	776002	30,492	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/7/2005	2552 Gundry Ave	33.803577	-118.173289	776002	4,356	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/6/2007	1899 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,350	sf		
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/7/2007	1900 (1890) Oribaza Ave	33.790924	-118.156725	776003	63,400	sf		
Flow-Through Treatment BMP		In-N-Out Burger	5/27/2011	799 E. Spring Street	33.812066	-118.183197	776011	65,220	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/1/2007	2652 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/2/2007	2653 Gundry Ave	33.805493	-118.173804	776012	1,395	sf		
Flow-Through Treatment BMP		2-Story Building and Parking Lot	12/29/2010	2654 Walnut Avenue	33.805754	-118.171978	776012				
Flow-Through Treatment BMP		Islamic Center	5/29/2009	996 27th St	33.806216	-118.180729	776012	5000	sf		
Flow-Through Treatment BMP		Crescent Square Development	8/10/2007	1600-1799 Green House Place				136,955	sf		
Infiltration BMPs	Existing	Fresh & Easy	11/19/2009	2477 Cherry Avenue	33.802363	-118.168152	775510	76,143	sf		
Infiltration BMPs	Existing	US Bank	9/19/2008	2617 Cherry Ave	33.804856	-118.167999	775510	18732	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Planned	Applebee's	3/12/2013	899 E. Spring Street	33.812089	-118.181855	775510	23,580	sf		
Infiltration BMPs	Existing	Hawk Industries	5/10/2007	1247 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Infiltration BMPs		Boiler Tech Warehouse	10/1/2009	2502 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Infiltration BMPs		Pacific Walk	1/4/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	100,200	sf		
Infiltration BMPs		Pacific Walk	1/5/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	149,015	sf		
Infiltration BMPs		Pacific Walk	1/6/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	1,300	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/8/2007	1901 (1890) Oribaza Ave	33.790924	-118.156725	776003	94,750	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/10/2007	1903 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/9/2013	845 E. Willow Street	33.804664	-118.182279	776009	22,651	sf	1095	cf
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/10/2013	846 E. Willow Street	33.804664	-118.182279	776009	37,304	sf	1890	cf
Infiltration BMPs		In-N-Out Burger	5/28/2011	800 E. Spring Street	33.812066	-118.183197	776011	65,220	sf	3425	cf
Infiltration BMPs		Shoreline Fabricators	8/3/2007	2654 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Infiltration BMPs		Islamic Center	5/28/2009	995 27th St	33.806216	-118.180729	776012	5000	sf		
Infiltration BMPs	Existing	A & A Ready Mix Concrete	8/1/2007	900 E. Patterson	33.806664	-118.182206	776012	2	ac		
Permeable Pavement	Existing	US Bank	9/18/2008	2616 Cherry Ave	33.804856	-118.167999	775510	60	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Permeable Pavement	Existing	Hawk Industries	5/11/2007	1248 E. 23rd Street	33.799126	-118.17577	776002	5,628	sf		

D1.7. City of South Gate

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Self Storage	9/15/2008	2405 Southern Ave	33.953436	-118.229363	796034	0.25	ac		
Bioretention / Biofiltration		Hollydale Plaza	3/30/2010	12222 Garfield Avenue	33.915655	-118.168383	796076	15,278	sf		
Bioretention / Biofiltration		Atlantic Avenue Improvements	4/21/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	7.44	ac		
Bioretention / Biofiltration	Planned	azalea	11/25/2012	4641 Firestone Blvd.	33.952413	-118.187909	796084	7,328	sf	0.22	cfs
Bioswales		South Gate McDonald's	9/30/2013	3313 Tweedy Boulevard	33.945113	-118.211464	796034	5,119	sf		
Bioswales		South Gate McDonald's	10/1/2013	3314 Tweedy Boulevard	33.945113	-118.211464	796034	5,545	sf		
Bioswales		Commercial Center	10/4/2010	9200 Califlornia Avenue	33.950805	-118.206221	796034	12,367	sf		
Bioswales		Commercial Center	10/5/2010	9201 Califlornia Avenue	33.950805	-118.206221	796034	4,263	sf		
Bioswales		Hot Mix Asphalt Plant	5/11/2001	5626 Southern Avenue	33.944913	-118.168148	796083	2.7	ac		
Bioswales		Goals Soccer Centers - South Gate	2/9/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	53,142	sf		
Flow-Through Treatment BMP	Existing	South Gate McDonald's	9/26/2013	3309 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Flow-Through Treatment BMP		South Gate McDonald's	9/28/2013	3311 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Walgreens	7/24/2006	9830 Long Beach	33.946082	-118.215937	796034	48,725	sf		
Flow-Through Treatment BMP	Existing	King's Car Wash	11/29/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	10,461	sf		
Flow-Through Treatment BMP		King's Car Wash	12/1/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034				
Flow-Through Treatment BMP	Existing	Sarina Townhomes	2/12/2007	9321 State Street	33.950368	-118.21325	796034	14,375	sf		
Flow-Through Treatment BMP		Commercial Center	10/6/2010	9202 Califlornia Avenue	33.950805	-118.206221	796034	16,630	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3830 Firestone Blvd	33.953324	-118.201934	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3831 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3800 Firestone Blvd	33.95348	-118.202386	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3801 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Planned	Calden Court Appartments	9/27/2013	8901 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Flow-Through Treatment BMP		Hollydale Plaza	3/31/2010	12223 Garfield Avenue	33.915655	-118.168383	796076	27,381	sf		
Flow-Through Treatment BMP	Existing	Sherwin Inc	4/10/2007	5530 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Flow-Through Treatment BMP		Hot Mix Asphalt Plant	5/10/2001	5625 Southern Avenue	33.944913	-118.168148	796083	9.5	ac		
Flow-Through Treatment BMP		Atlantic Avenue Improvements	4/22/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	13.32	ac		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/11/2010	9601 Pinehurst Avenue	33.945107	-118.182378	796084	70,036	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/12/2010	9602 Pinehurst Avenue	33.945107	-118.182378	796084	37,897	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/13/2010	9603 Pinehurst Avenue	33.945107	-118.182378	796084	63,400	sf		
Flow-Through Treatment BMP	Planned	azalea	11/24/2012	4640 Firestone Blvd.	33.952413	-118.187909	796084	1,583,819	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Interior Removal Specialist Demolition	5/21/2007	9309 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/22/2007	9310 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/23/2007	9311 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/24/2007	9312 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Petrochem Manufacturing	12/18/2006	8401 Quartz	33.957949	-118.191835	796090	162,305	sf		
Flow-Through Treatment BMP		Petrochem Manufacturing	12/19/2006	8402 Quartz	33.957949	-118.191835	796090	51,401	sf		
Infiltration BMPs		South Gate McDonald's	9/27/2013	3310 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Infiltration BMPs		South Gate McDonald's	9/29/2013	3312 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		
Infiltration BMPs		South Gate McDonald's	10/4/2013	3317 Tweedy Boulevard	33.945113	-118.211464	796034	3,743	sf		
Infiltration BMPs		King's Car Wash	11/30/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	3,047	sf		
Infiltration BMPs		Sarina Townhomes	2/13/2007	9322 State Street	33.950368	-118.21325	796034	17,519	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs		Office Bldg	12/22/2007	3832 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Infiltration BMPs		Office Bldg	12/22/2007	3802 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		
Infiltration BMPs	Existing	Family Dollar	10/8/2012	3610 Firestone	33.95374	-118.204546	796034		sf		
Infiltration BMPs	Planned	Calden Court Appartments	9/28/2013	8902 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Infiltration BMPs		South Gate Ward Building New Parking Lot	10/15/2010	2771 Liberty Boulevard	33.961969	-118.220918	796034	14,811	sf		
Infiltration BMPs		Sherwin Inc	4/11/2007	5531 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Infiltration BMPs		Atlantic Avenue Improvements	4/23/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	22,400	sf		
Infiltration BMPs		Batting Cages	11/4/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	7,953	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/10/2010	9600 Pinehurst Avenue	33.945107	-118.182378	796084	113	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/14/2010	9604 Pinehurst Avenue	33.945107	-118.182378	796084	171,333	sf		
Infiltration BMPs	Planned	azalea	11/19/2012	4635 Firestone Blvd.	33.952413	-118.187909	796084	444,636	sf	31,365	cf
Infiltration BMPs	Planned	azalea	11/20/2012	4636 Firestone Blvd.	33.952413	-118.187909	796084	110,869	sf	12,946	cf
Infiltration BMPs	Planned	azalea	11/21/2012	4637 Firestone Blvd.	33.952413	-118.187909	796084	582,860	sf	72,234	cf
Infiltration BMPs	Planned	azalea	11/22/2012	4638 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	25,348	cf
Infiltration BMPs	Planned	azalea	11/23/2012	4639 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	64,314	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Existing	New South Central Properties, LLC	5/28/2009	8600 Rheem Ave	33.955566	-118.192042	796084	20,960	sf		
Infiltration BMPs		LA Water	8/4/2010	9415 Burtis	33.947369	-118.176109	796350	154,538	sf		
Permeable Pavement		South Gate McDonald's	10/2/2013	3315 Tweedy Boulevard	33.945113	-118.211464	796034	8,697	sf		
Permeable Pavement		South Gate McDonald's	10/3/2013	3316 Tweedy Boulevard	33.945113	-118.211464	796034	3,550	sf		

D1.8. City of Whittier

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Planned	GWT Biolswale	2014	Greenway Trail from to	33.972121	-118.044253	895098				
Bioretention / Biofiltration	Planned	Whittier Blvd Widening and Bioswale	2017	Whittier Blvd from to							
Green Streets (Describe)	Planned	Lower Uptown reverse drains	2014	Milton, Newlin, Comstock from La Cuarta to Walnut	33.970199	-118.039721	895098		TBD		TBD
Site-Scale Detention Basin	Existing	Police Building and City Hall Storm Drainage	2010	13230 Penn St	33.974748	-118.03371	895098				

Attachment E: SUPPORTING CALIBRATION DATA

Submitted to:

LLAR WMP Group

LCC WMP Group

LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

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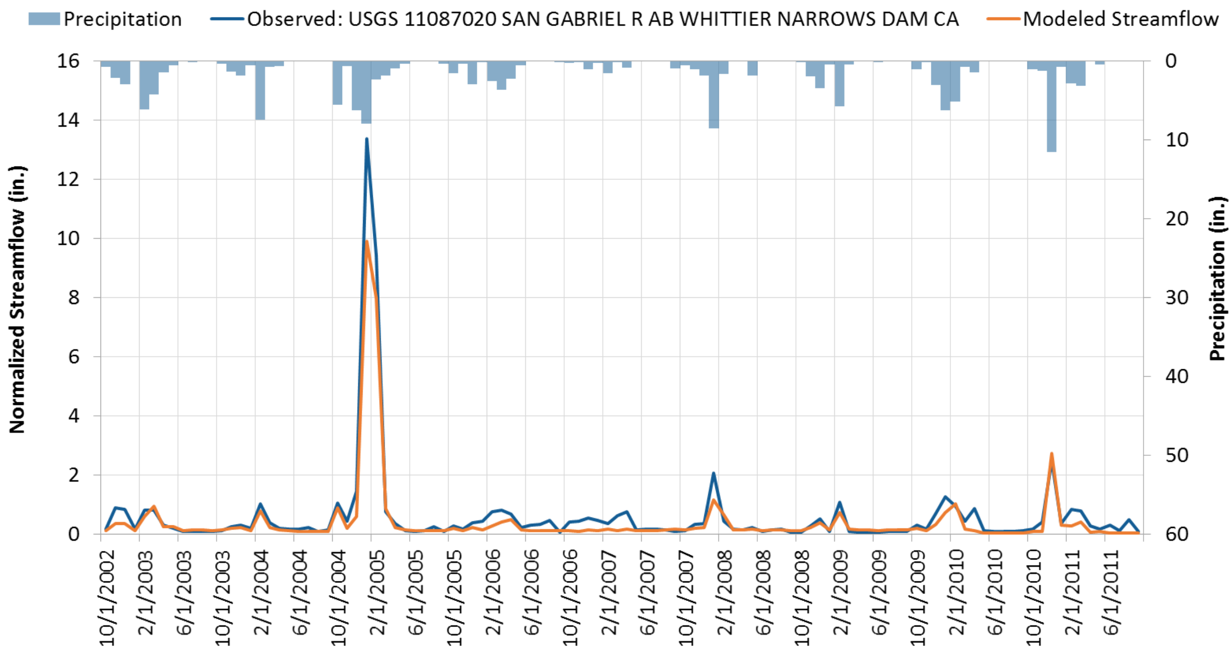
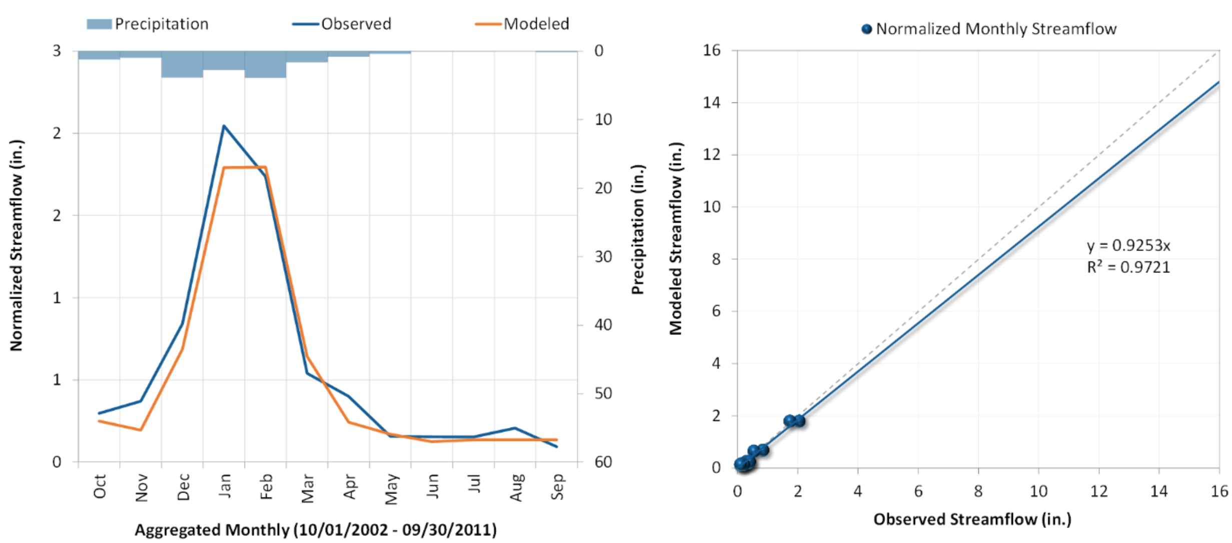


Figure 1. Monthly hydrograph for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).



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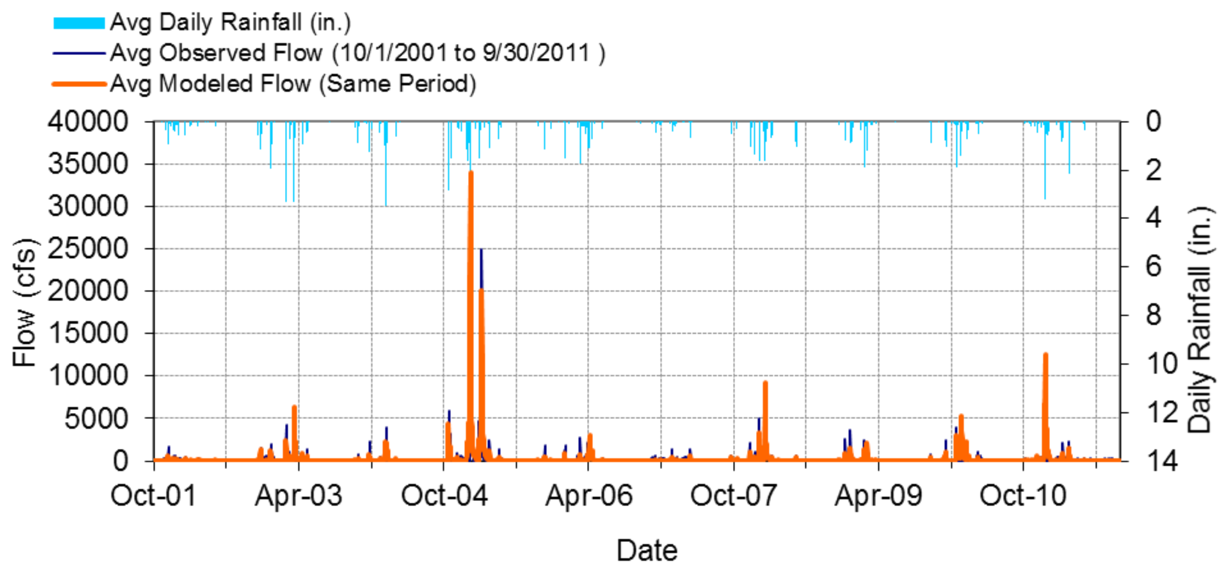

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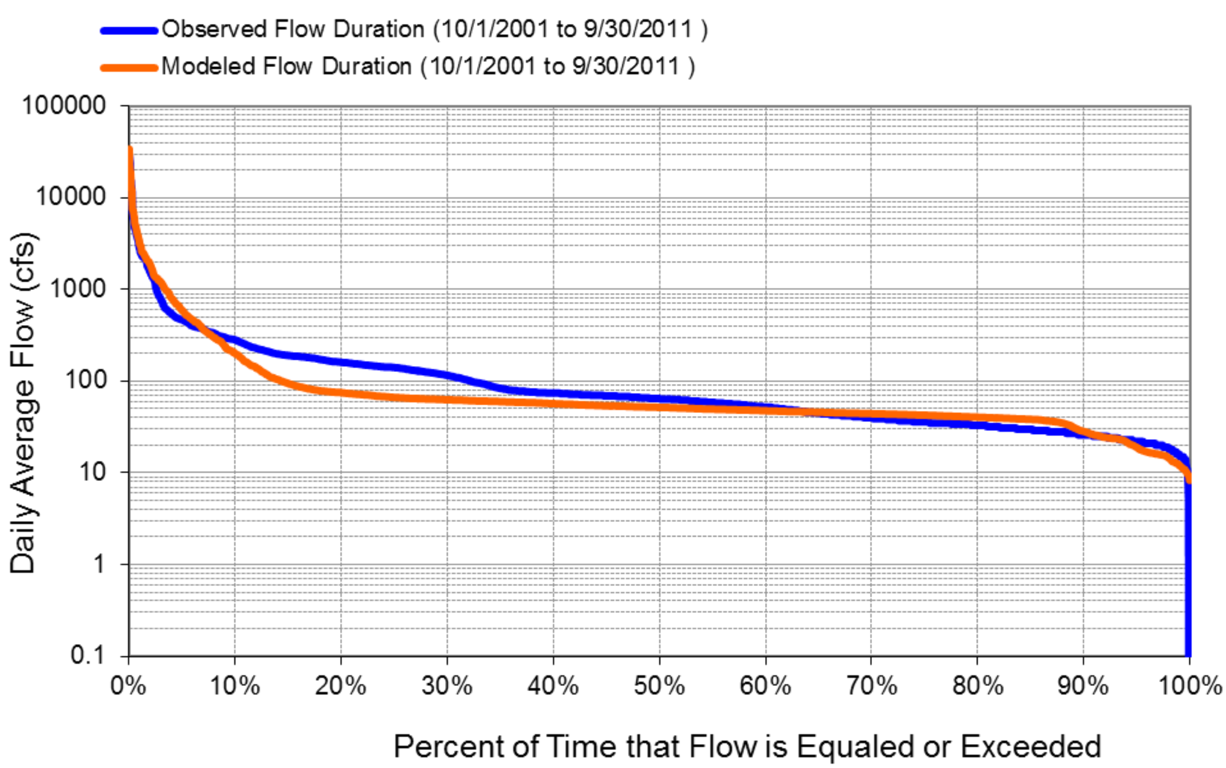

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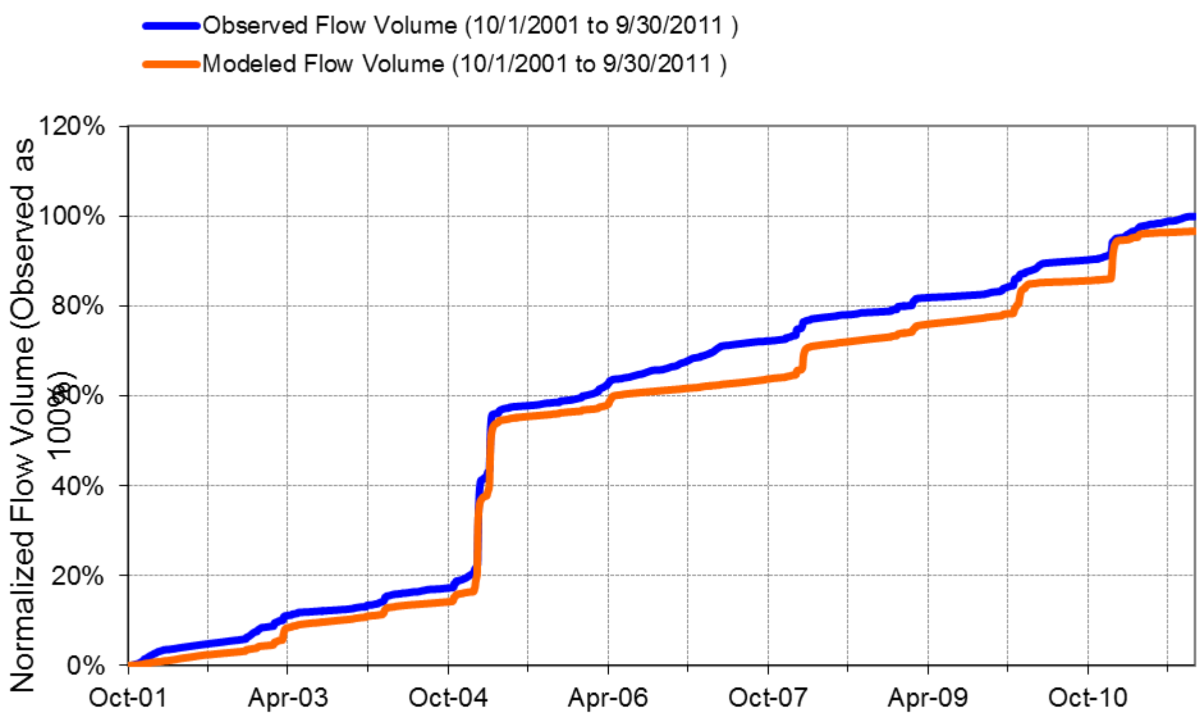

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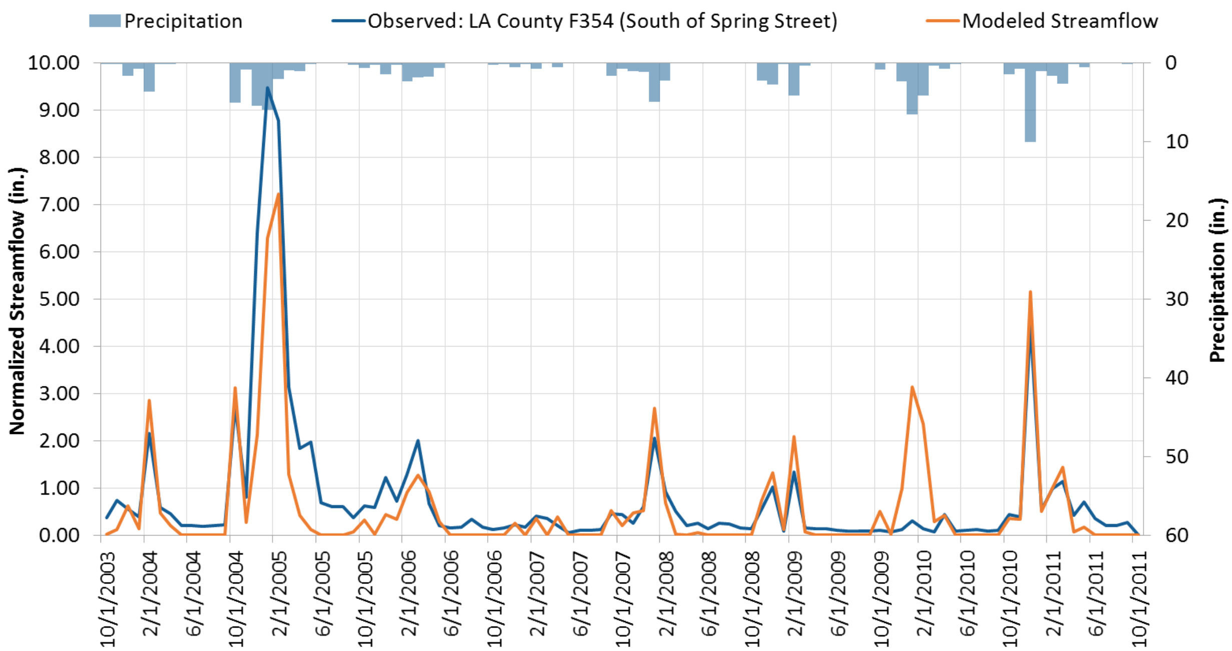
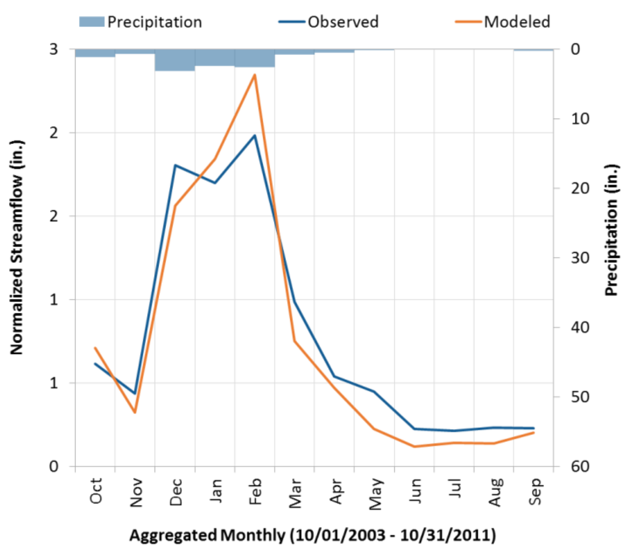


Figure 6. Monthly hydrograph for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.



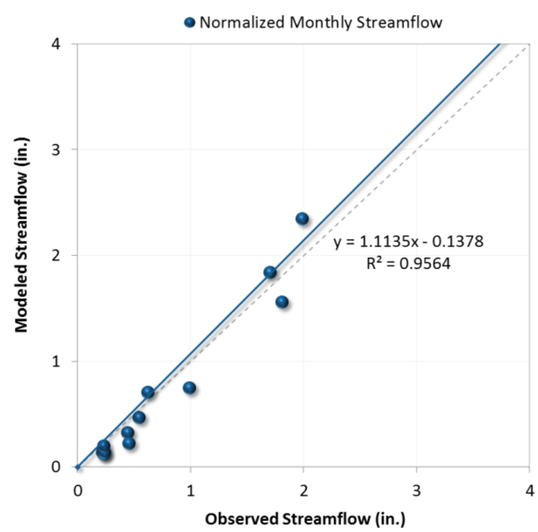
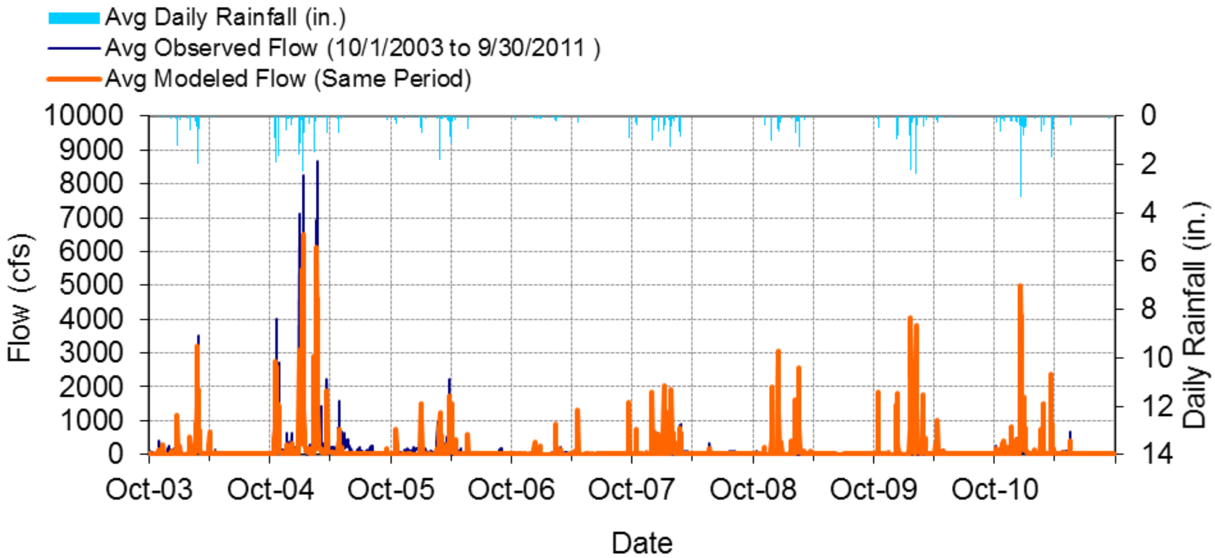


Figure 7. Aggregated monthly hydrograph for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.



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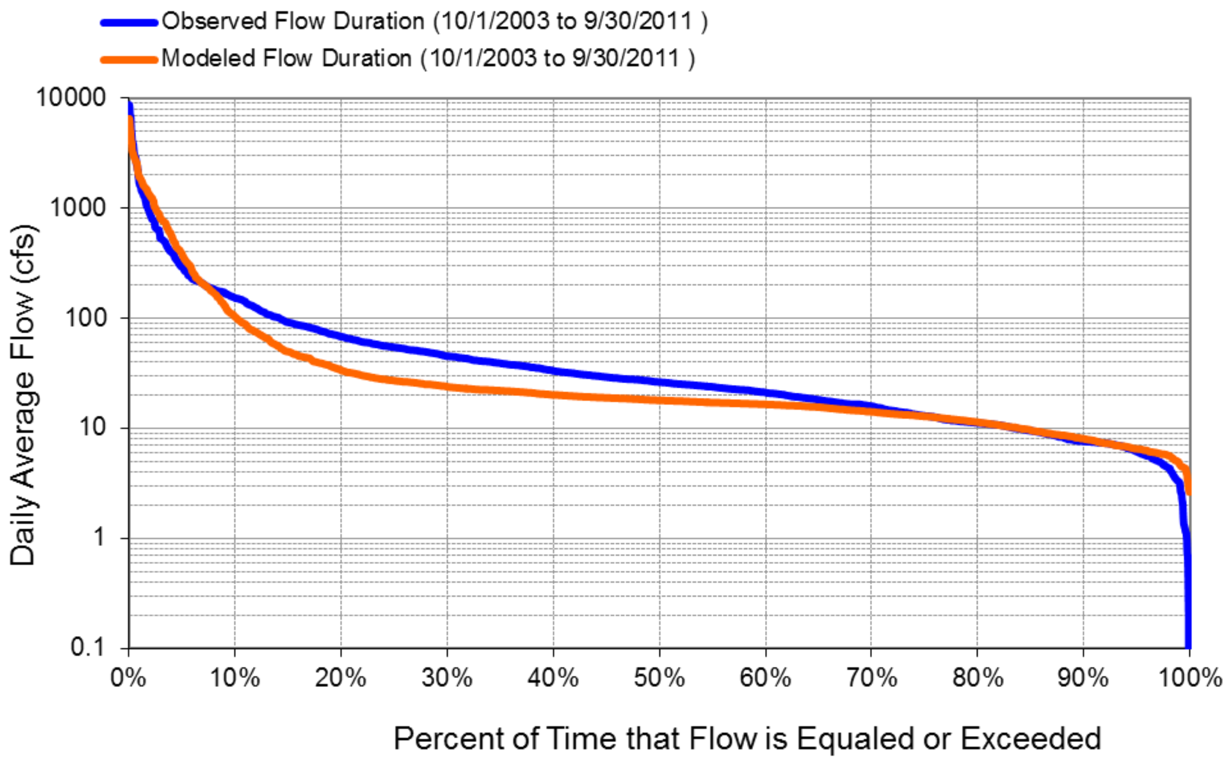


Figure 9. Daily flow exceedance for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

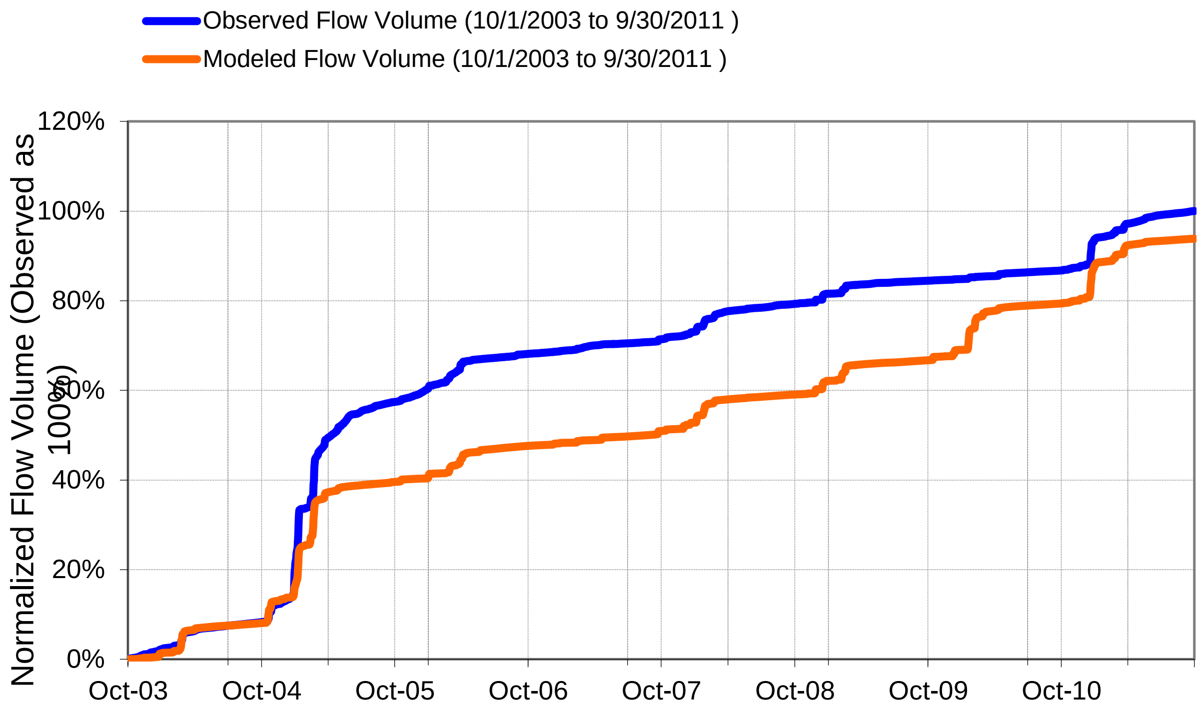
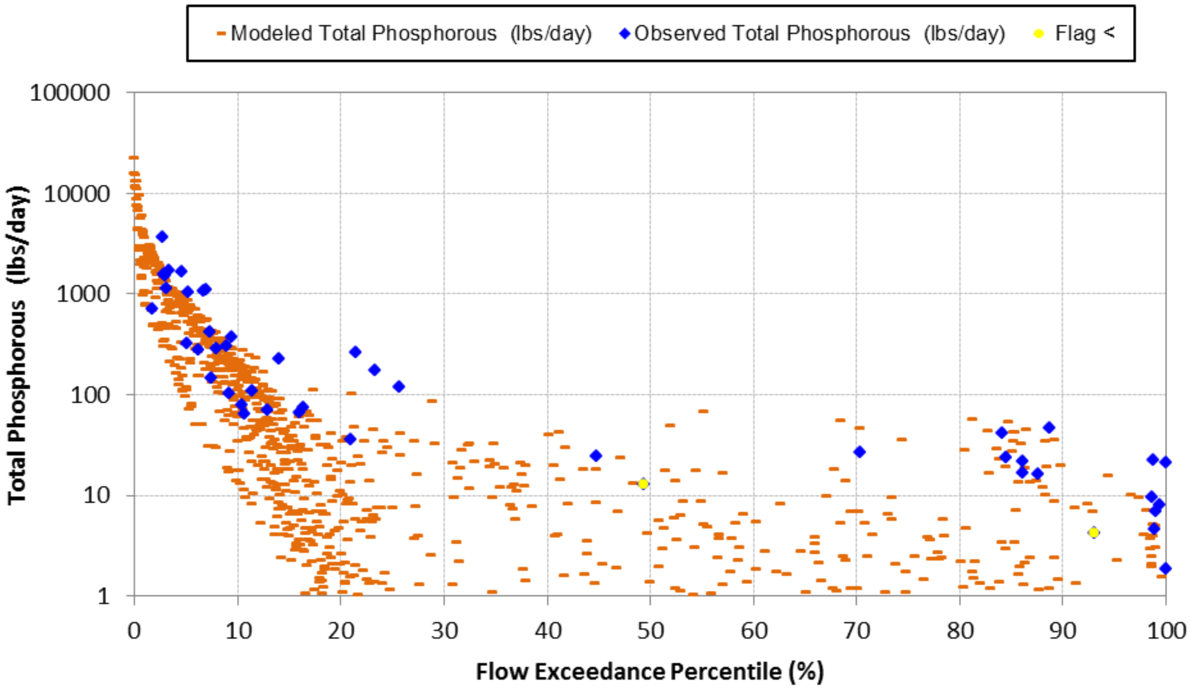


Figure 10. Flow accumulation for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

Table 1. Summary of water quality data evaluated for the Lower San Gabriel River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S14	Total Copper (ug/l)	5.0	10.5	13.1	23.9	81.4
S13	Total Copper (ug/l)	0.5	11.8	28.1	48.3	351.0
S14	Total Lead (ug/l)	0.7	1.4	2.9	8.2	56.0
S13	Total Lead (ug/l)	0.2	1.1	10.2	19.2	147.0
S14	TSS (mg/L)	5.0	16.8	38.0	169.8	1258.0
S13	TSS (mg/L)	1.0	48.0	97.0	230.5	1556.0
S14	Total Zinc (ug/l)	19.8	36.6	61.0	86.9	440.0
S13	Total Zinc (ug/l)	1.0	62.0	135.0	241.5	2010.0
S14	Fecal Coliform (MPN/100mL)	20	300	1,300	50,000	16,000,000
S13	FC (MPN/100mL)	20	1,300	16,000	90,000	2,200,000
S14	Total Nitrogen (mg/l)	-	-	-	-	-
S13	Total Nitrogen (mg/l)	-	-	-	-	-
S14	Total Phosphorous (mg/l)	0.05	0.11	0.18	0.41	0.86
S13	Total Phosphorous (mg/l)	-	-	-	-	-



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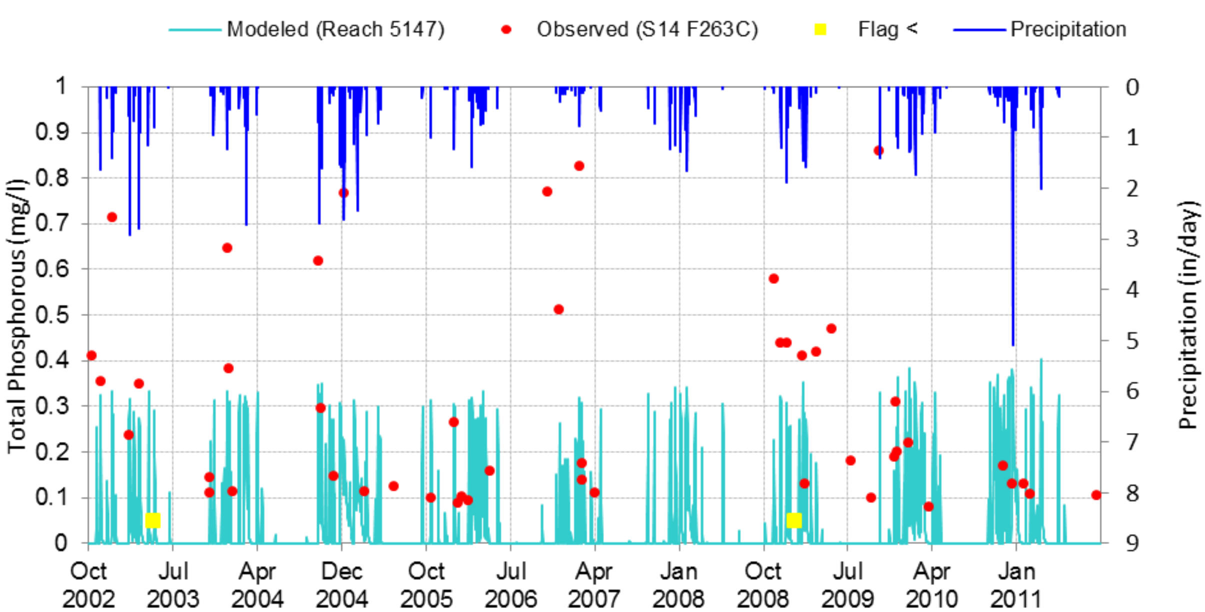

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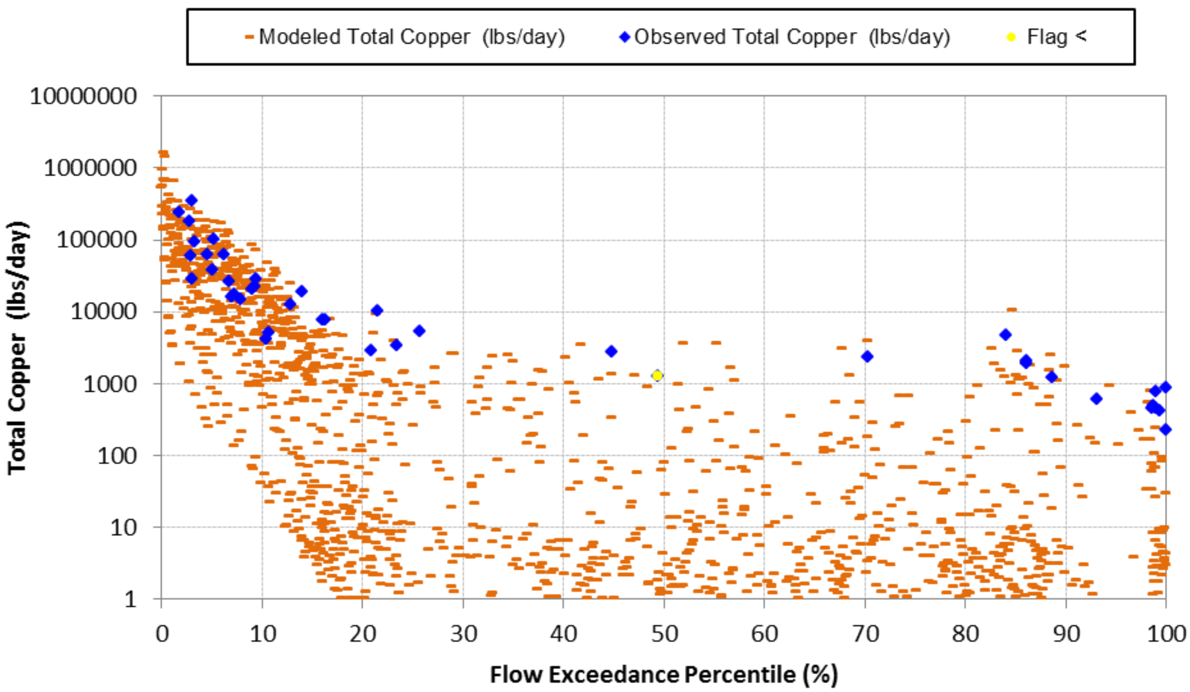

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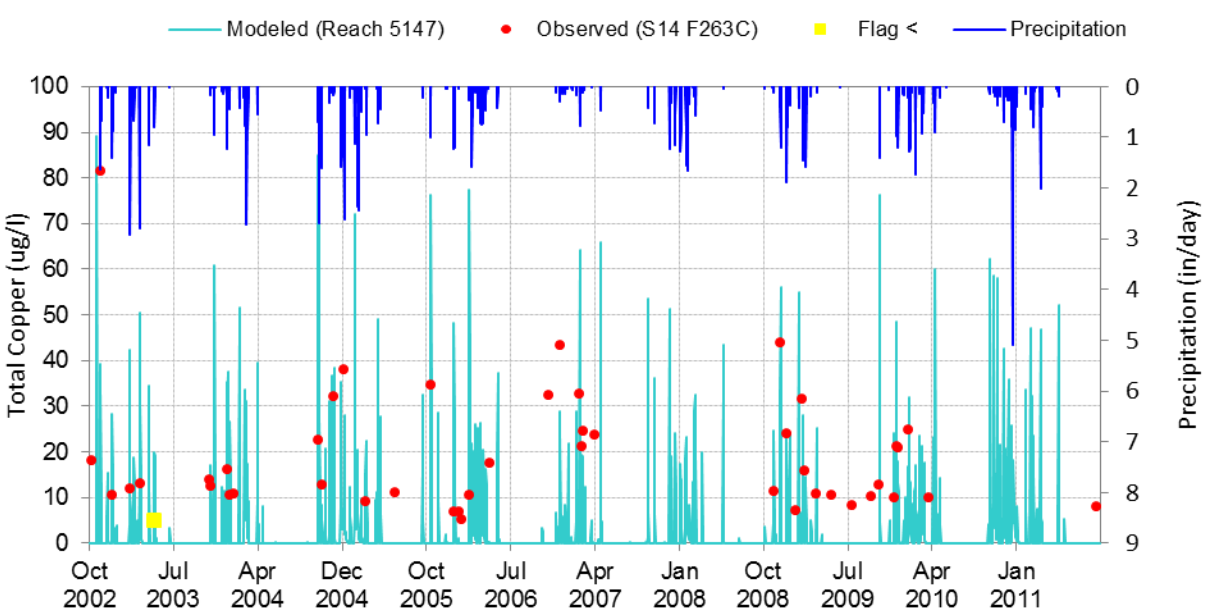

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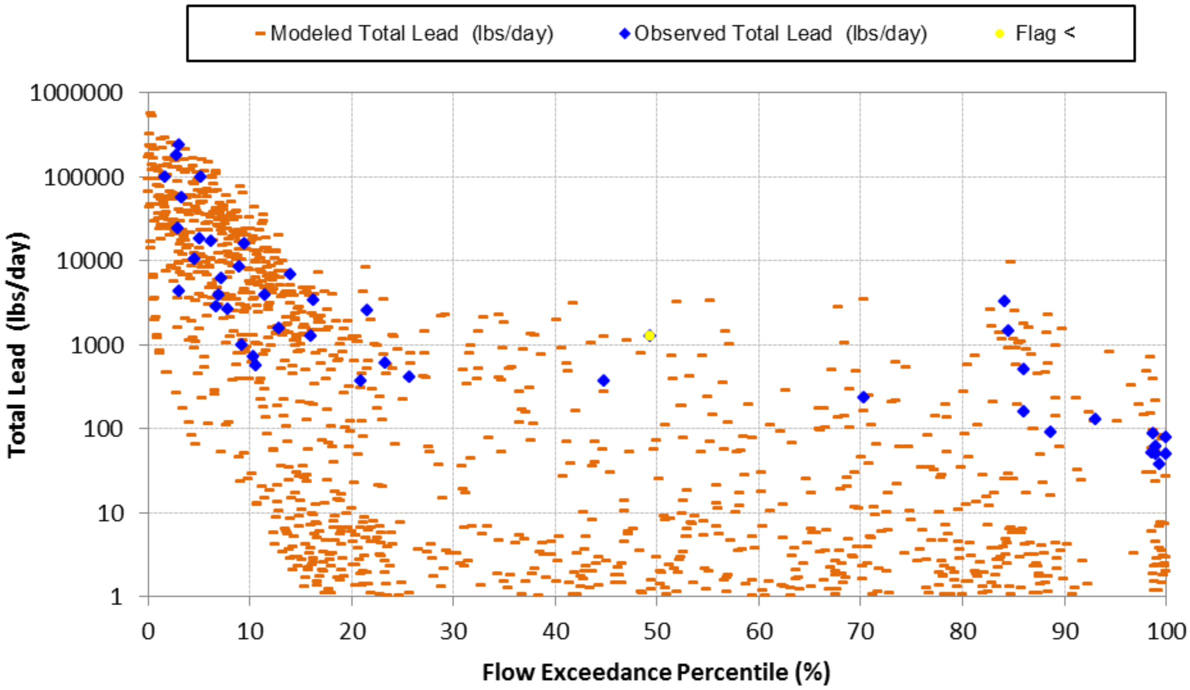

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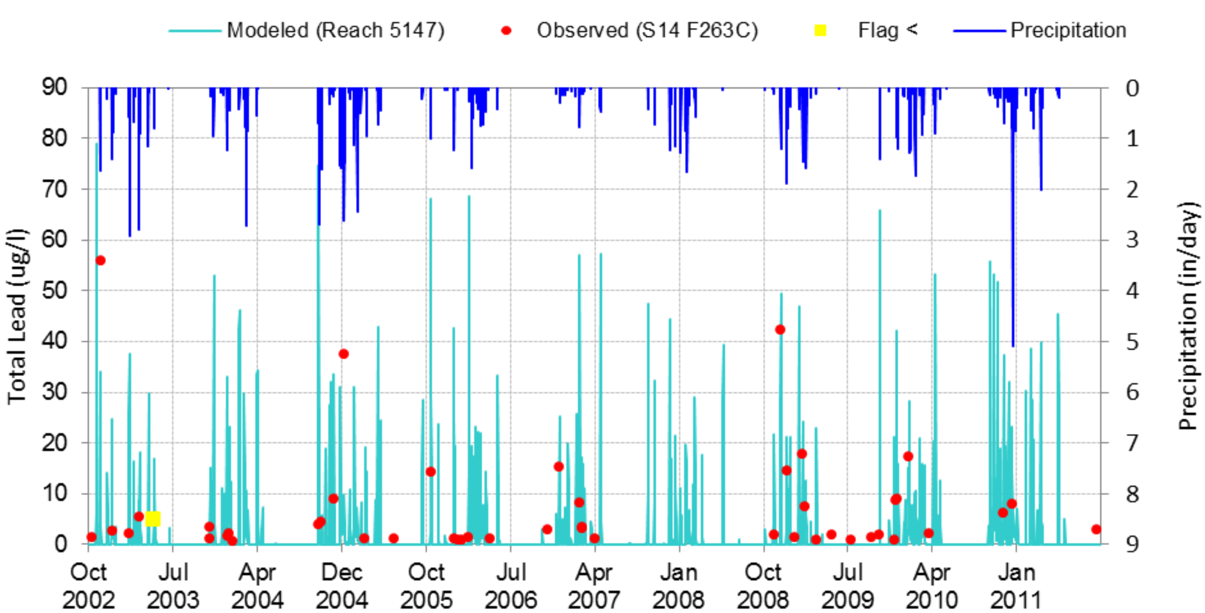

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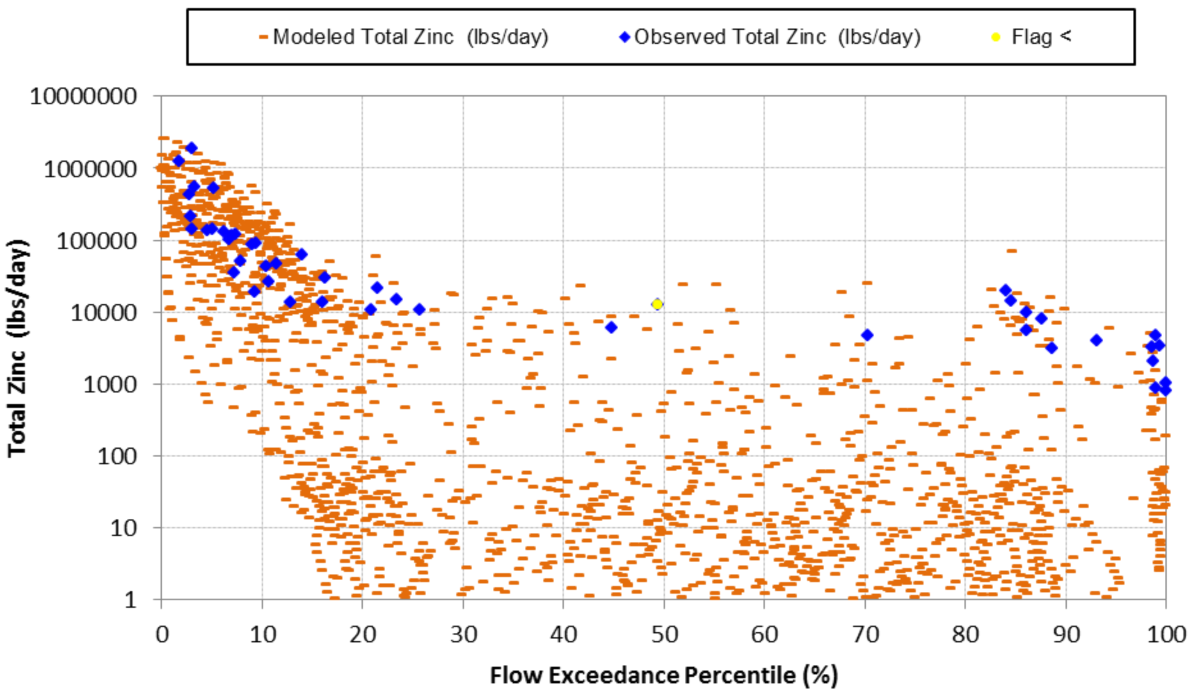

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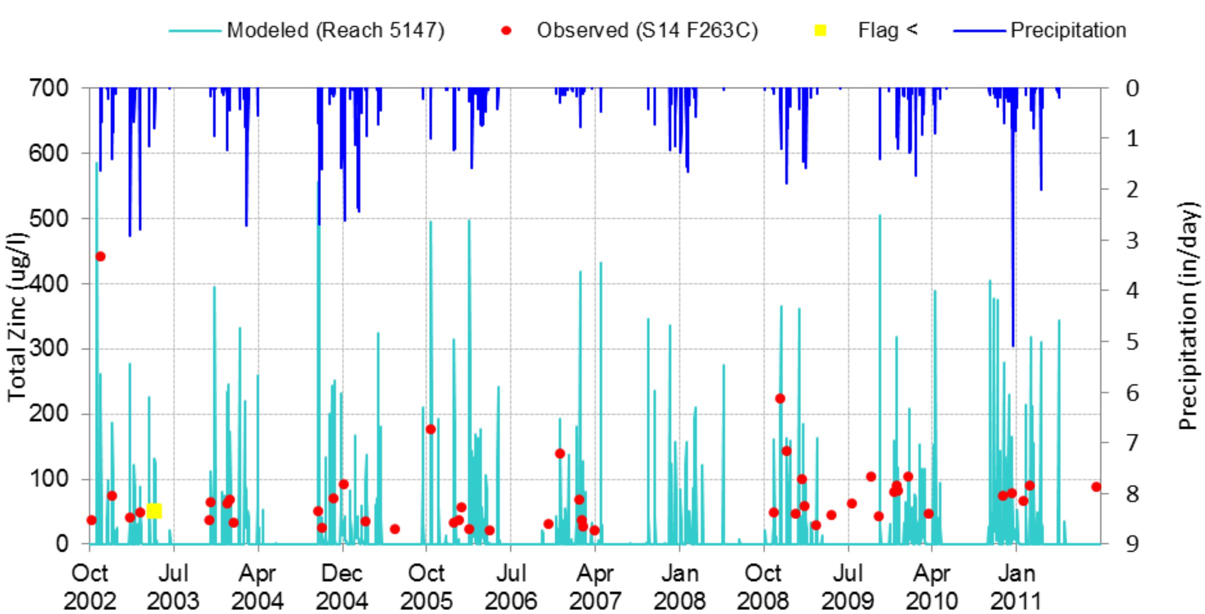

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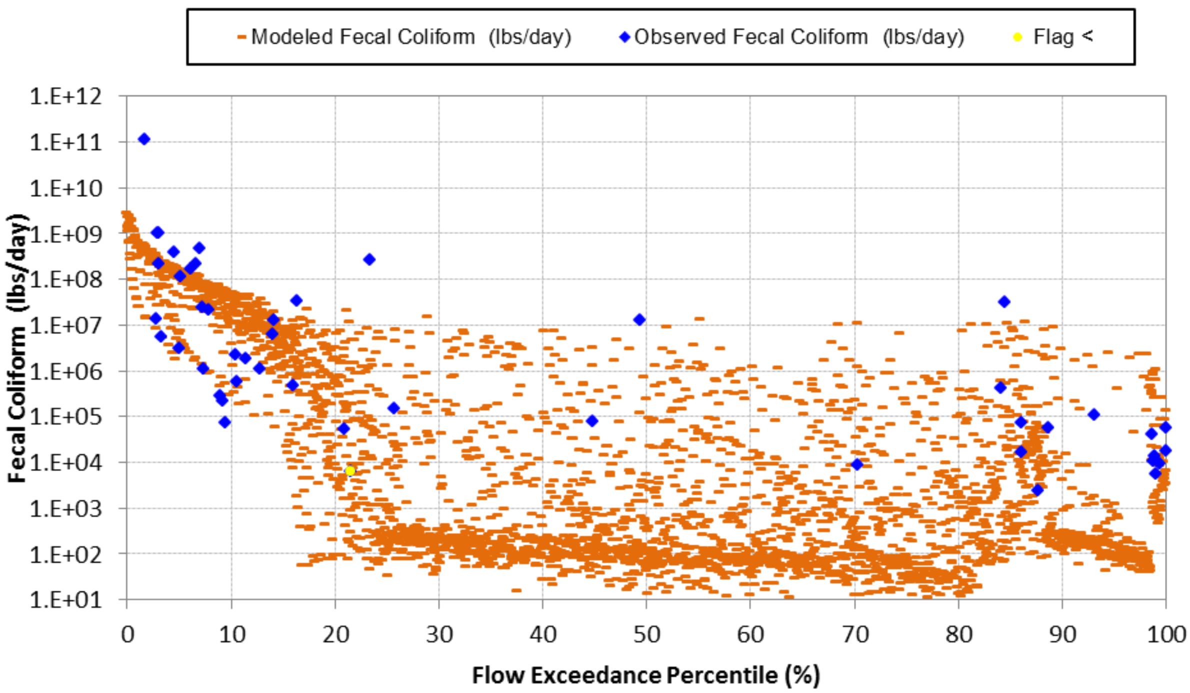

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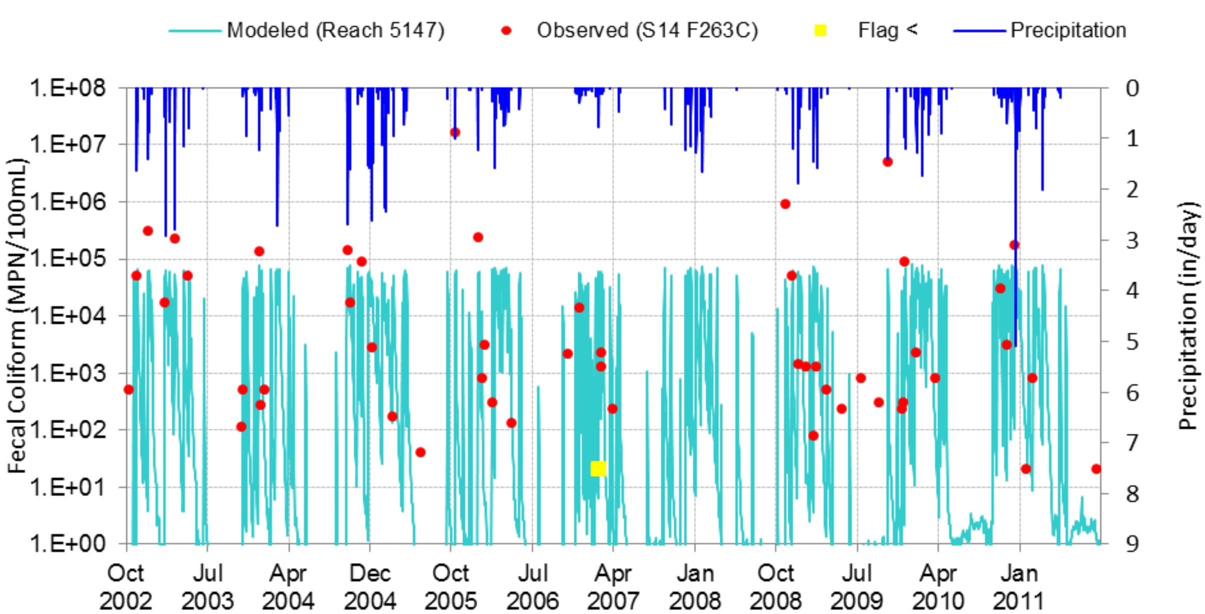

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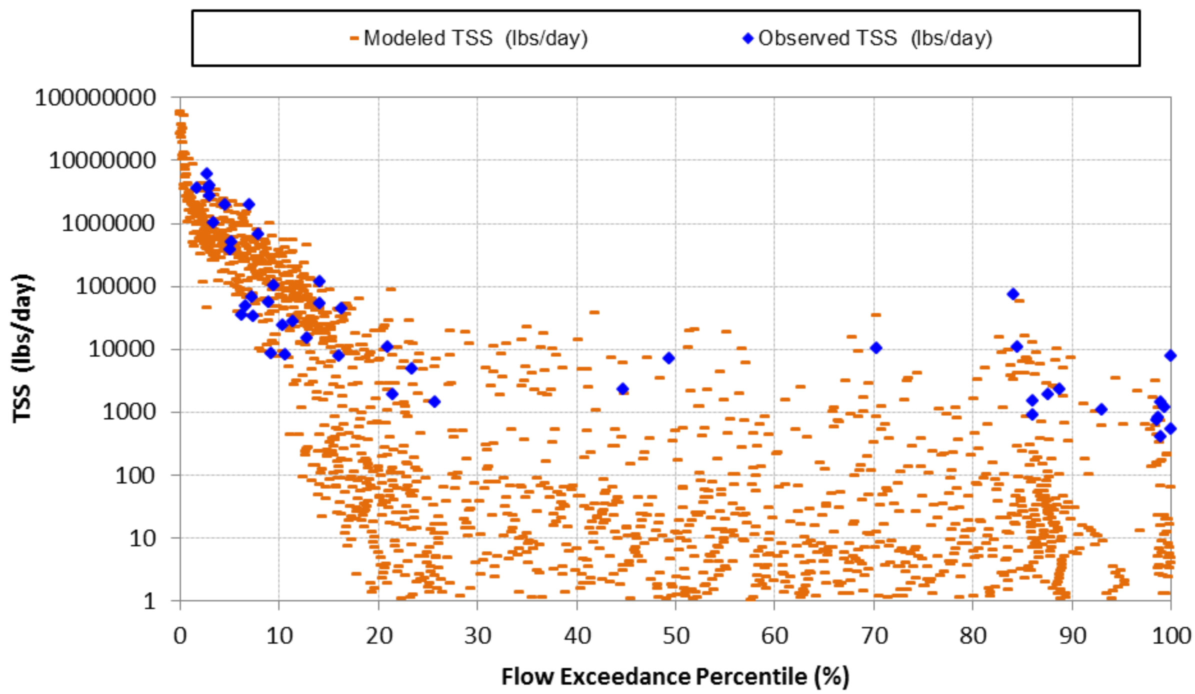

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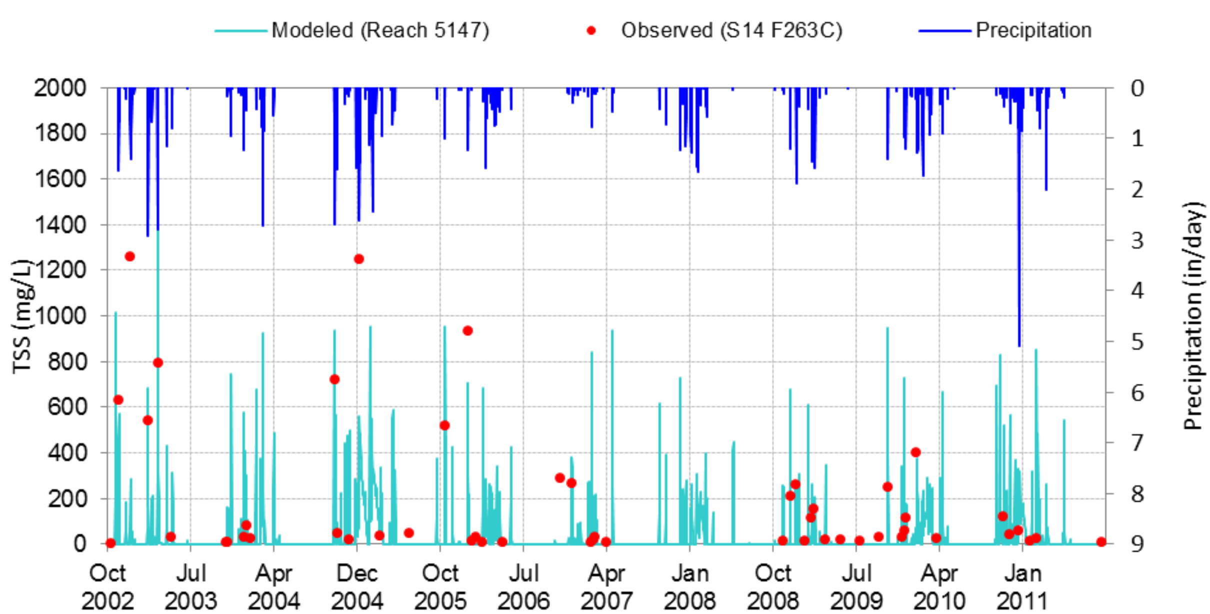

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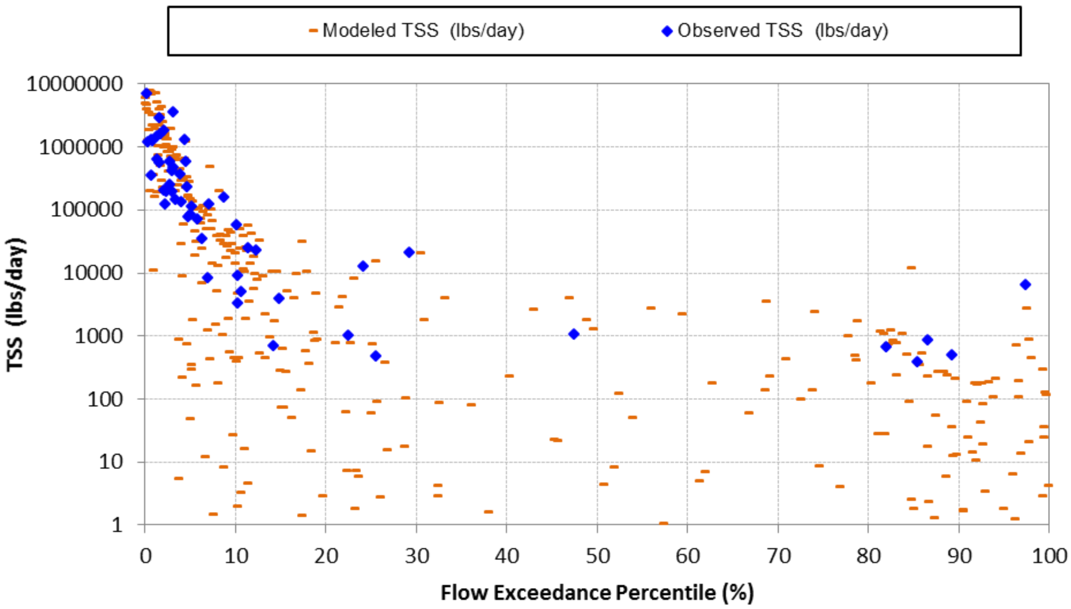

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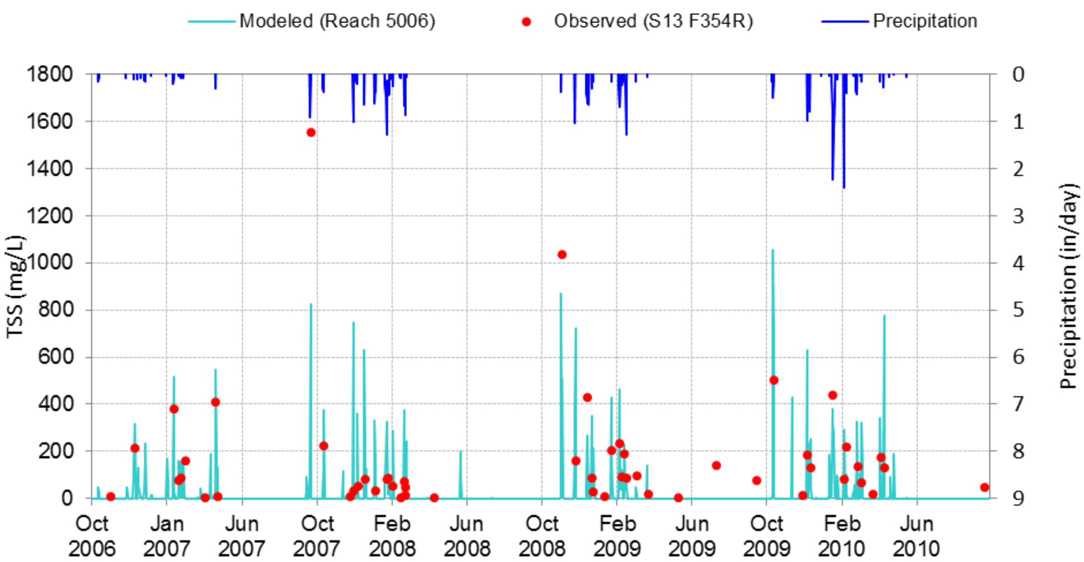

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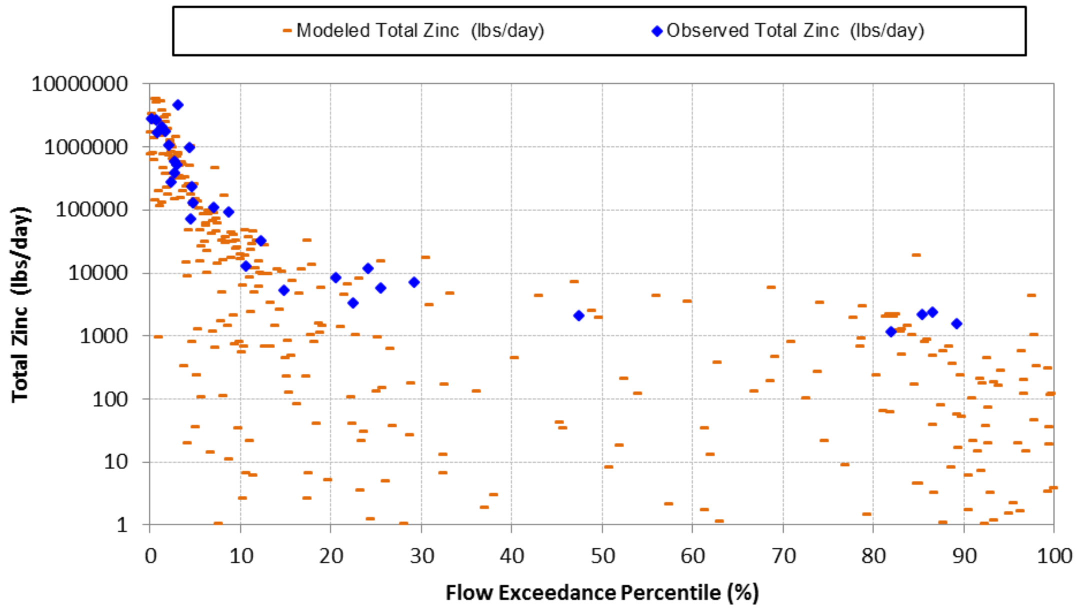

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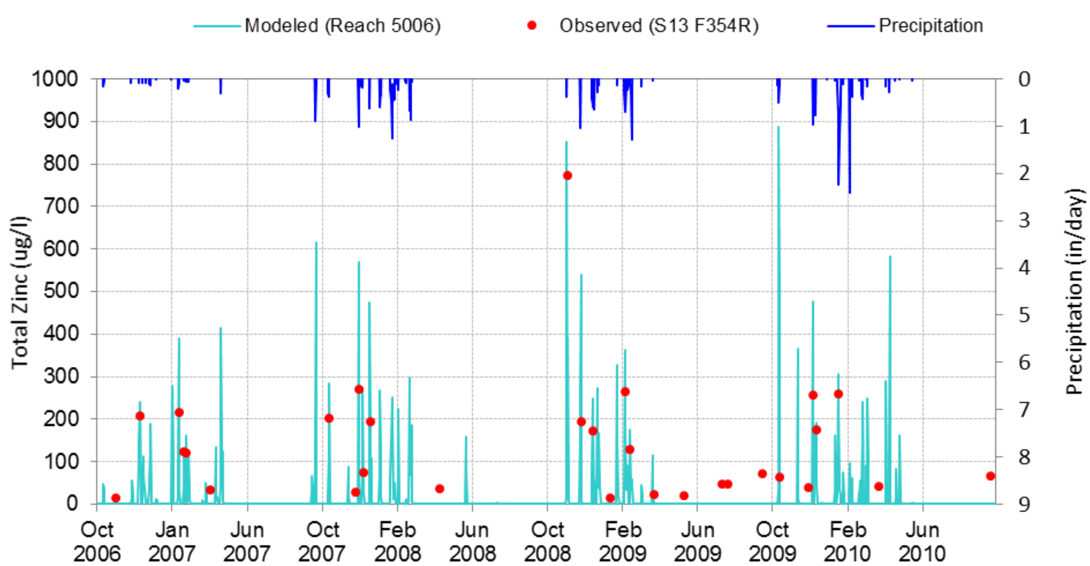

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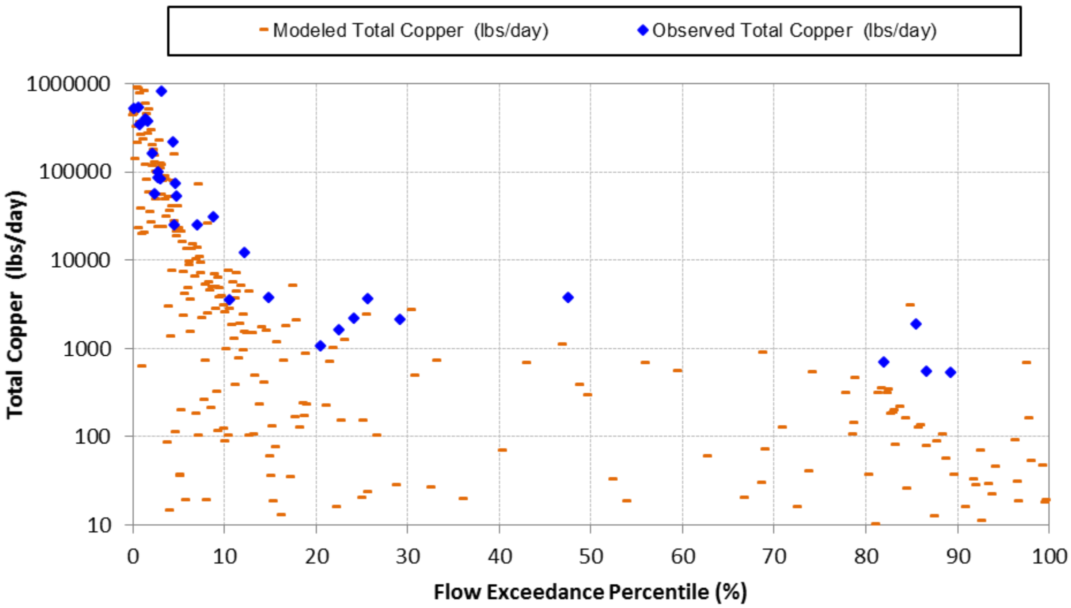

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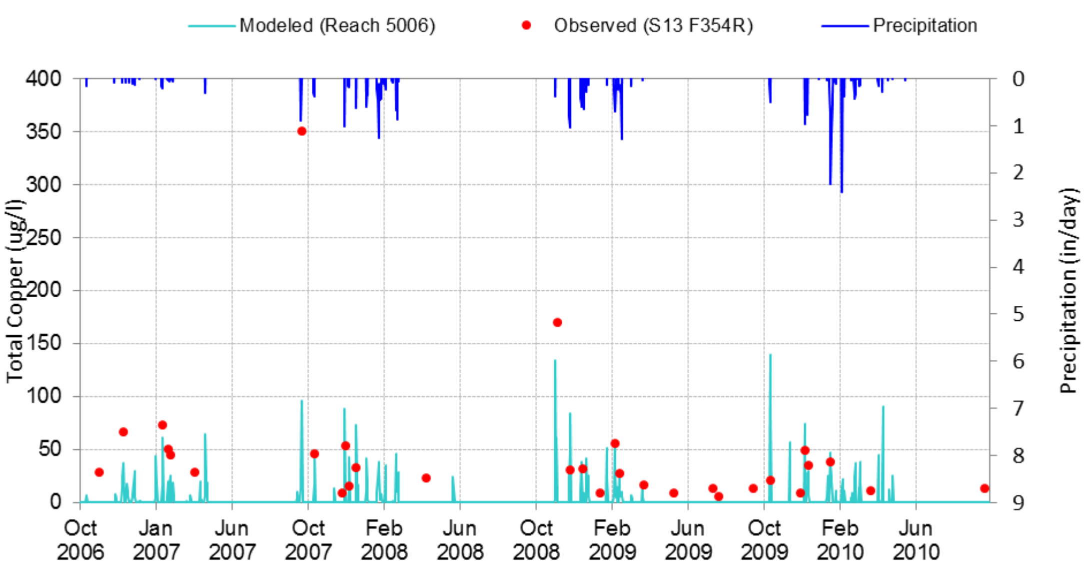

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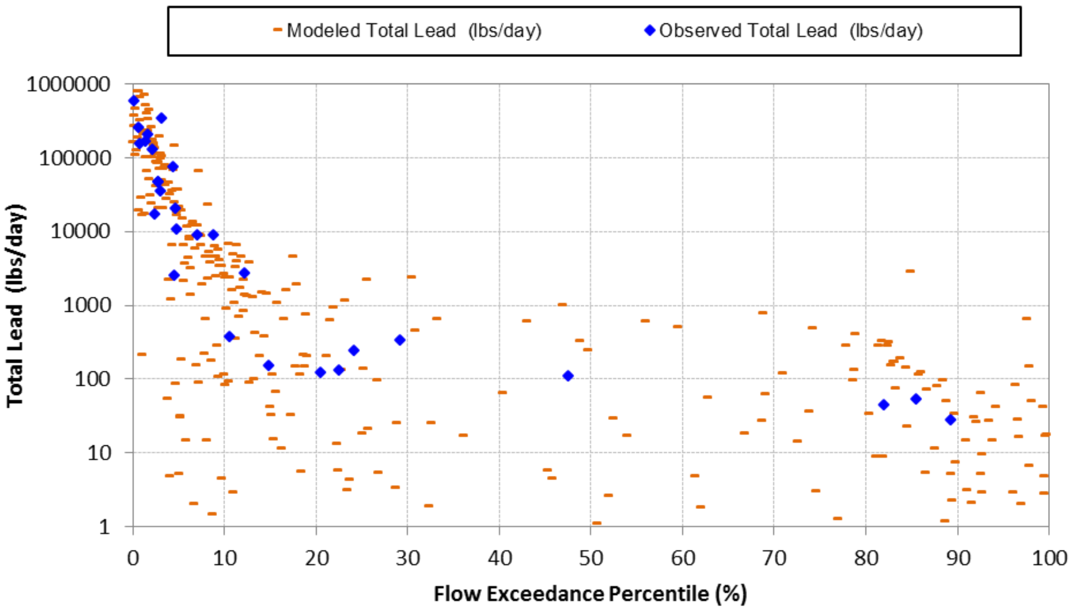

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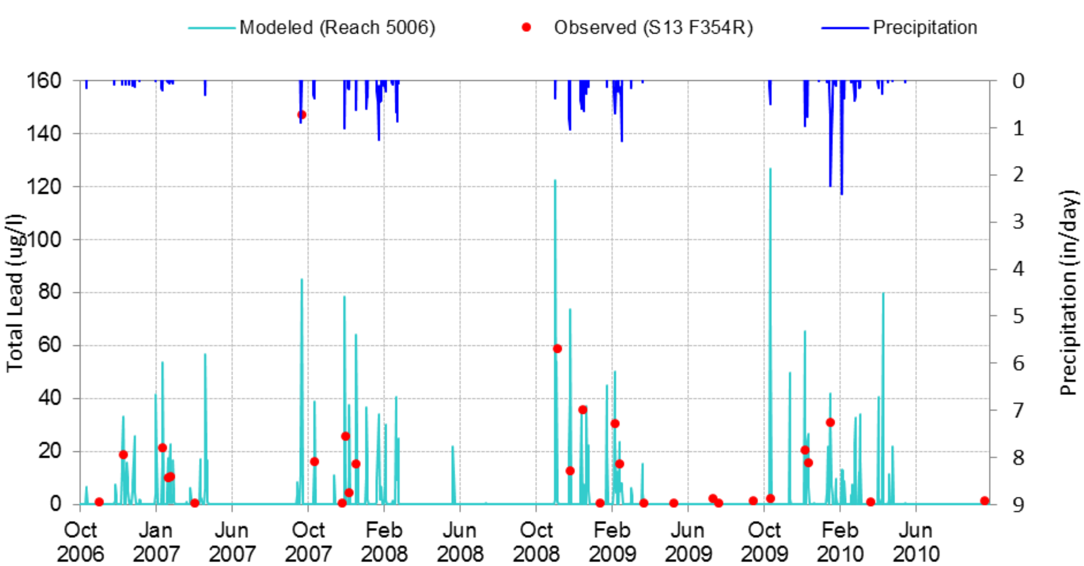


Figure 30. Simulated vs. observed timeseries plots for Total Lead (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

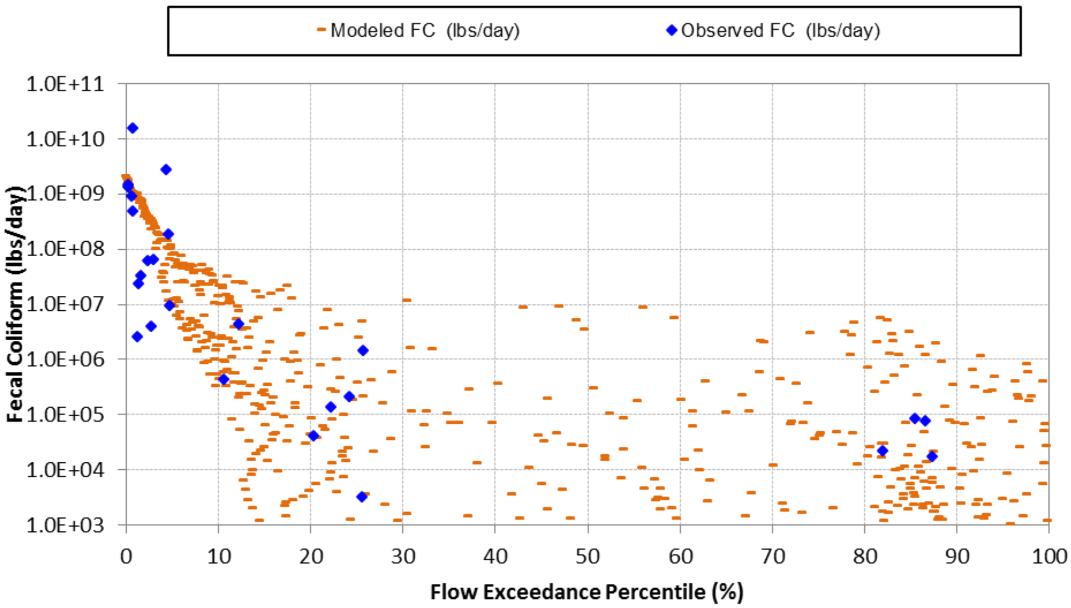


Figure 31. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

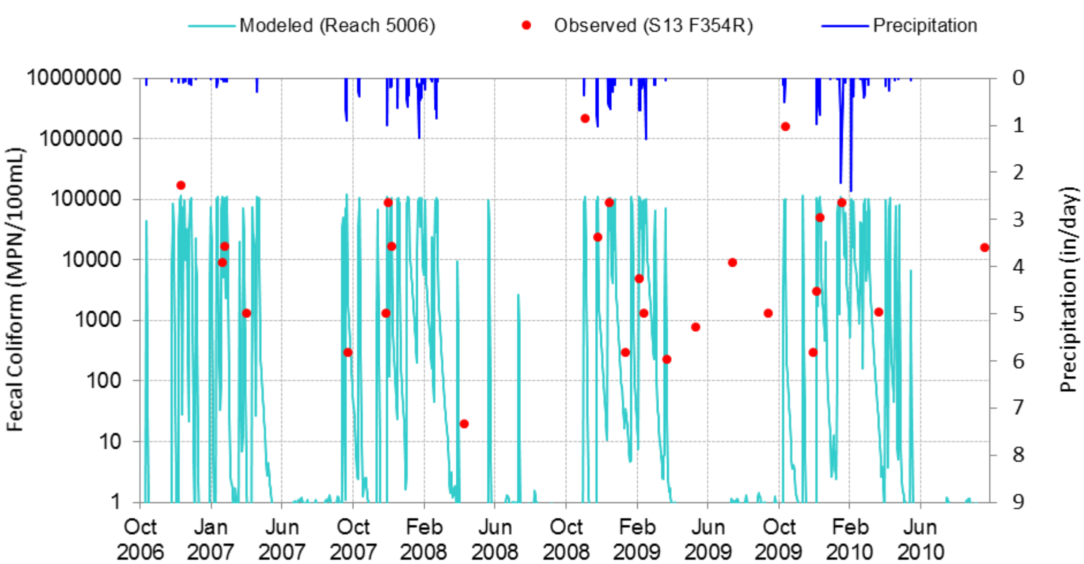


Figure 32. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

2. Lower Los Angeles River

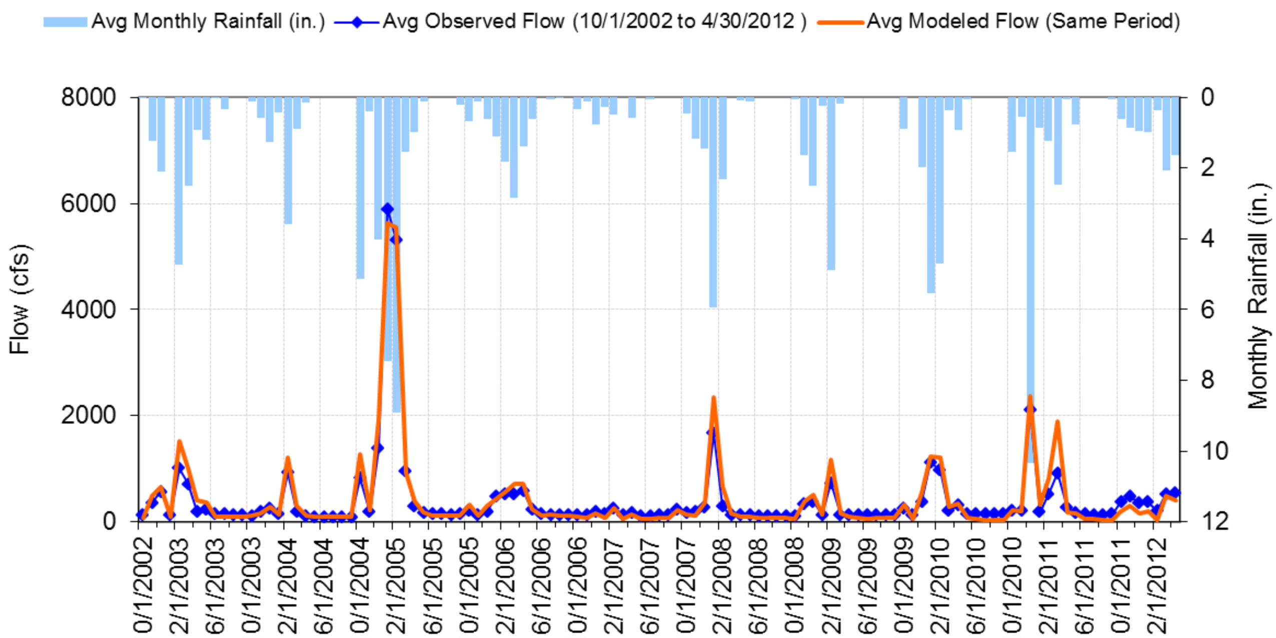


Figure 33. Monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

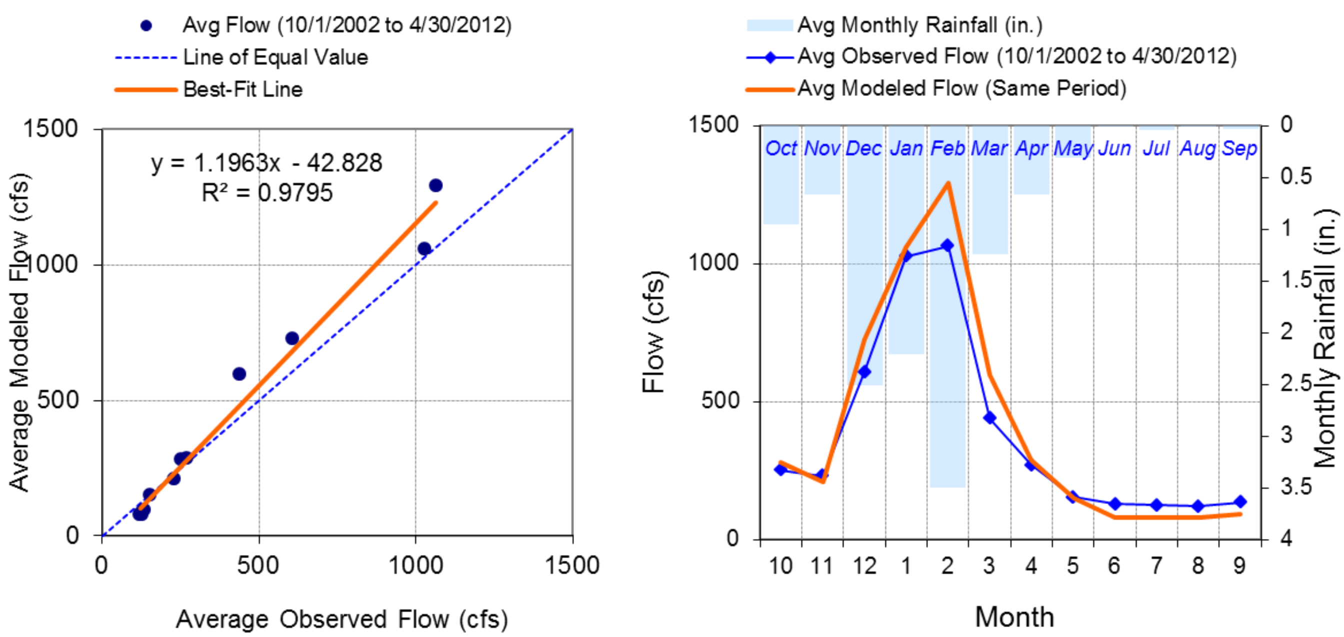


Figure 34. Aggregated monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

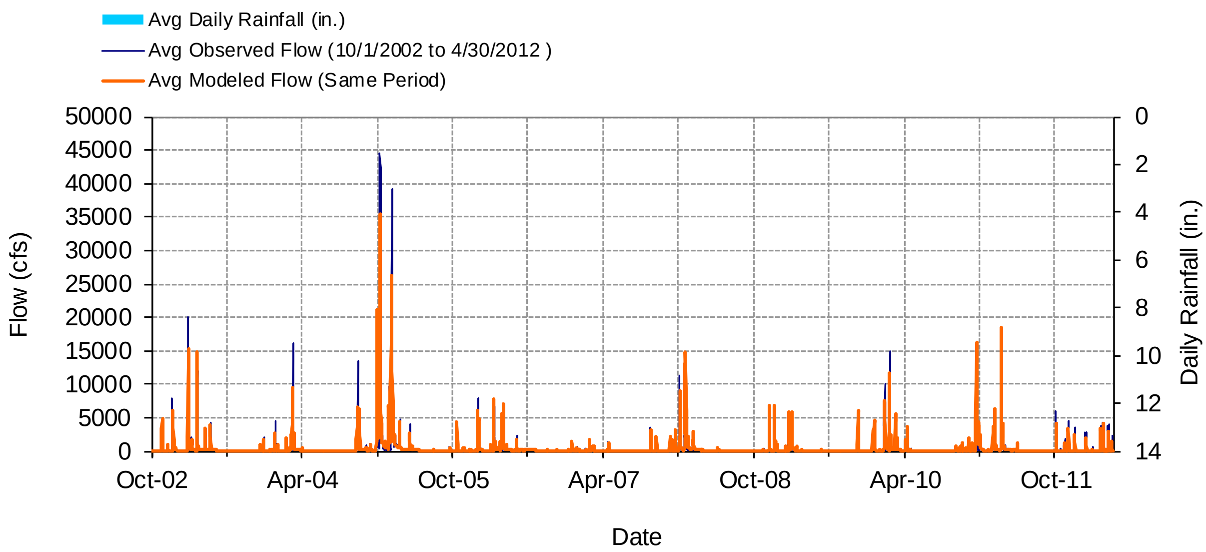


Figure 35. Mean daily flow for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

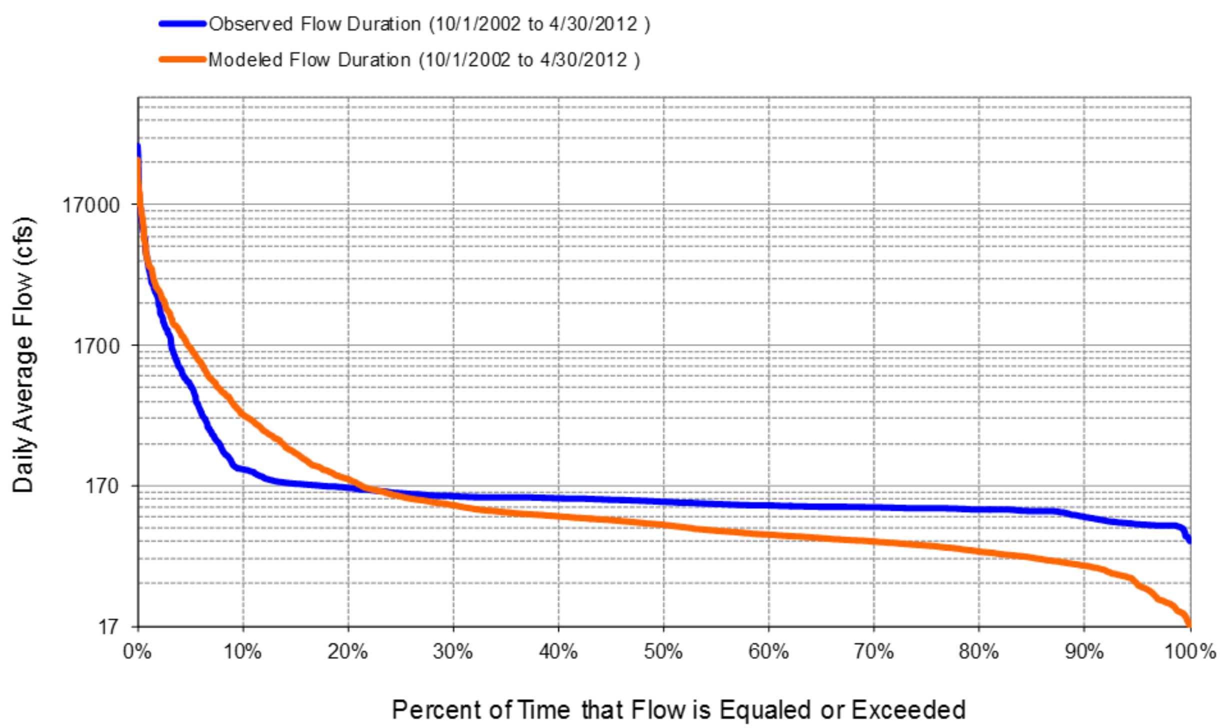


Figure 36. Daily flow exceedance for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

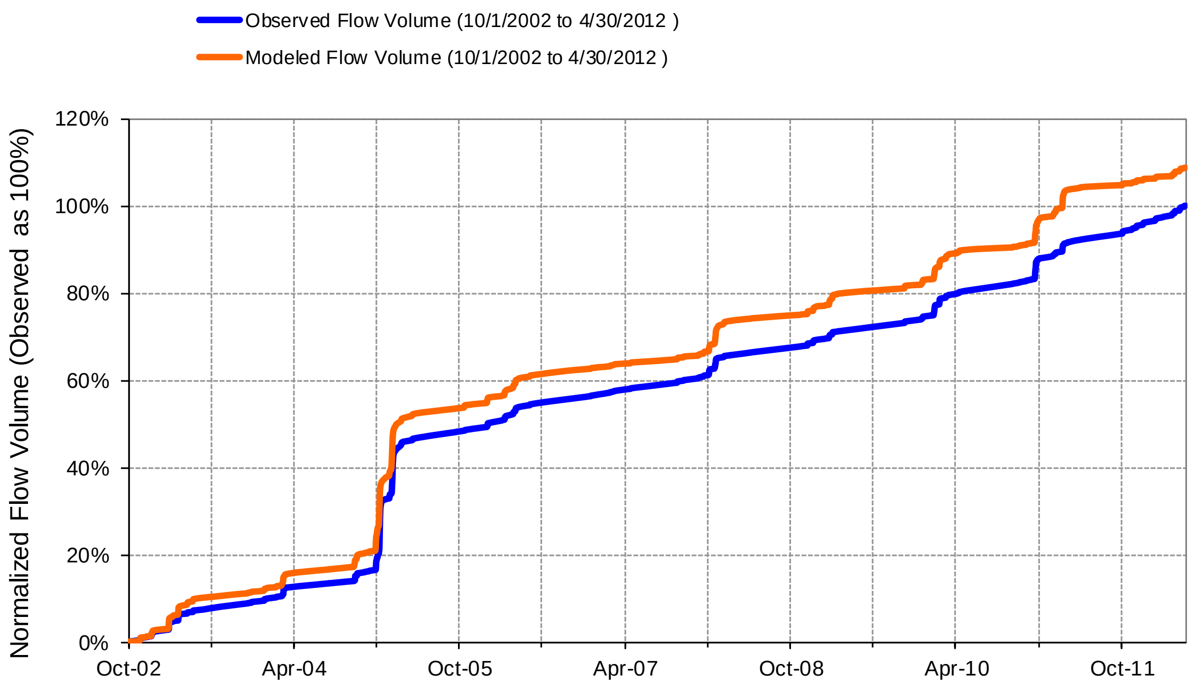


Figure 37. Flow accumulation for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

Table 2. Summary of water quality data evaluated for the Lower Los Angeles River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S10	Total Copper (ug/l)	0.5	12.975	25.8	49.55	424
S10	Total Lead (ug/l)	0.2	2.45	15.6	35.775	1070
S10	TSS (mg/L)	1	63	142.5	295	2280
S10	Total Zinc (ug/l)	22.3	63.85	124	261.75	2590
S10	Fecal Coliform (MPN/100mL)	20	500	24000	240000	24000000
S10	Total Nitrogen (mg/l)	0.03	0.60245	1.064	1.725	6.75
S10	Total Phosphorous (mg/l)	0.05	0.24	0.3785	0.538	8.24

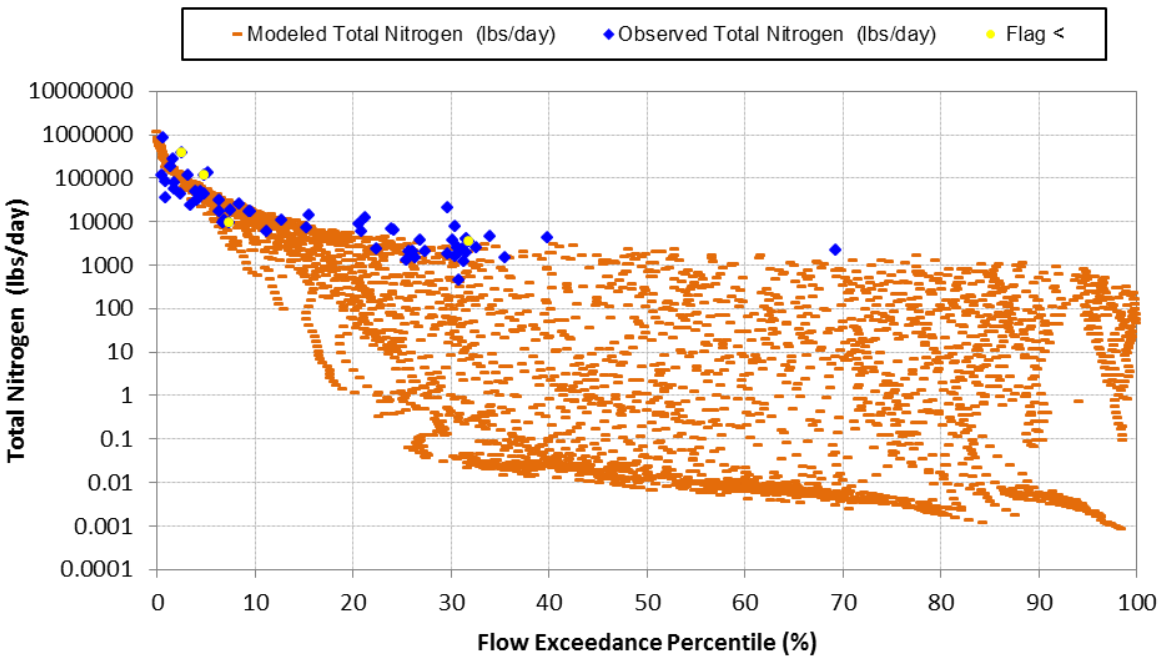


Figure 38. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

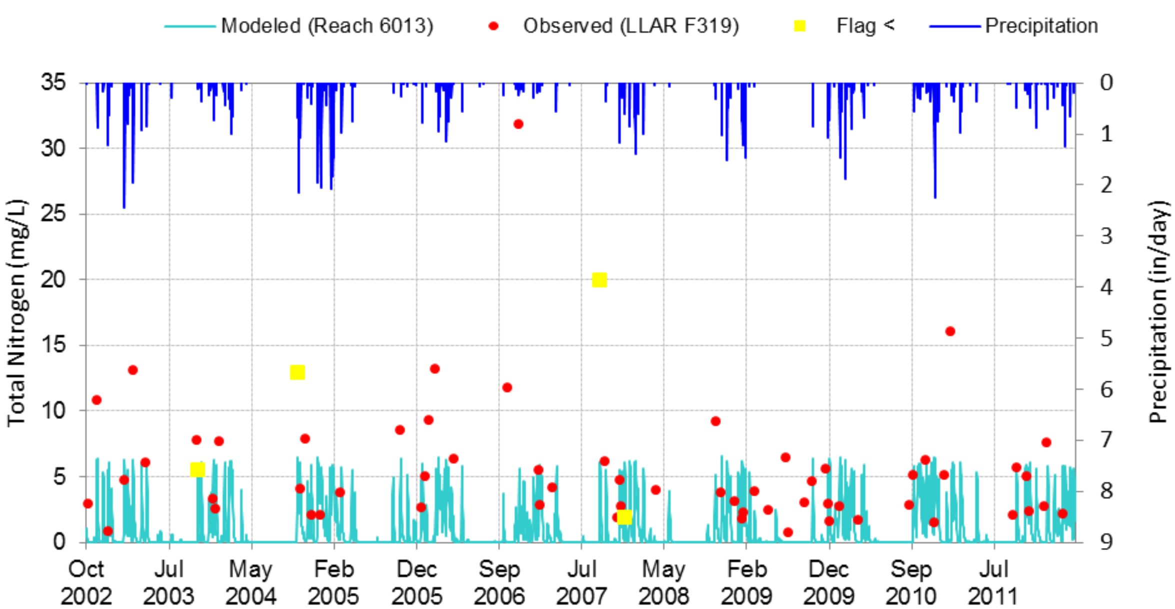


Figure 39. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

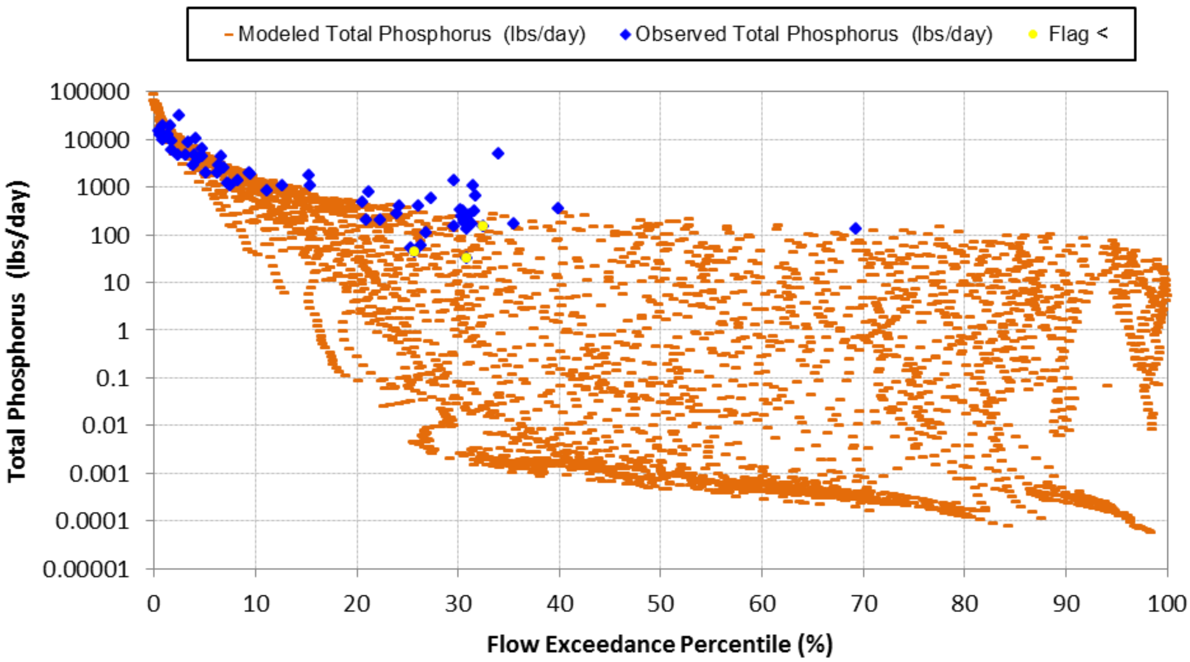


Figure 40. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

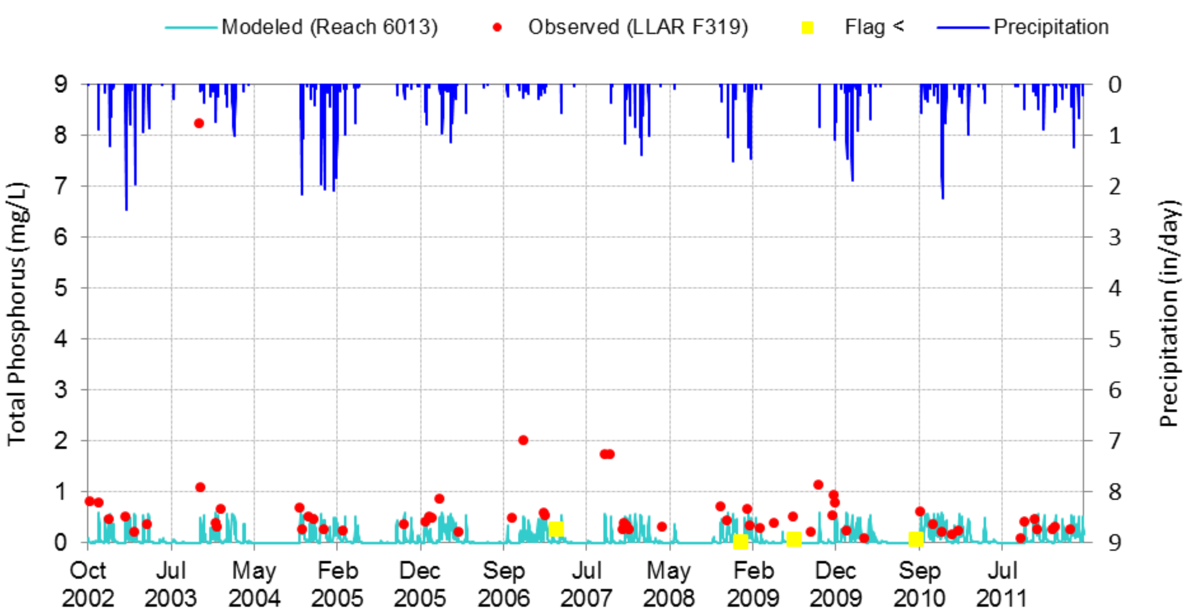


Figure 41. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

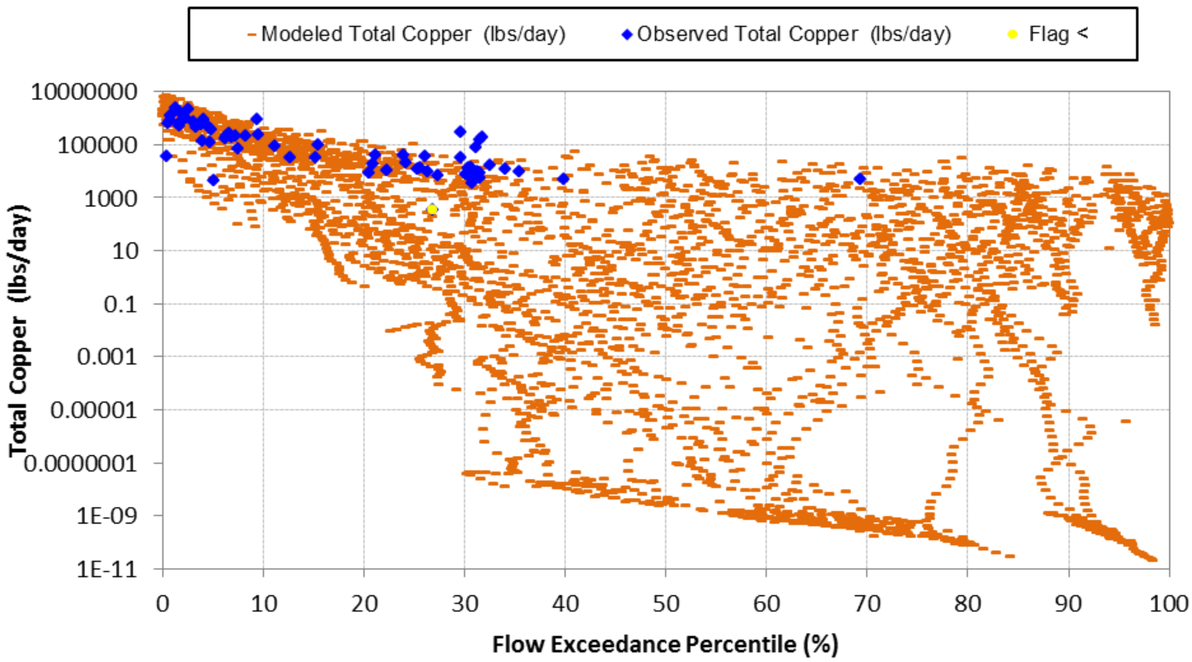


Figure 42. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

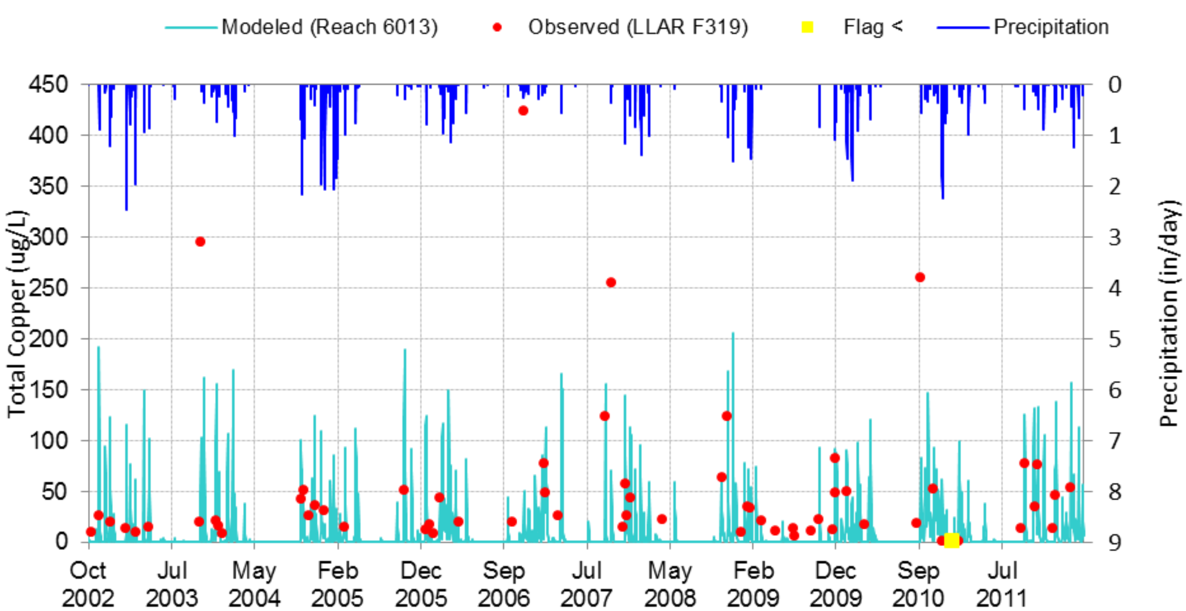


Figure 43. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

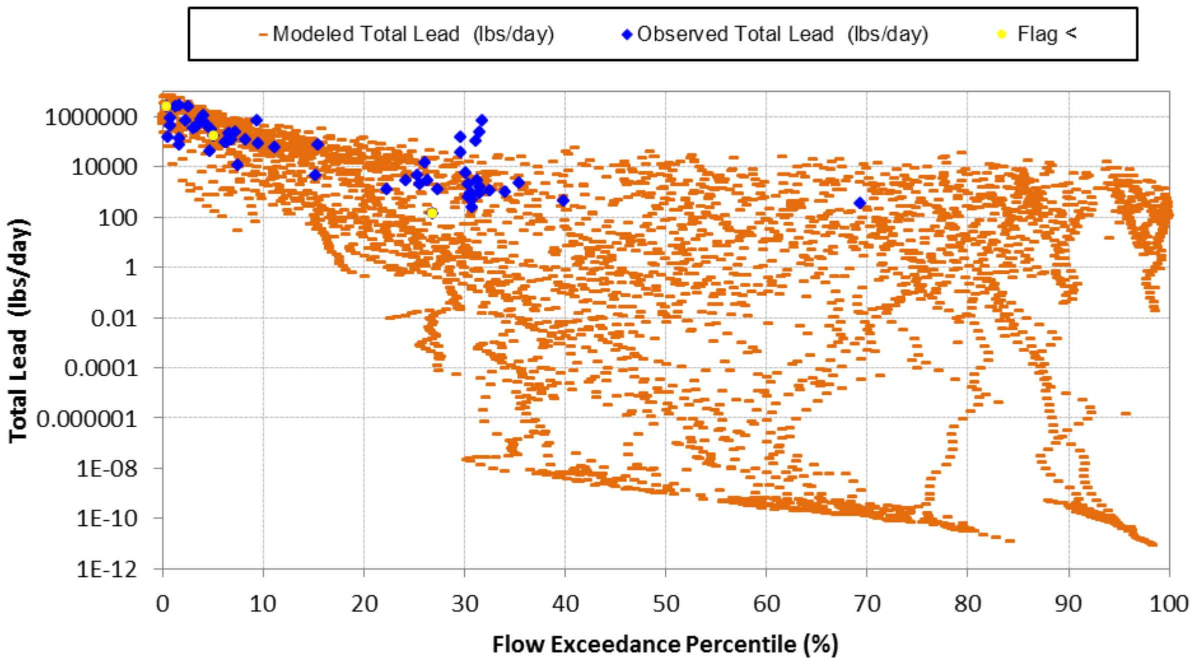


Figure 44. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

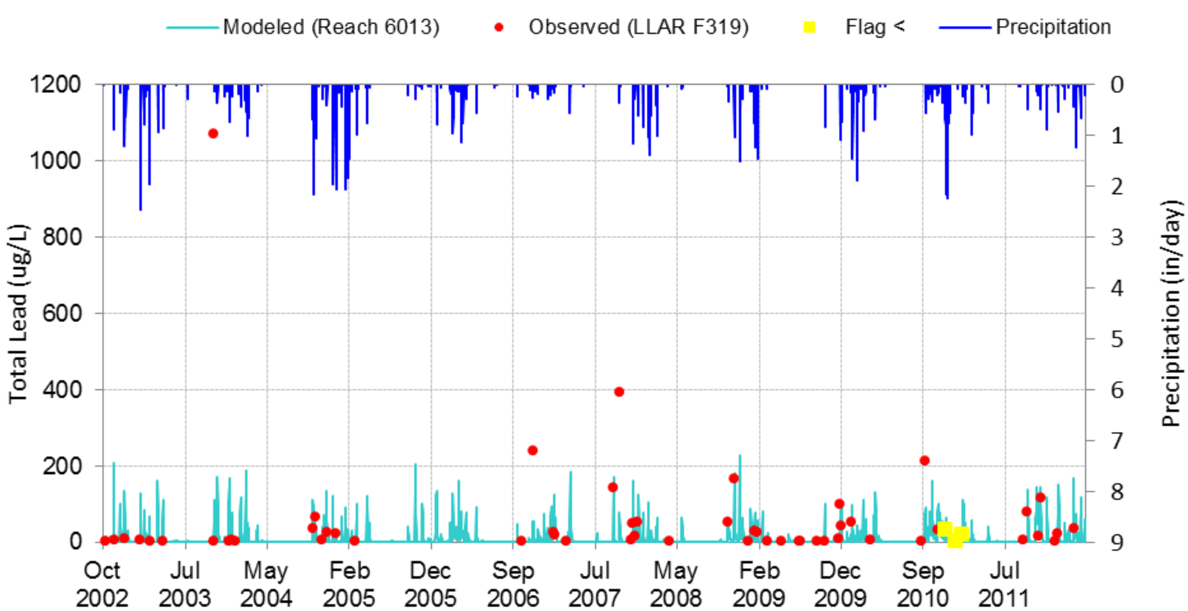


Figure 45. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

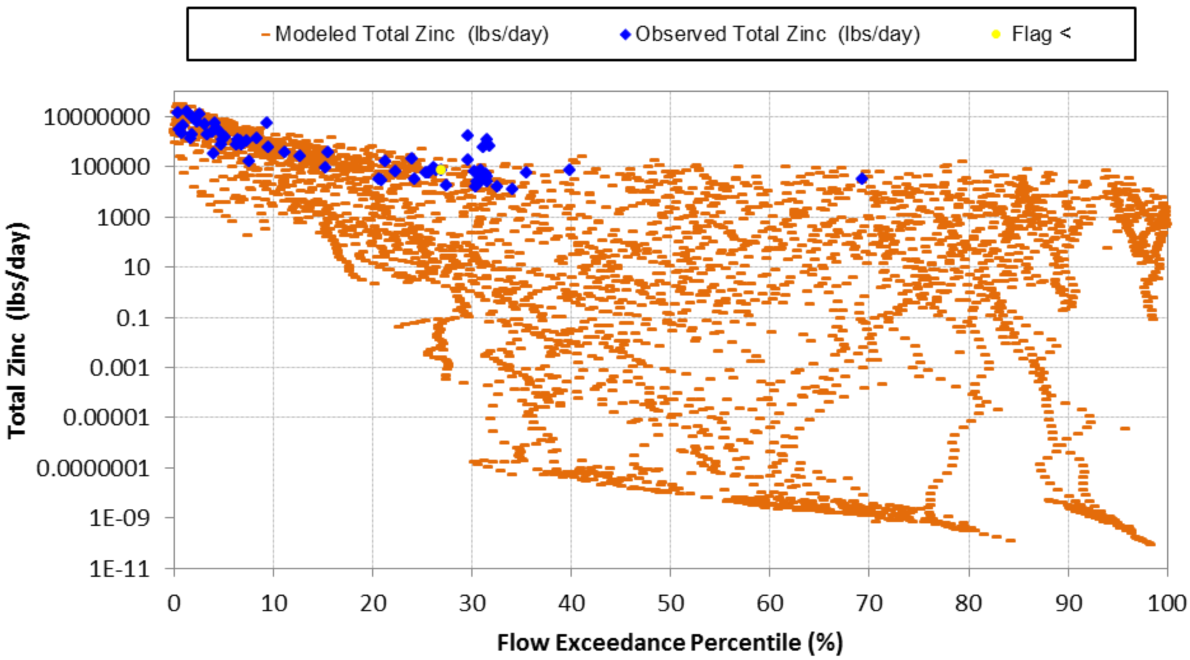


Figure 46. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

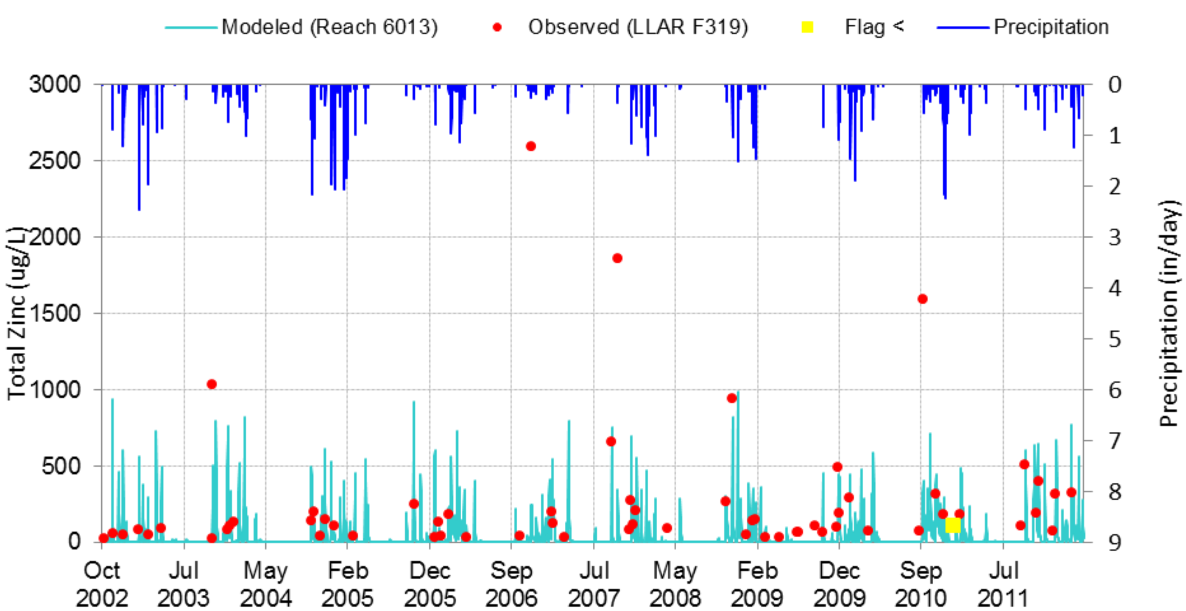


Figure 47. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

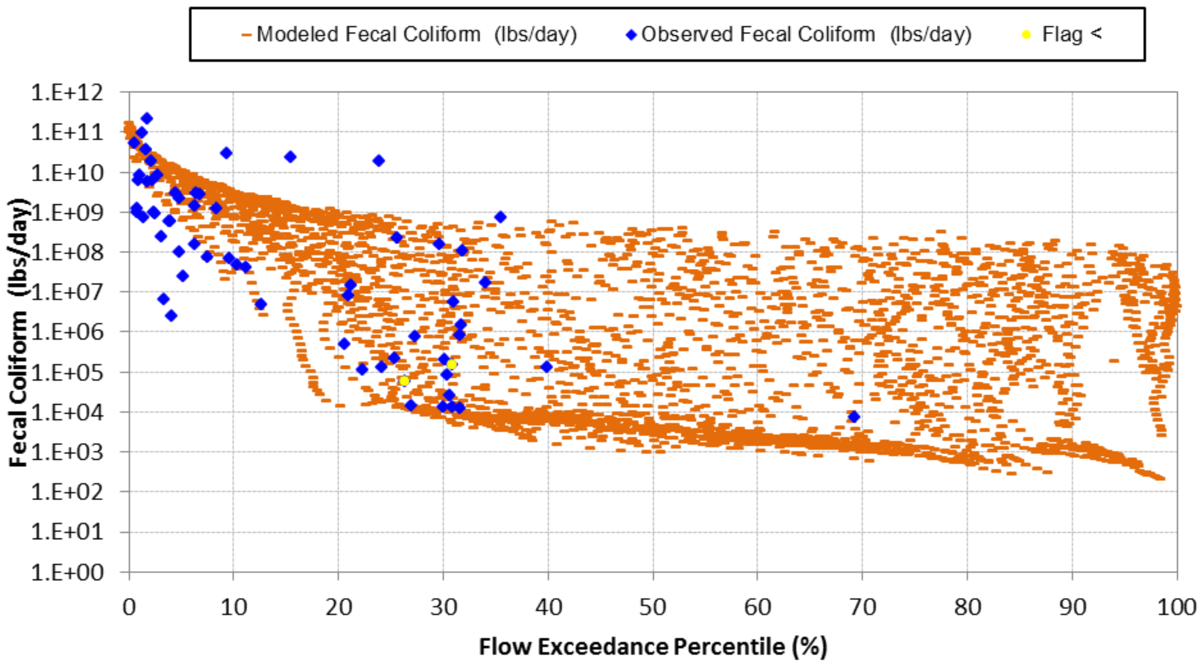


Figure 48. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

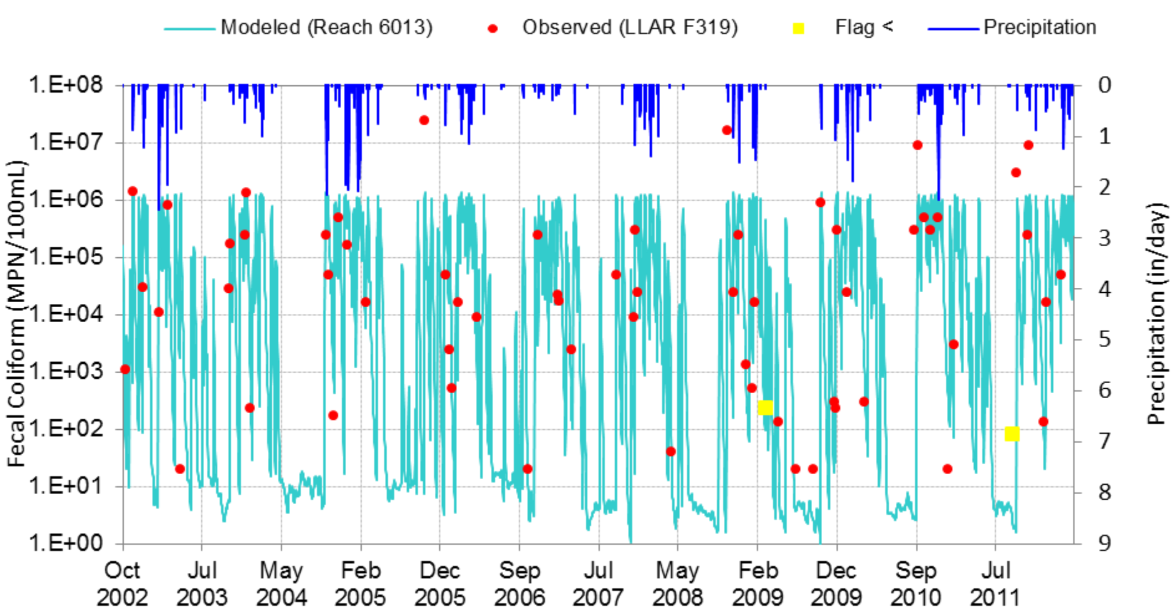


Figure 49. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

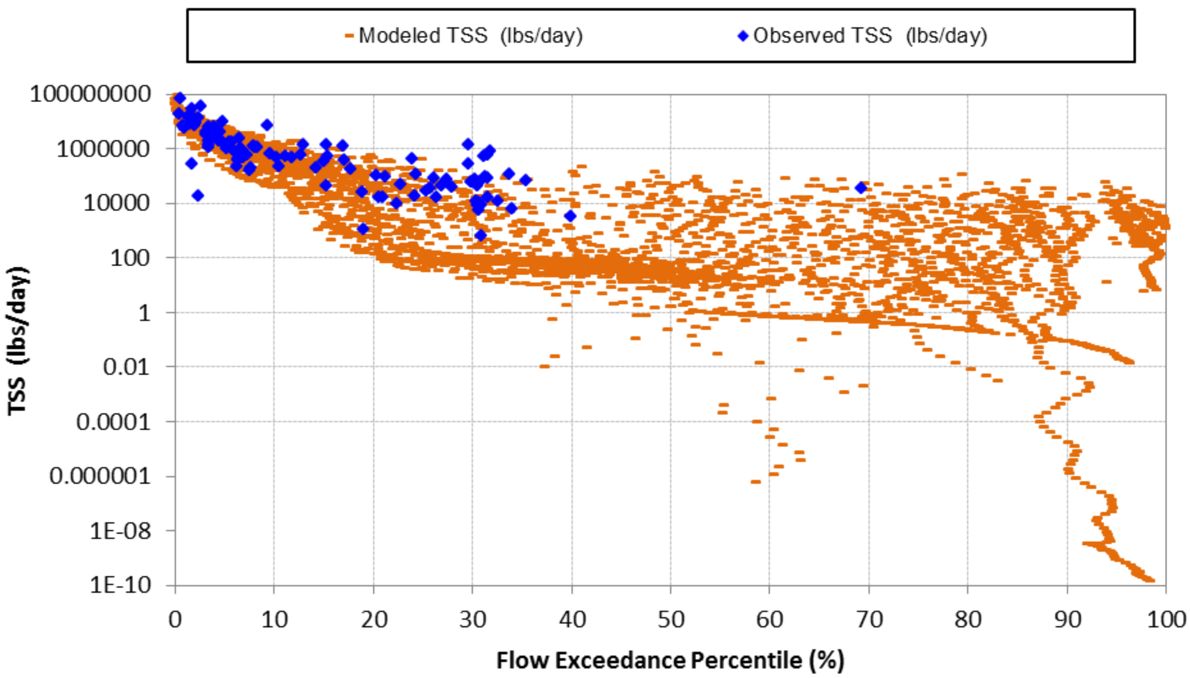


Figure 50. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

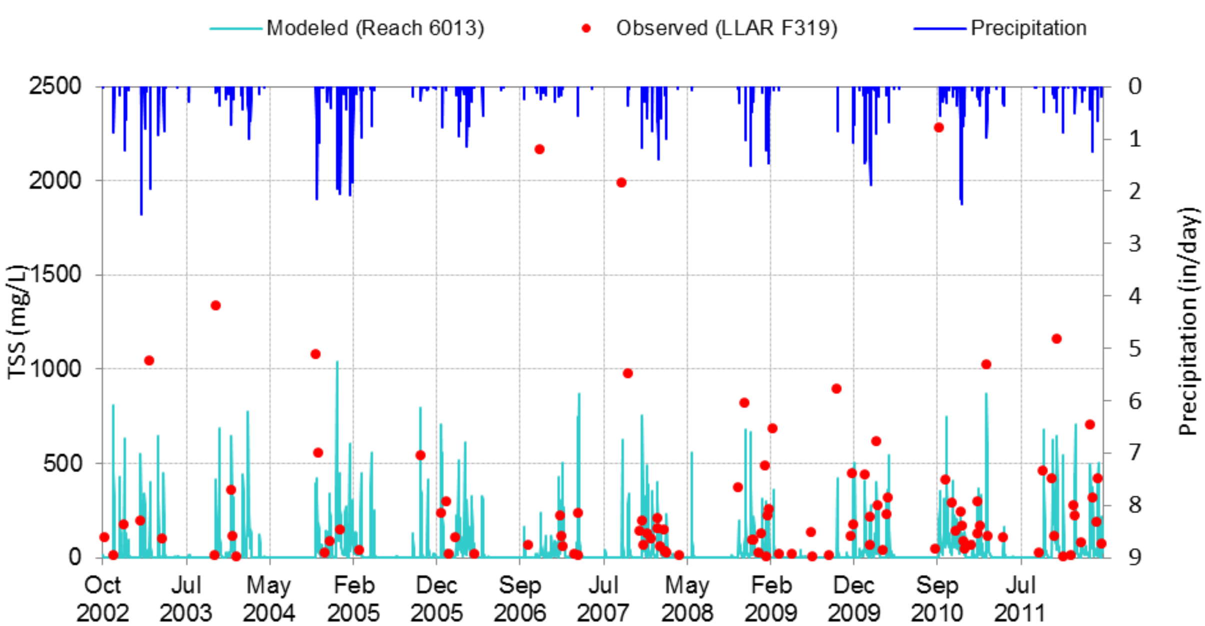


Figure 51. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

3. Los Cerritos Channel

Table 3. Summary of water quality data evaluated for Los Cerritos Channel

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
Stearns St.	Total Copper (ug/l)	8.4	17.25	25	43.5	240
Stearns St.	Total Lead (ug/l)	0.78	3.025	17	41.75	370
Stearns St.	TSS (mg/L)	2	52.5	110	210	1700
Stearns St.	Total Zinc (ug/l)	9.5	33	180	390	2600
Stearns St.	Fecal Coliform (MPN/100mL)	18	2275	8000	28500	1600000
Stearns St.	Total Nitrogen (mg/l)	0.9	2.147	3.292	4.532	23.7
Stearns St.	Total Phosphorous (mg/l)	0.083	0.22	0.53	0.91	6.2

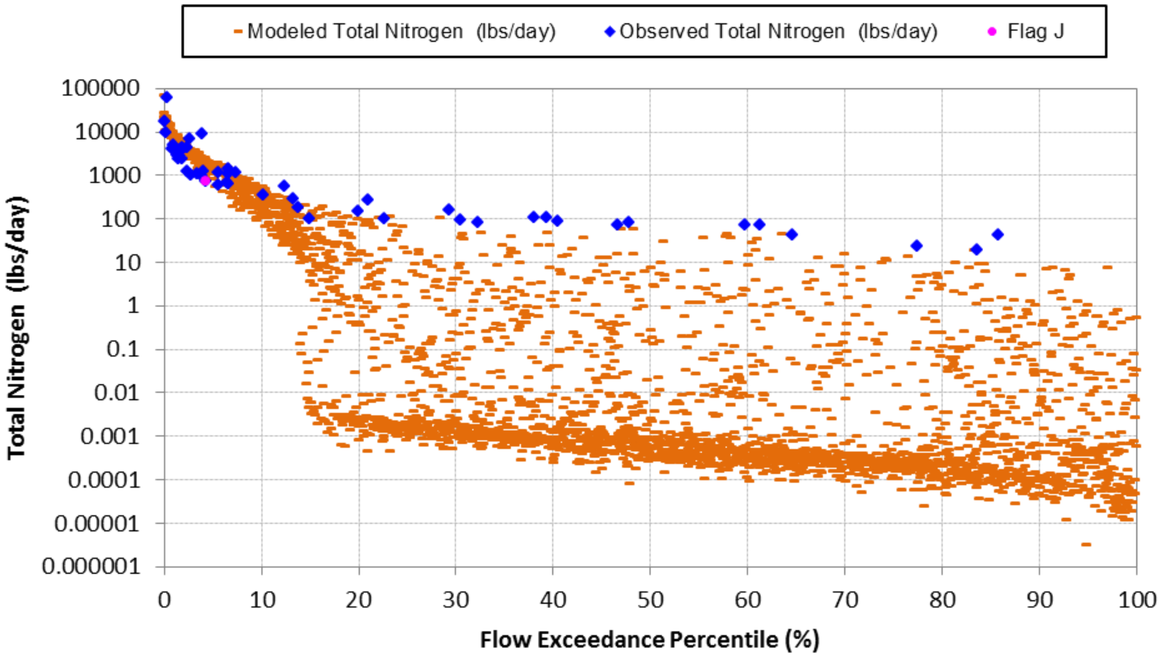


Figure 52. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

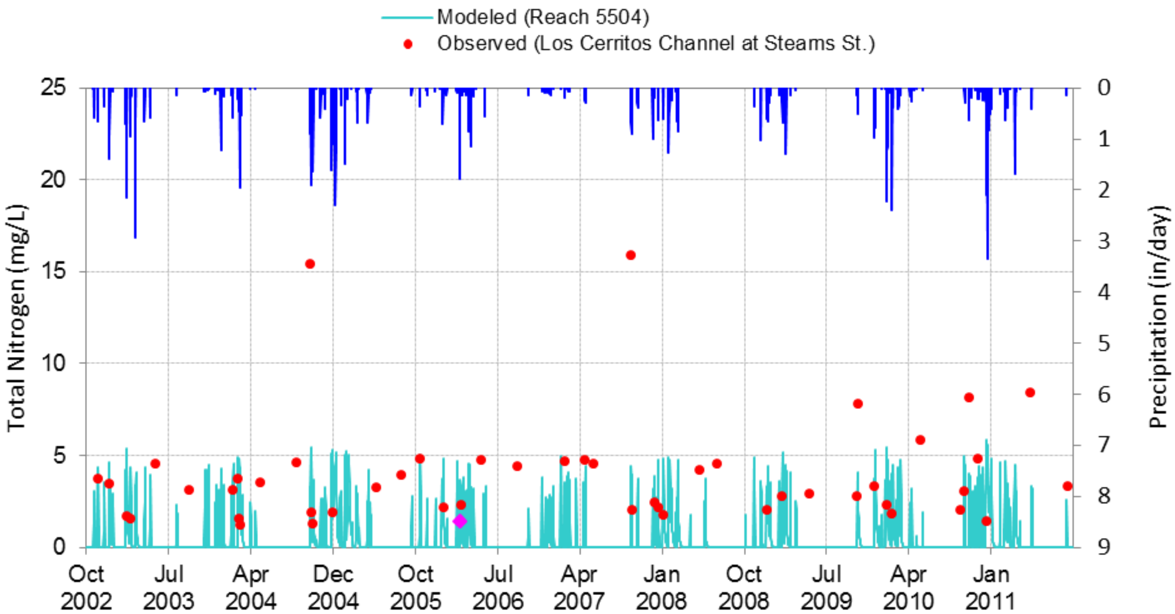


Figure 53. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

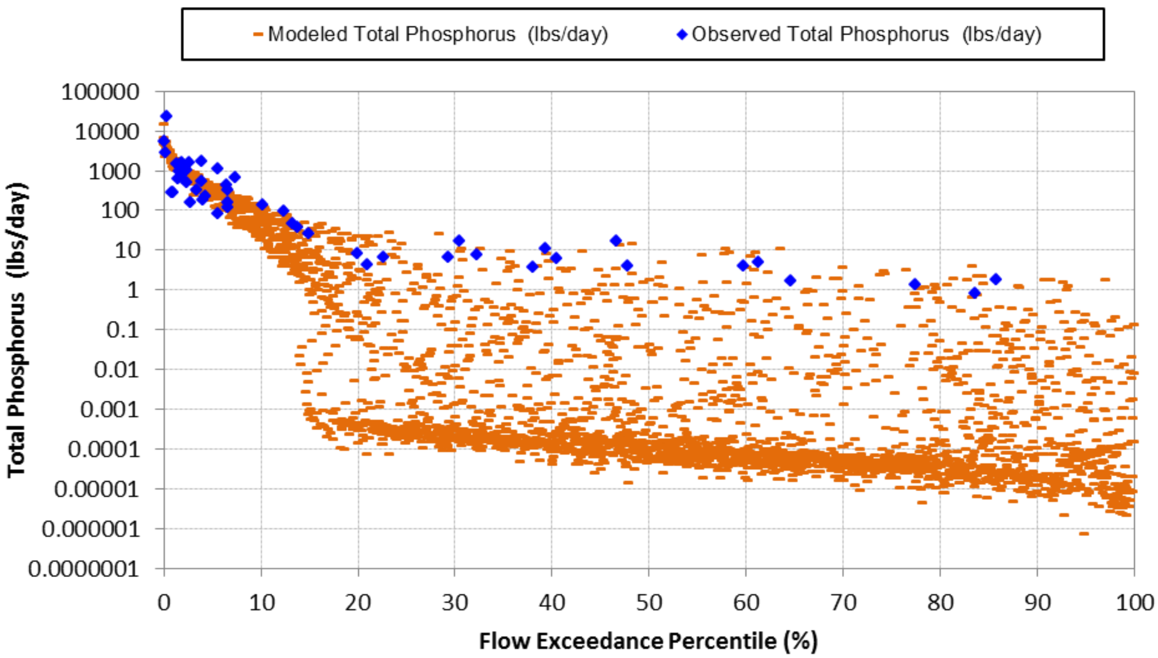


Figure 54. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

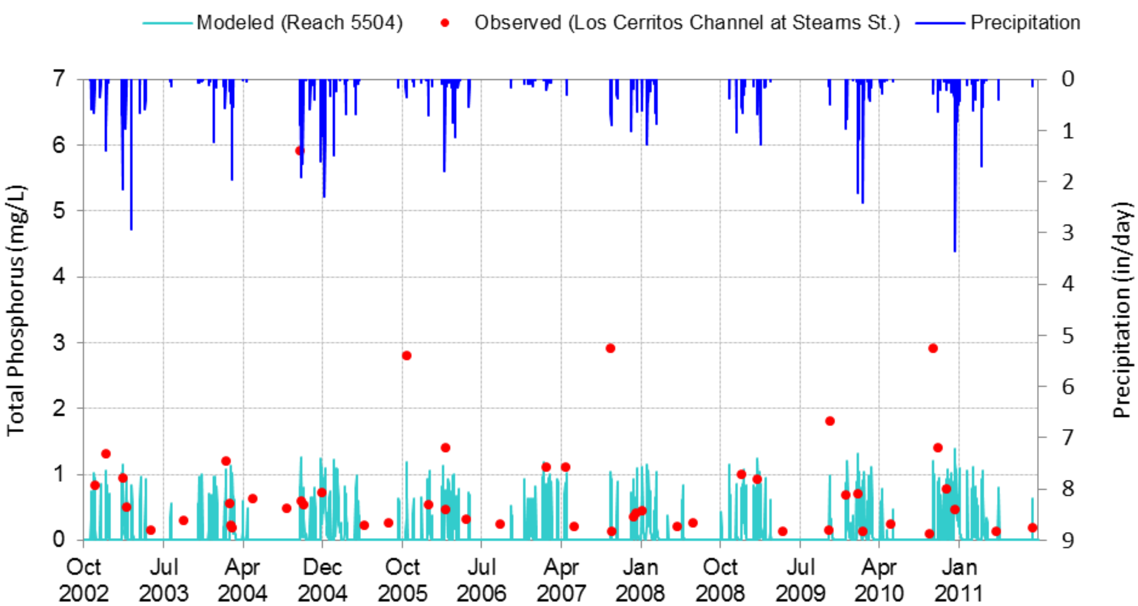


Figure 55. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

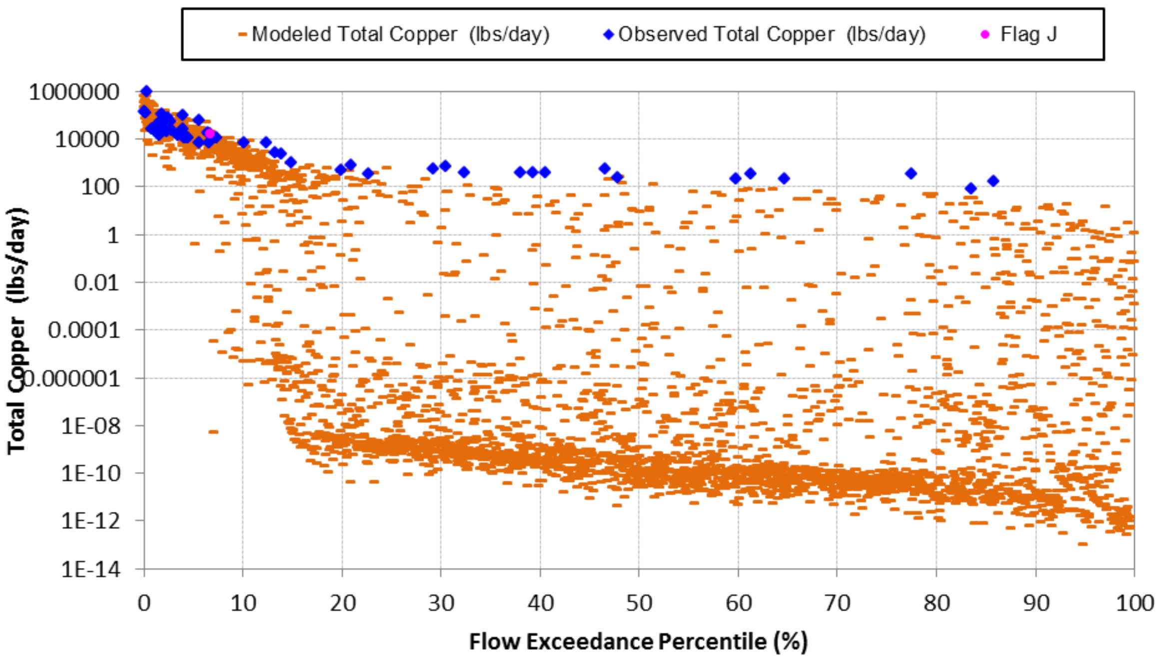


Figure 56. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

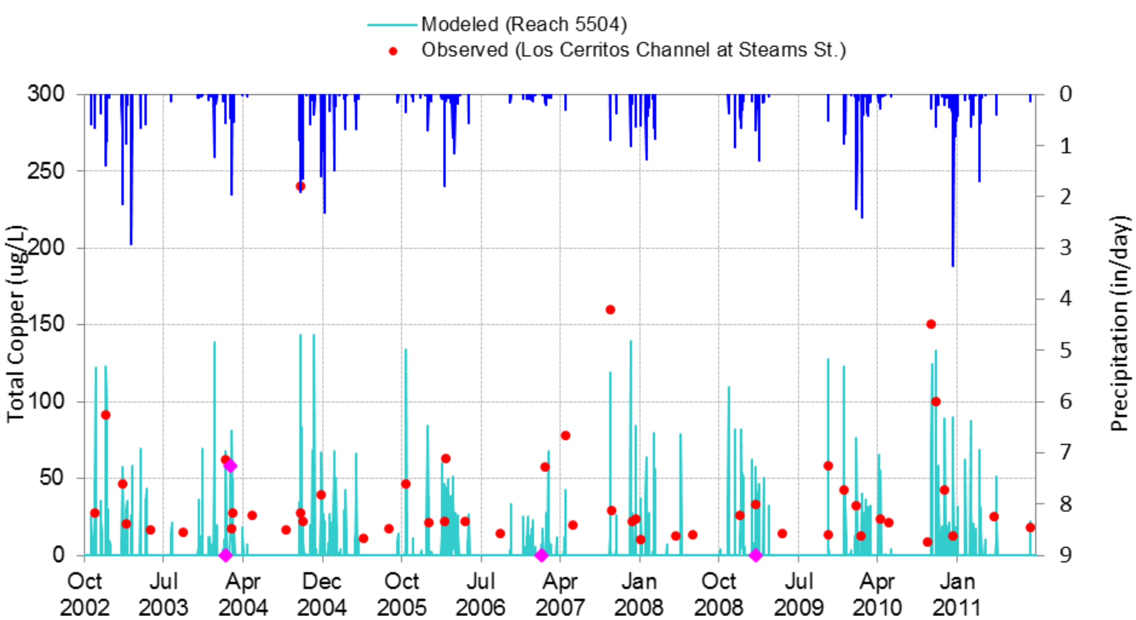


Figure 57. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

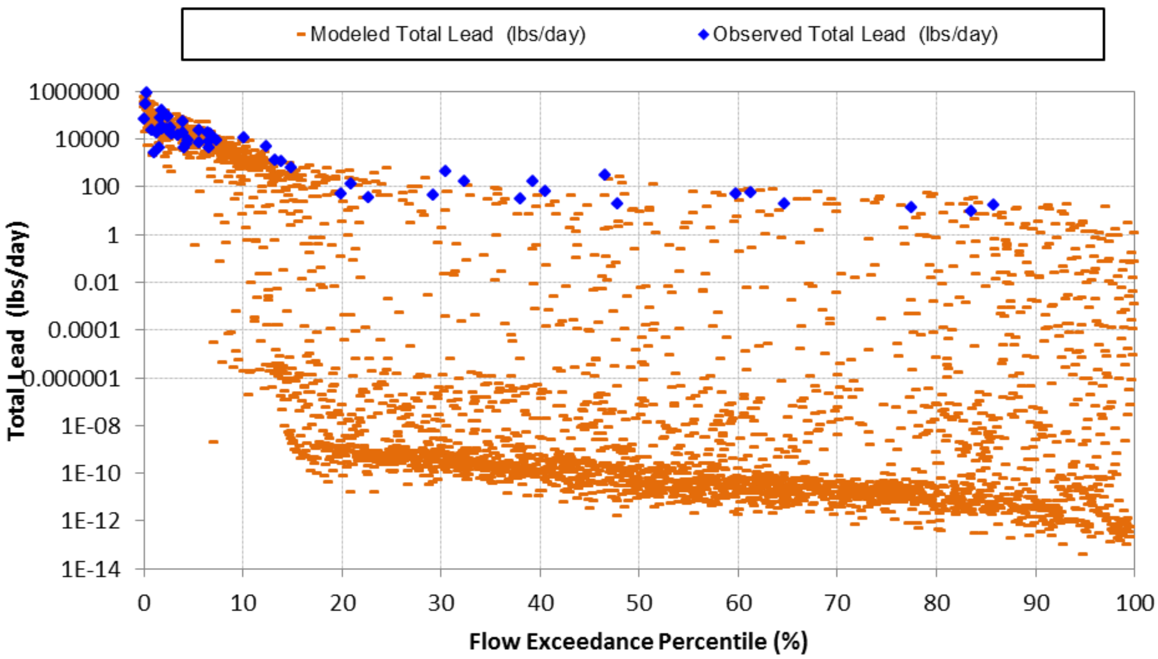


Figure 58. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

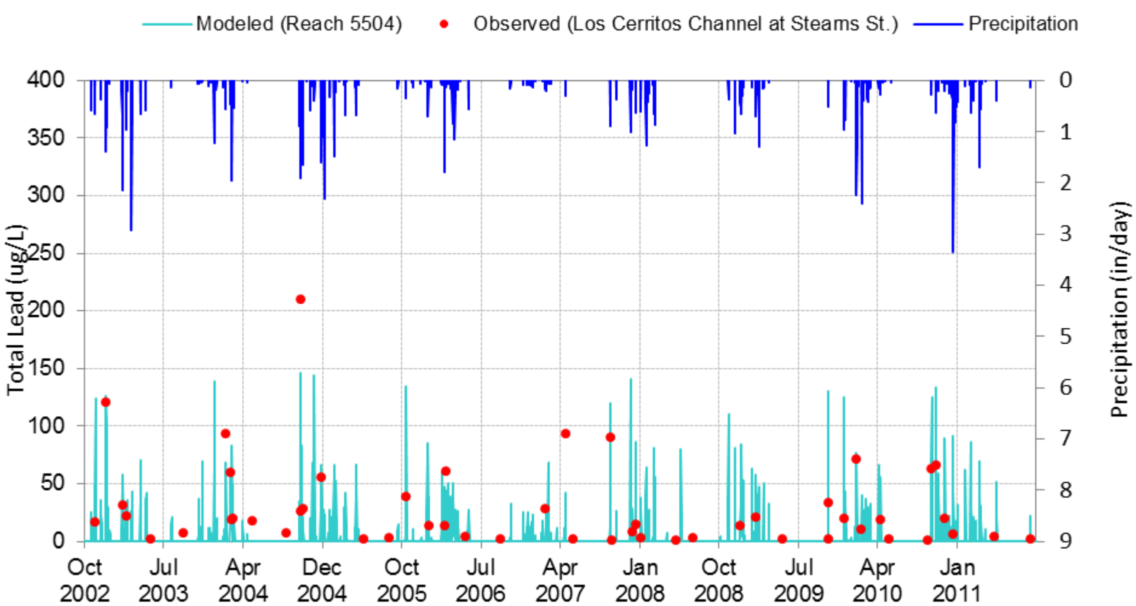


Figure 59. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

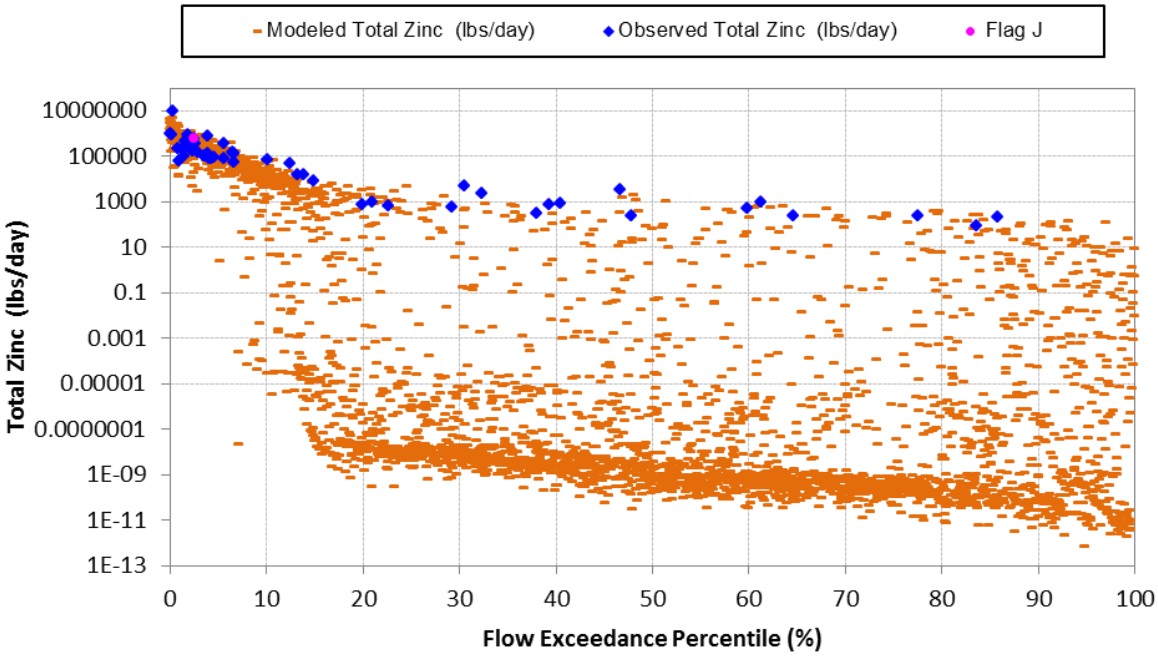


Figure 60. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

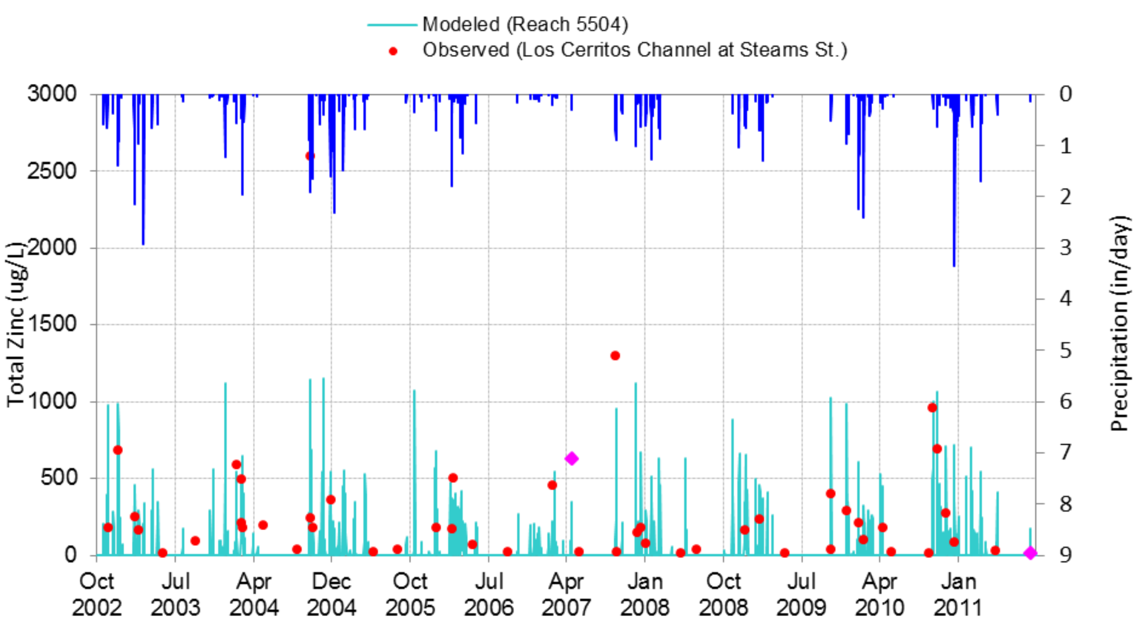


Figure 61. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

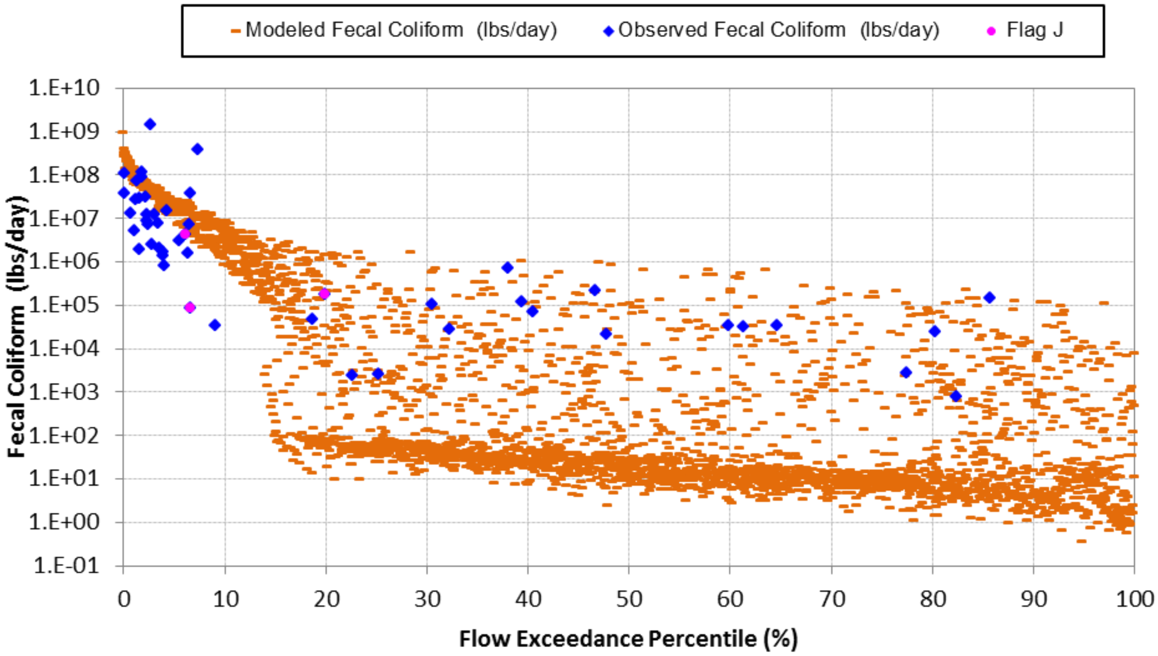


Figure 62. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

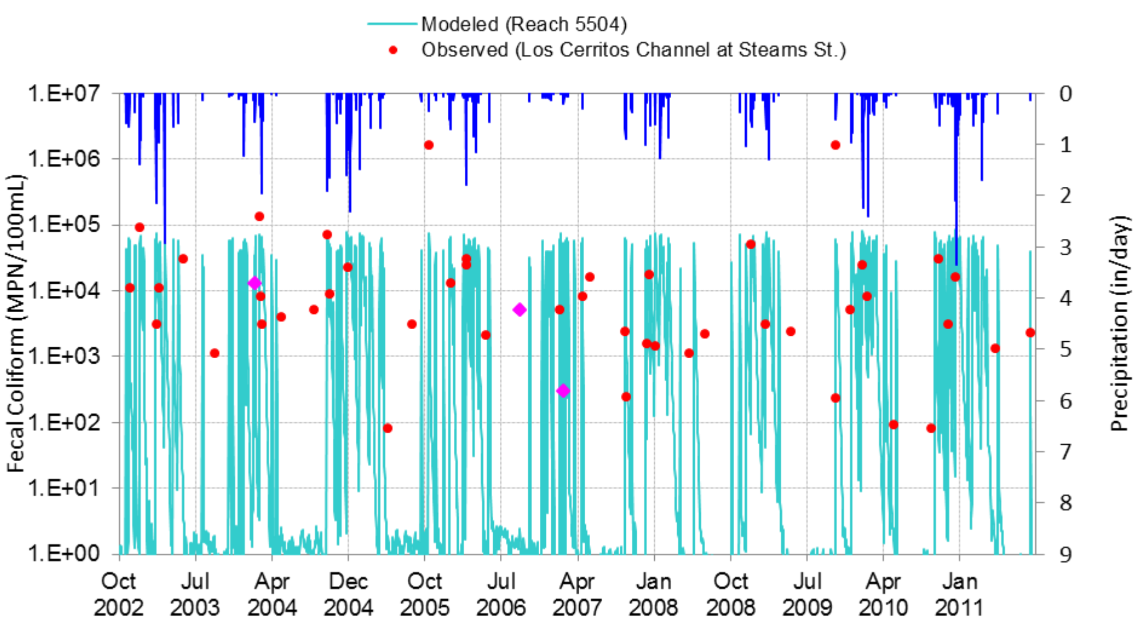
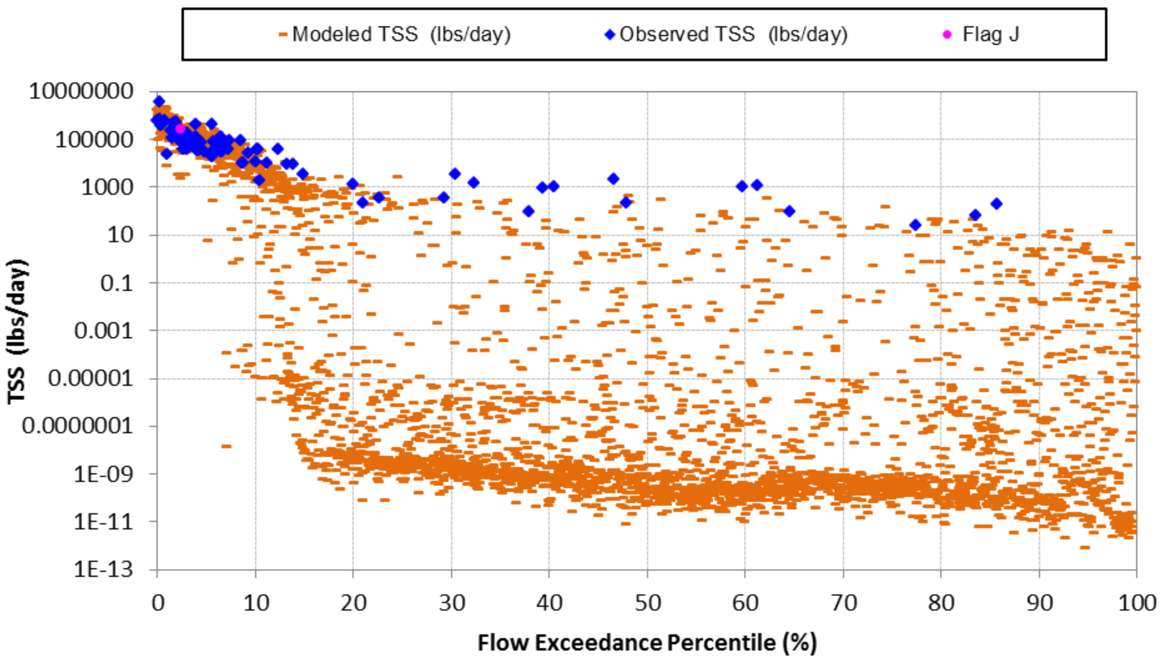


Figure 63. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.



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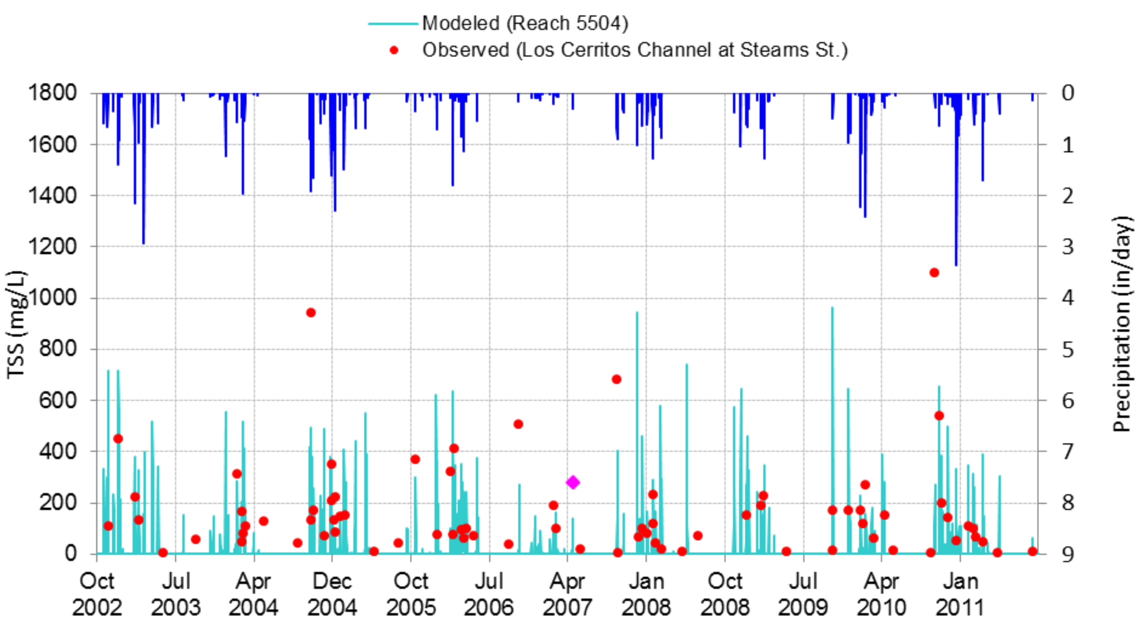

Figure 65. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

Attachment F: Modeled Existing Versus Allowable Pollutant Loadings Plots

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

Contents

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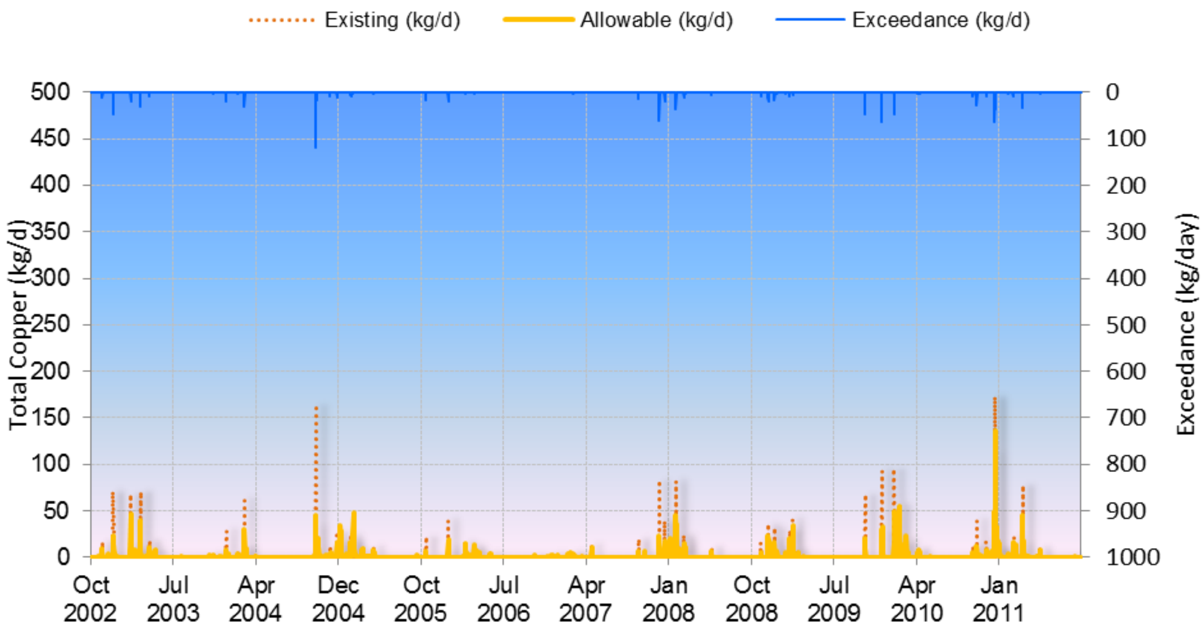


Figure 1. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

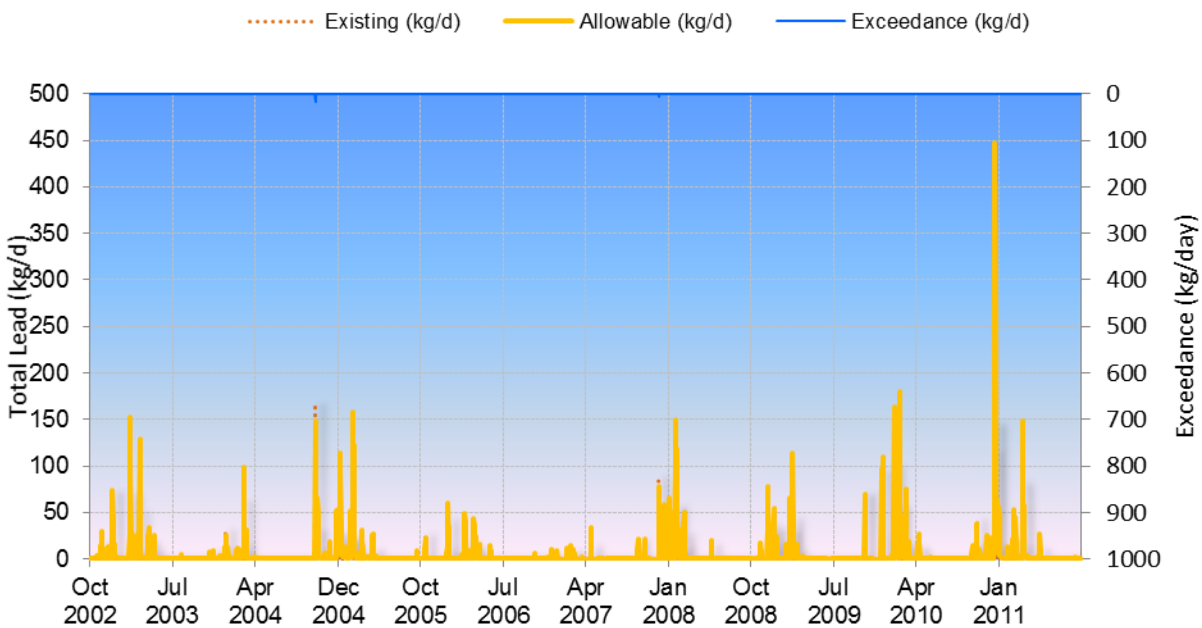
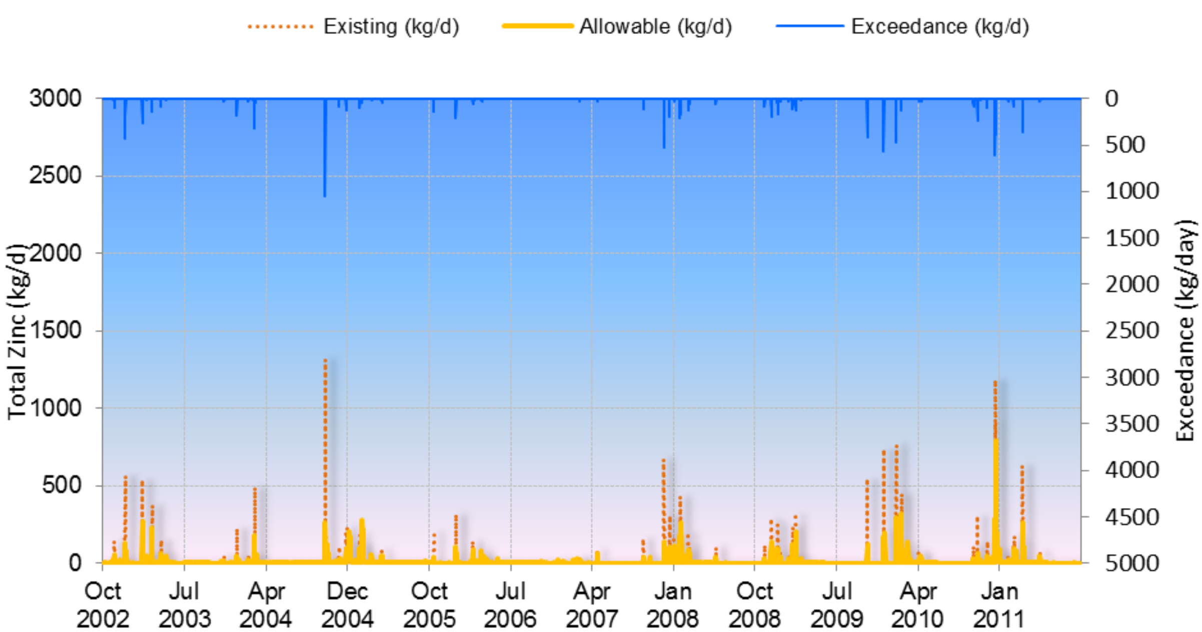


Figure 2. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.



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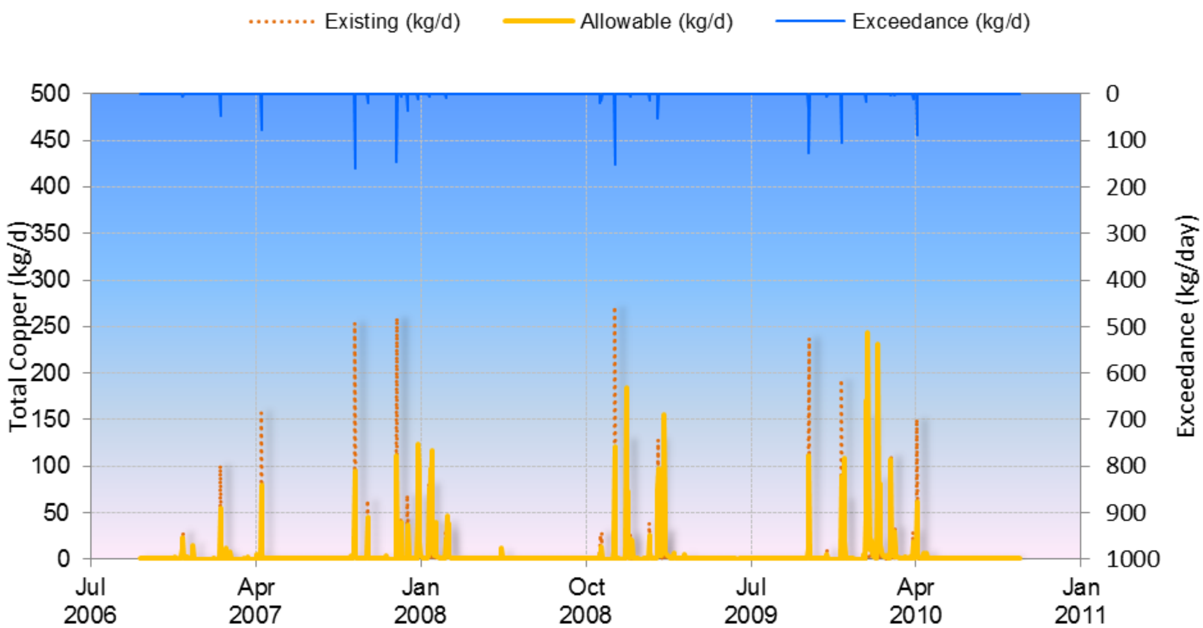

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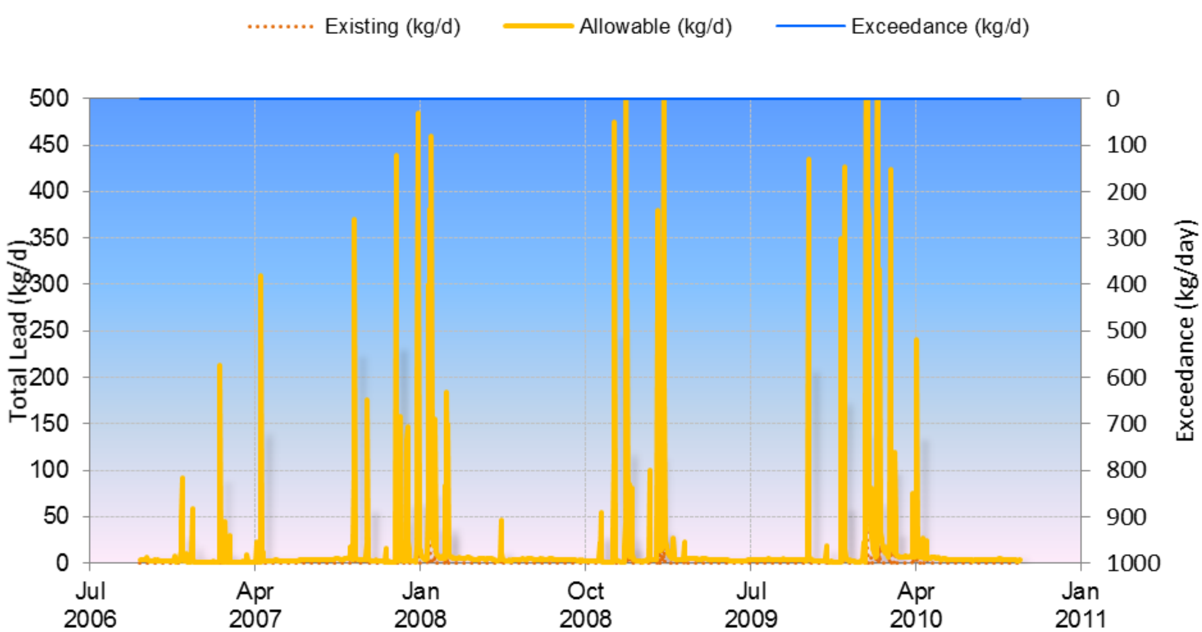

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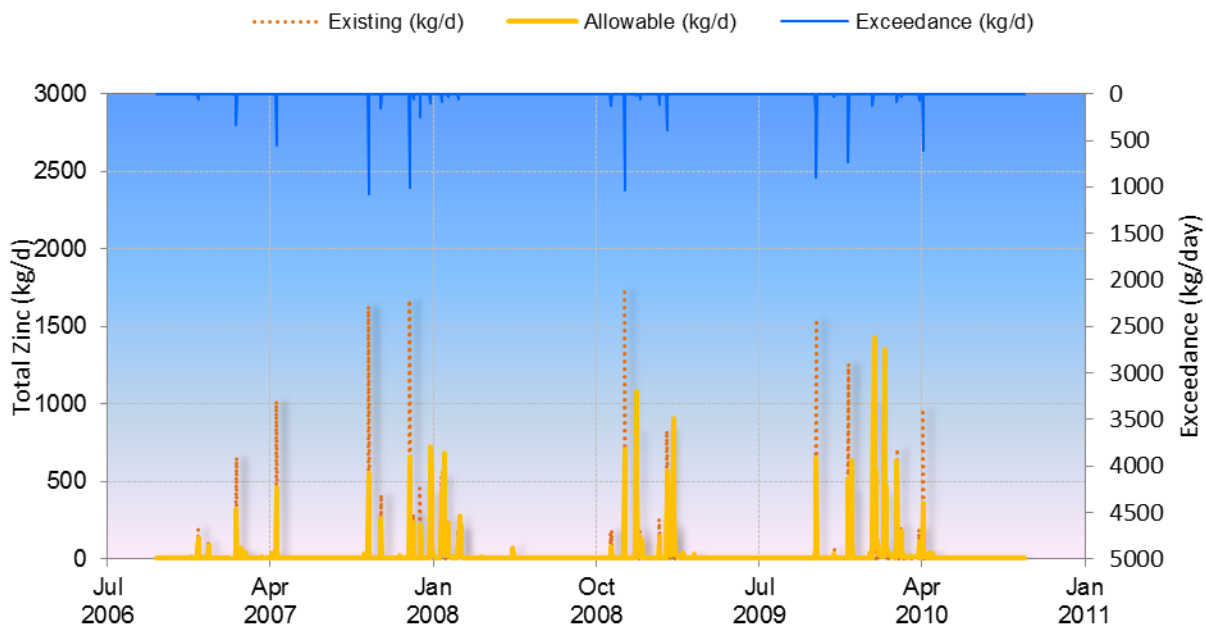
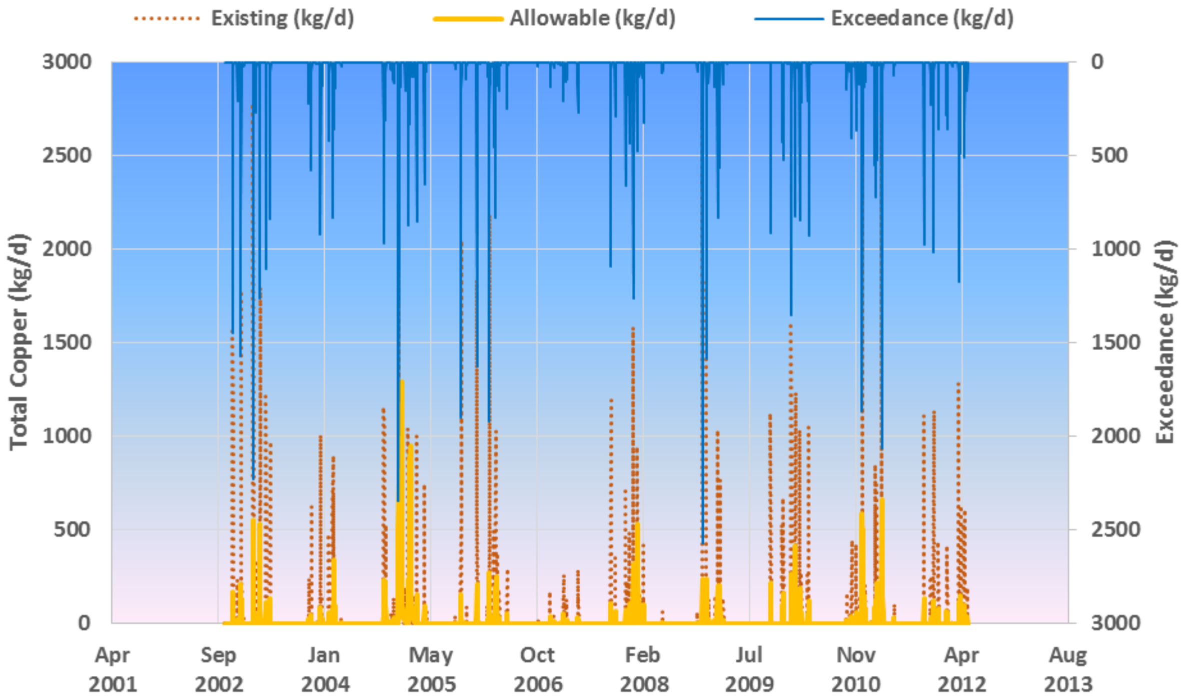


Figure 6. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2006 through 9/30/2011) at Coyote Creek mass emission station S13.

2. Lower Los Angeles River



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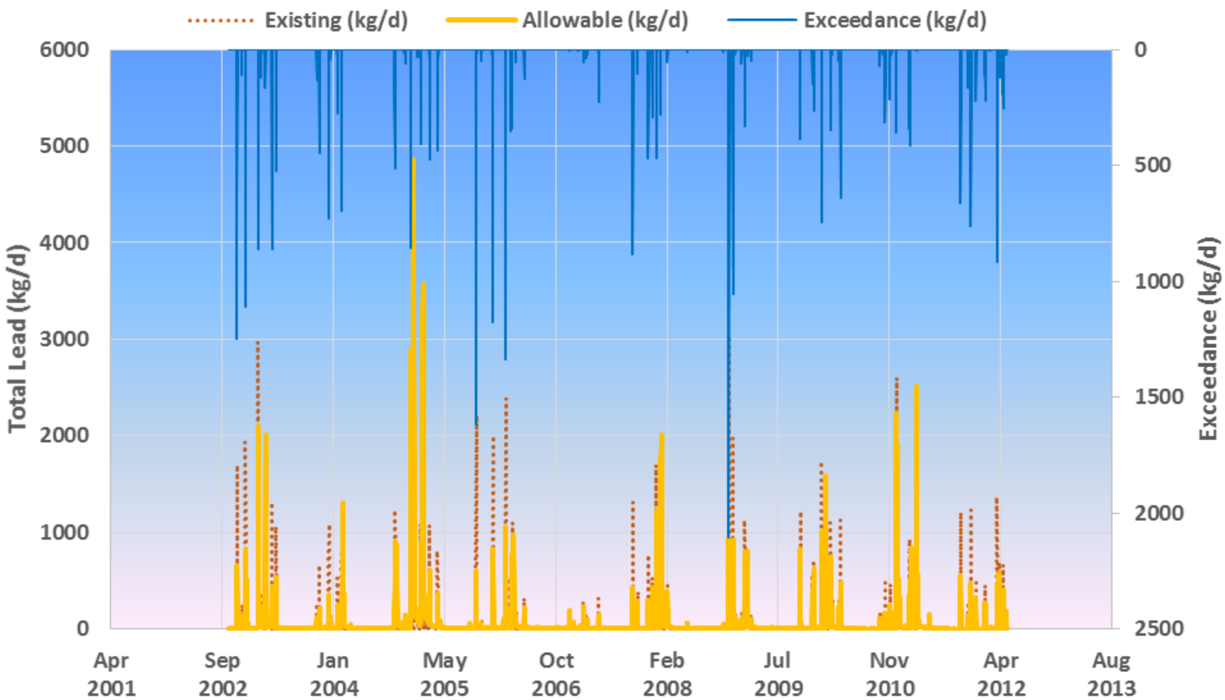

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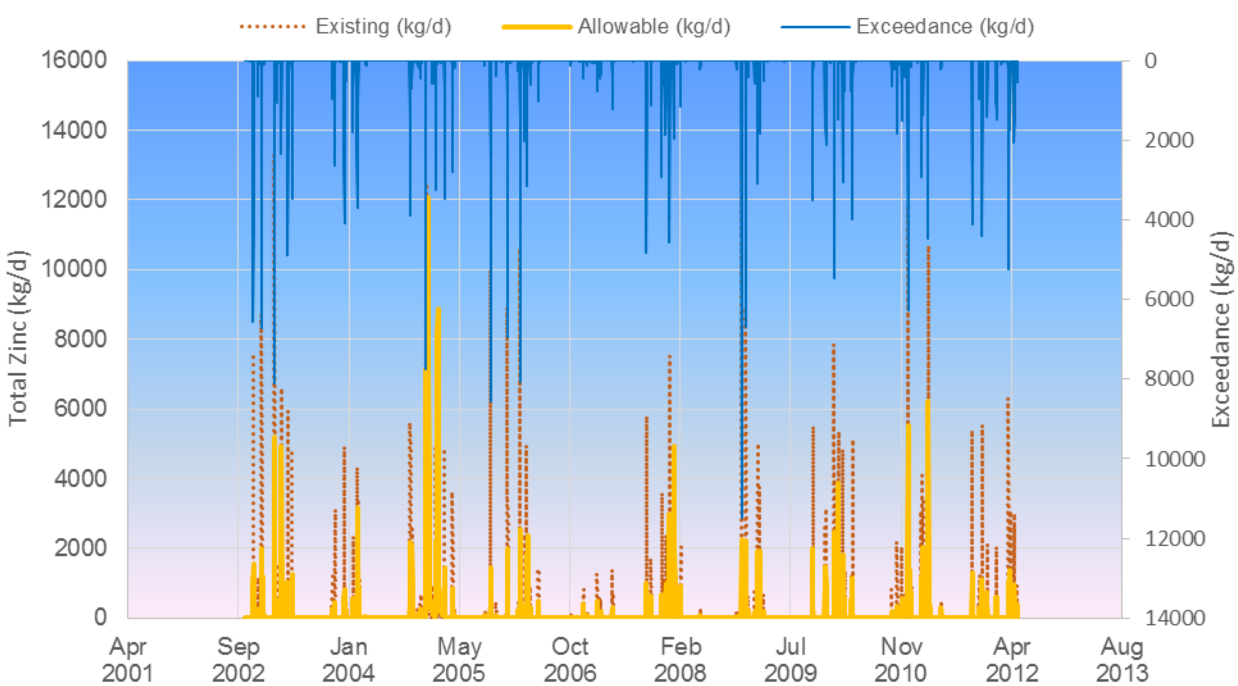

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3. Los Cerritos Channel

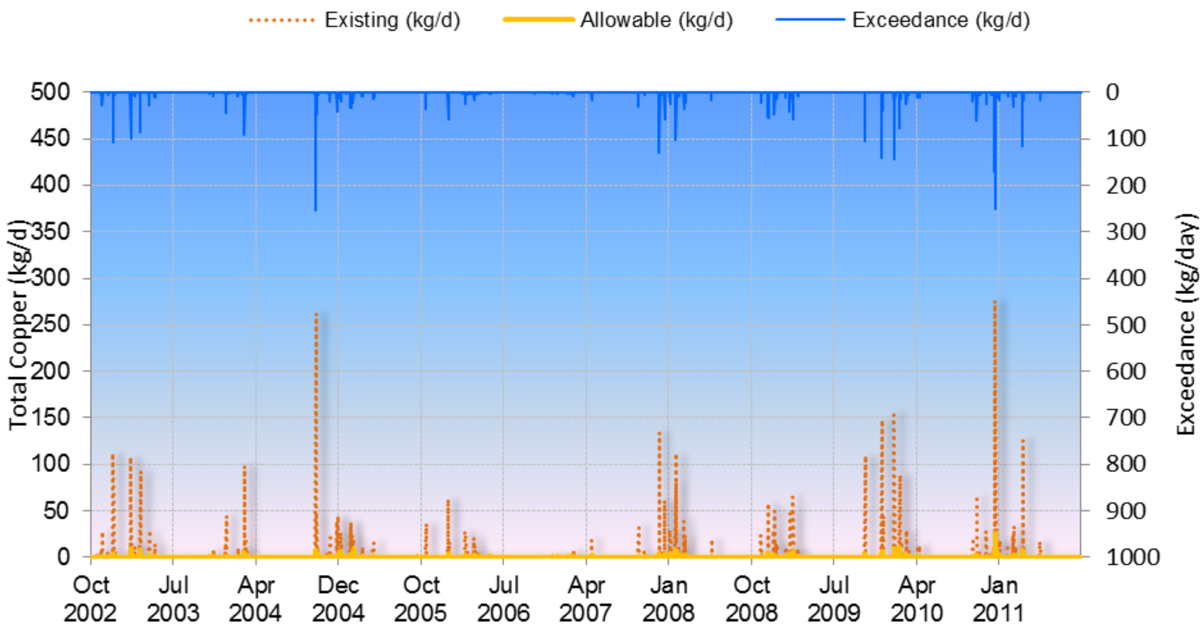


Figure 10. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.

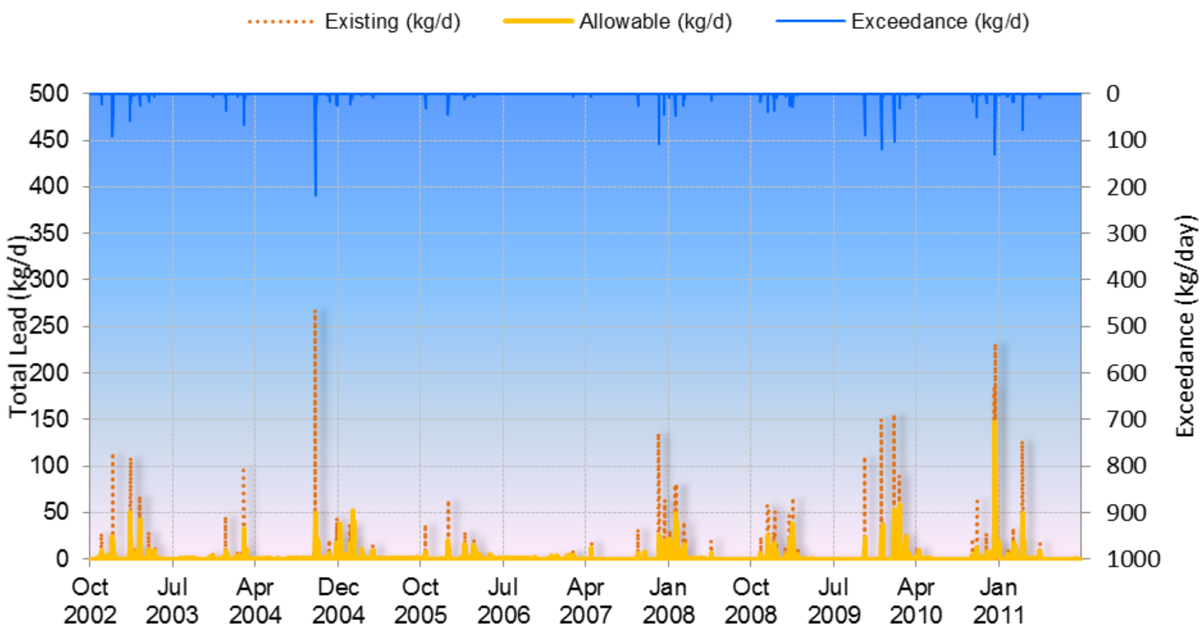
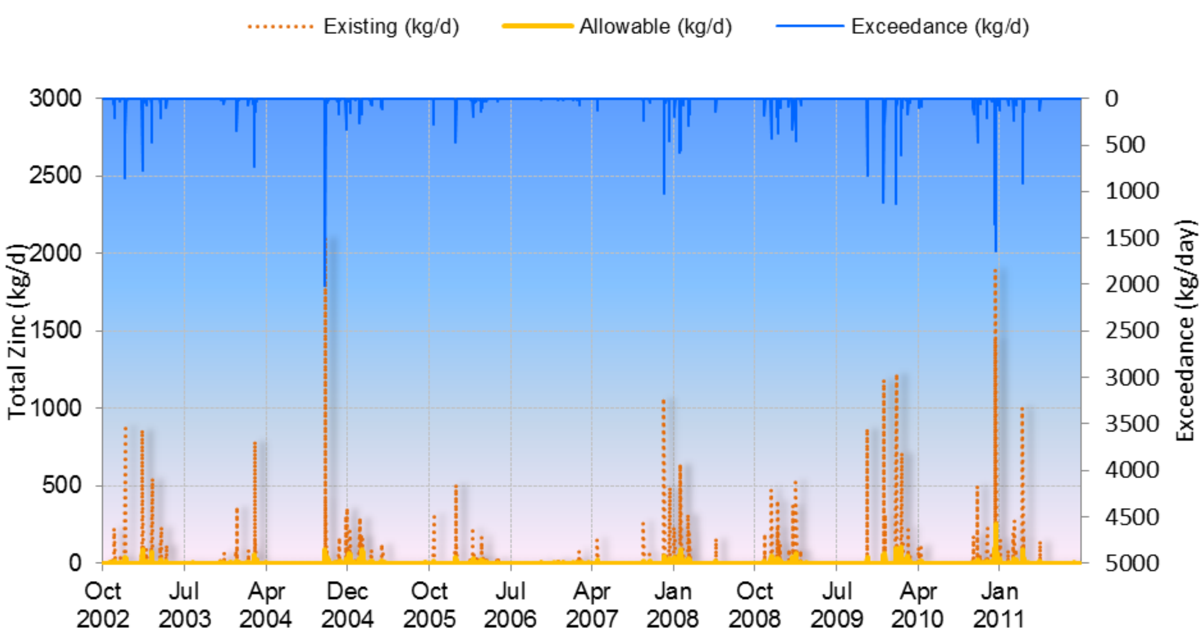


Figure 11. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.



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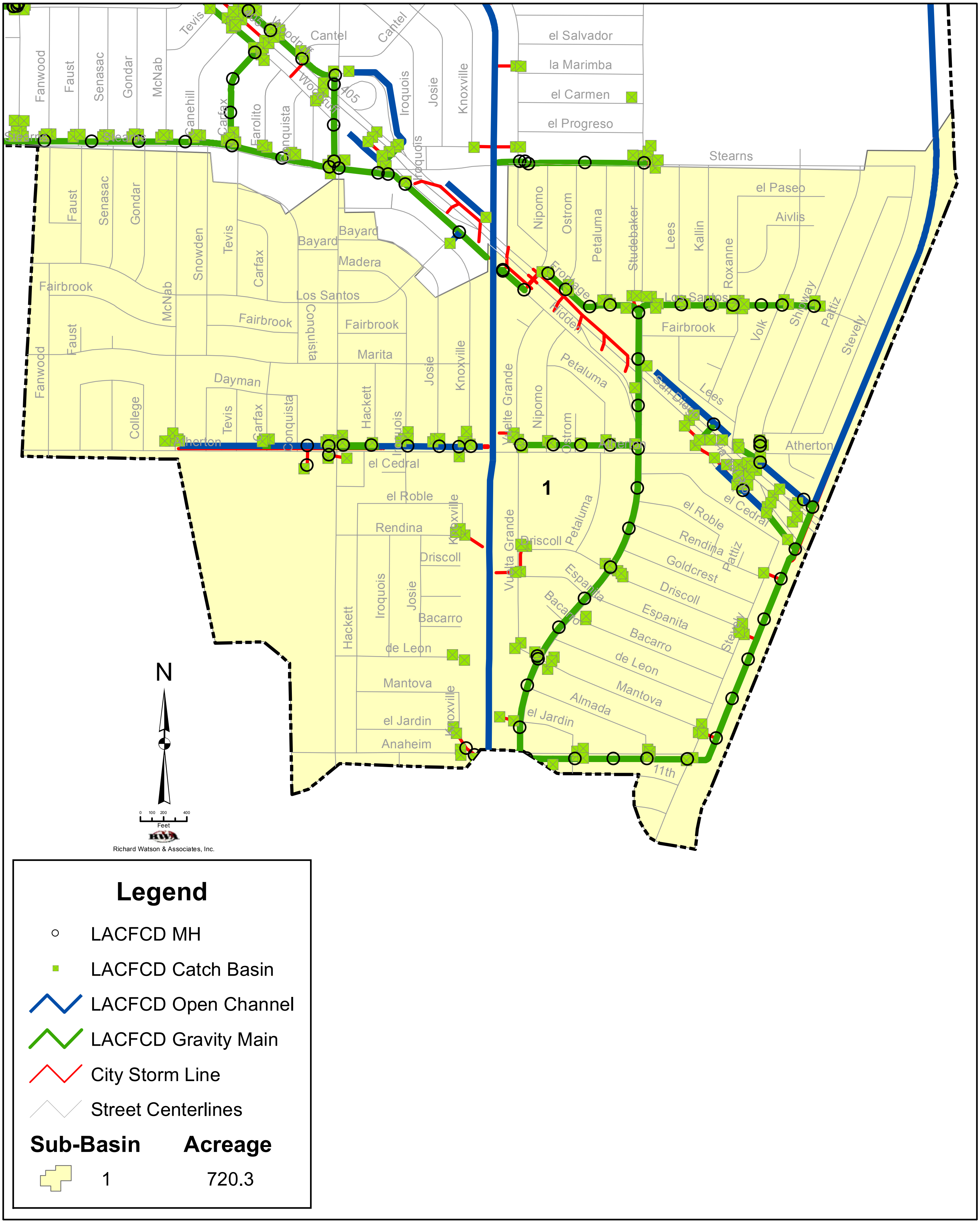
ATTACHMENT B:

LOS CERRITOS CHANNEL SUB-BASIN EXHIBITS

Los Cerritos Channel TMDL Sub-Basin 1

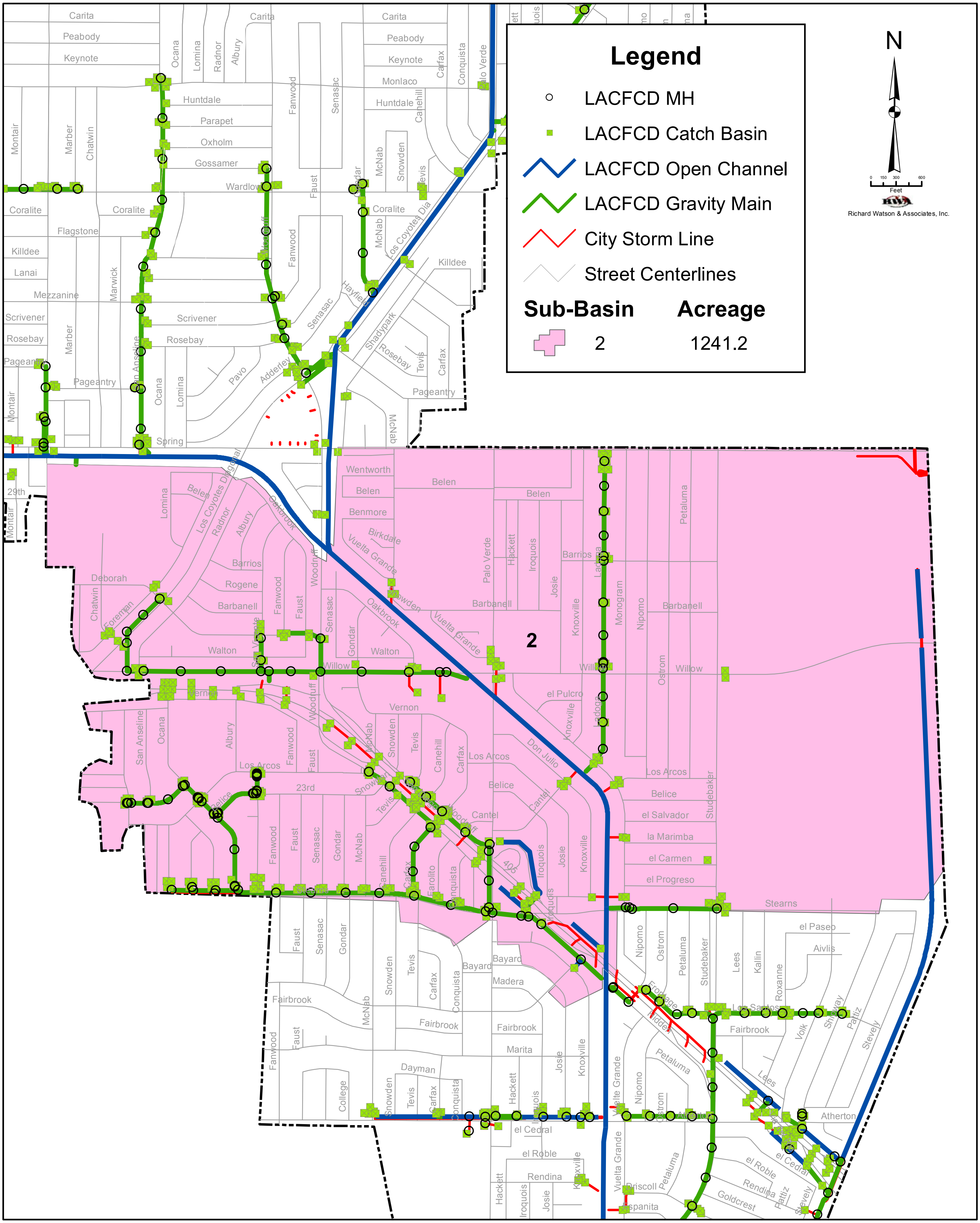


Los Cerritos Channel TMDL Sub Basin 1
Hydrologic Response Units

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

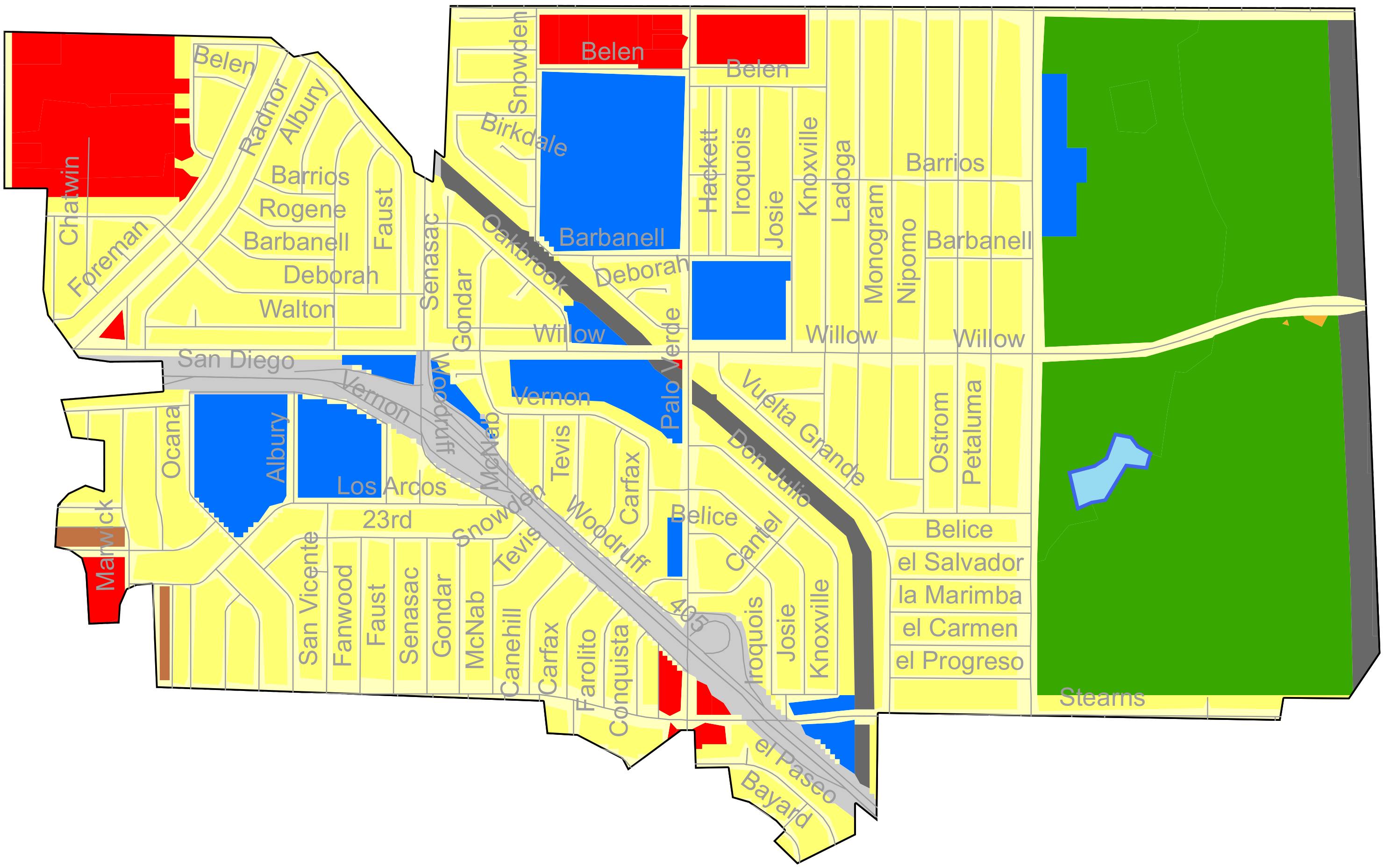
Los Cerritos Channel TMDL Sub-Basin 2



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 2
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
2	1241

Street Centerlines

N

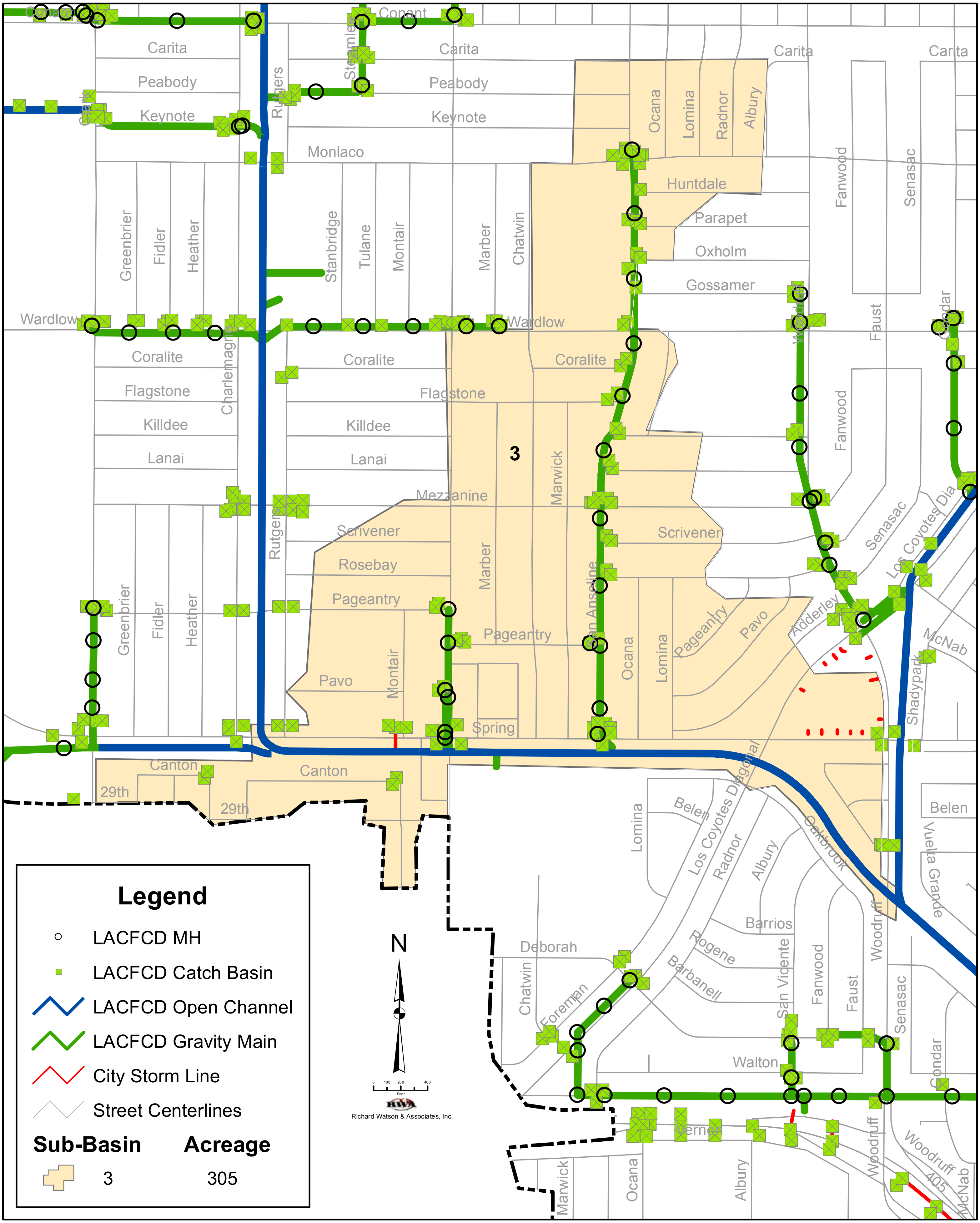
0 4,125 8,250 16,500
Inches

Richard Watson & Associates, Inc.

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

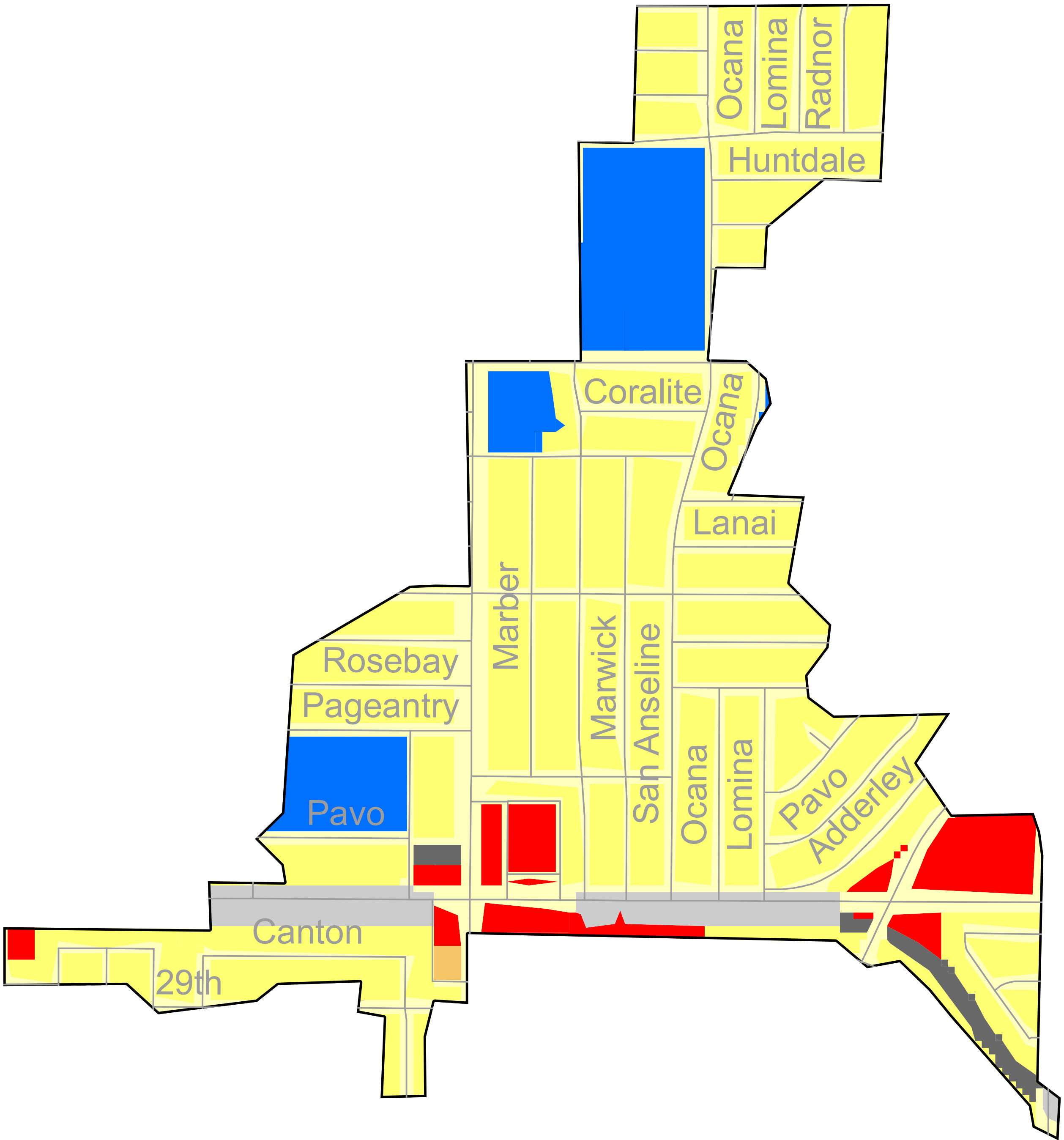
Los Cerritos Channel TMDL Sub-Basin 3



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 3
Hydrologic Response Units



Legend

Hydrologic Response Units

HD SFR	Commercial	Secondary Roads	Water Bodies
LD SFRM	Institutional	Agriculture Moderate Slope D	
LD SFR Steep S	Industrial	Vacant Moderate Slope D	
MF	Transportation	Vacant Steep Slope D	

Sub Basin	Acreage
3	305

Street Centerlines

N

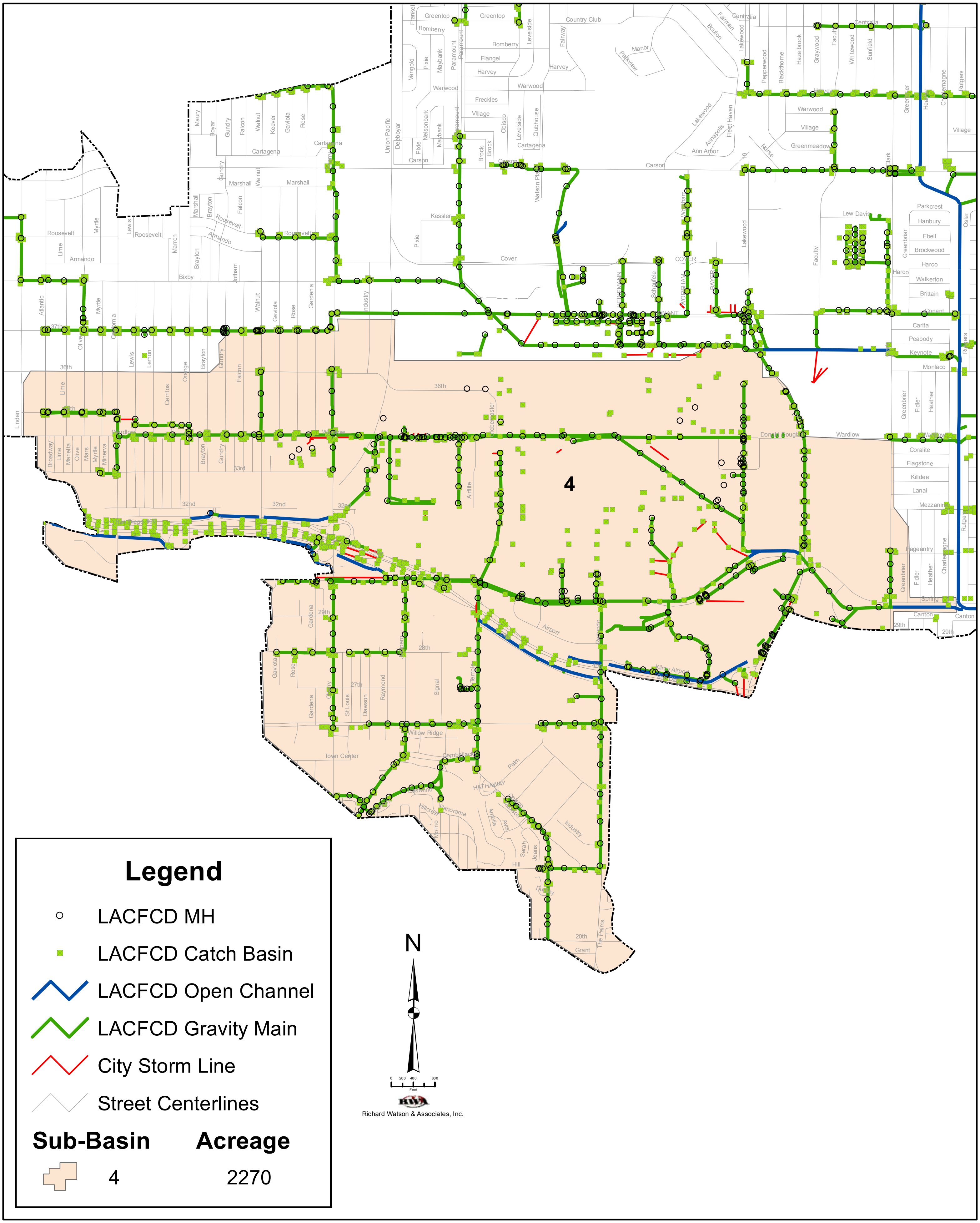
0 2,750 5,500 11,000
Inches

Richard Watson & Associates, Inc.

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

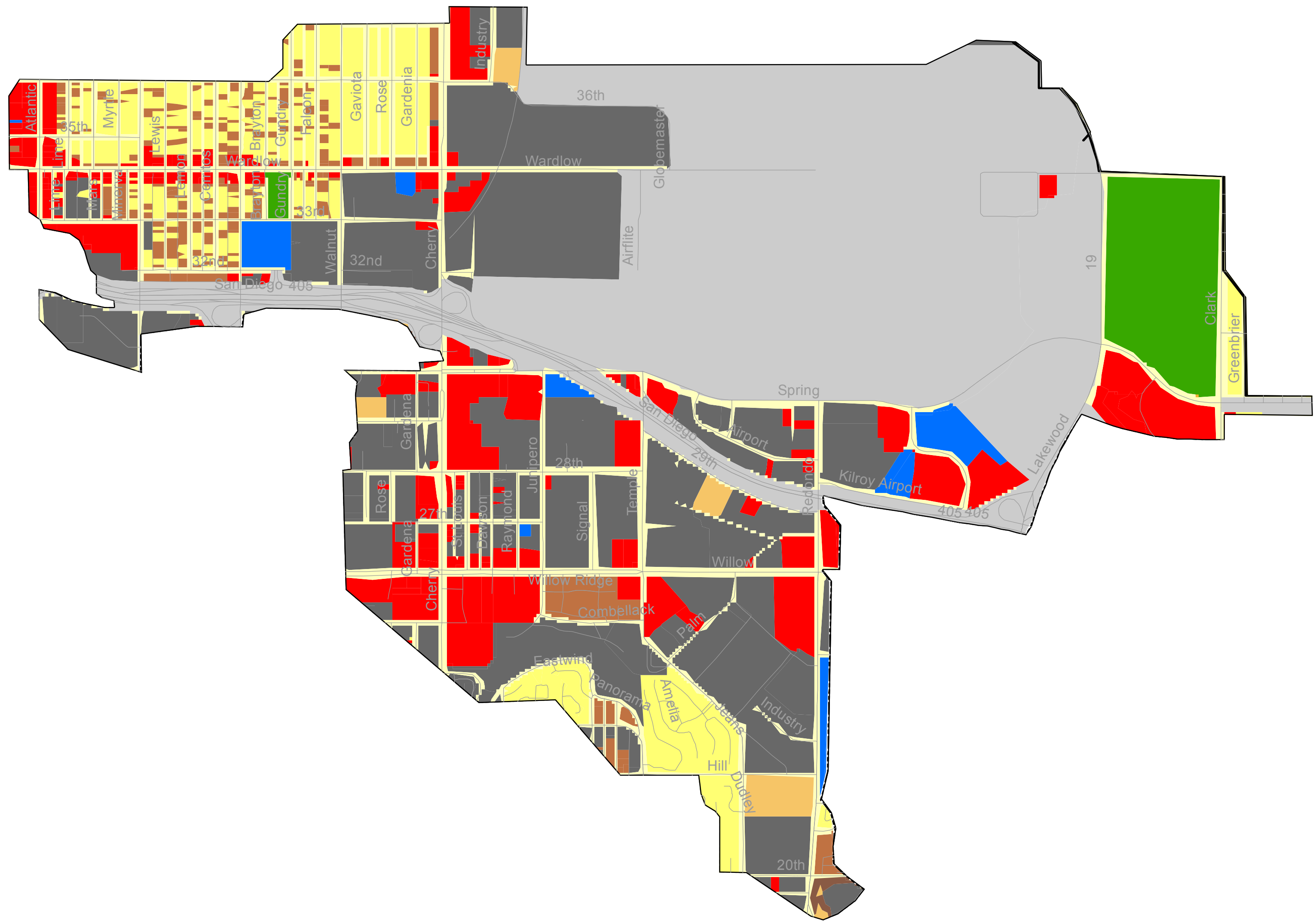
Los Cerritos Channel TMDL Sub-Basin 4



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 4
Hydrologic Response Units



Legend

Hydrologic Response Units

HD SFR	Commercial	Secondary Roads	Water Bodies
LD SFRM	Institutional	Agriculture Moderate Slope D	
LD SFR Steep S	Industrial	Vacant Moderate Slope D	
MF	Transportation	Vacant Steep Slope D	

Sub Basin 4

Acreage 2270

Street Centerlines

N

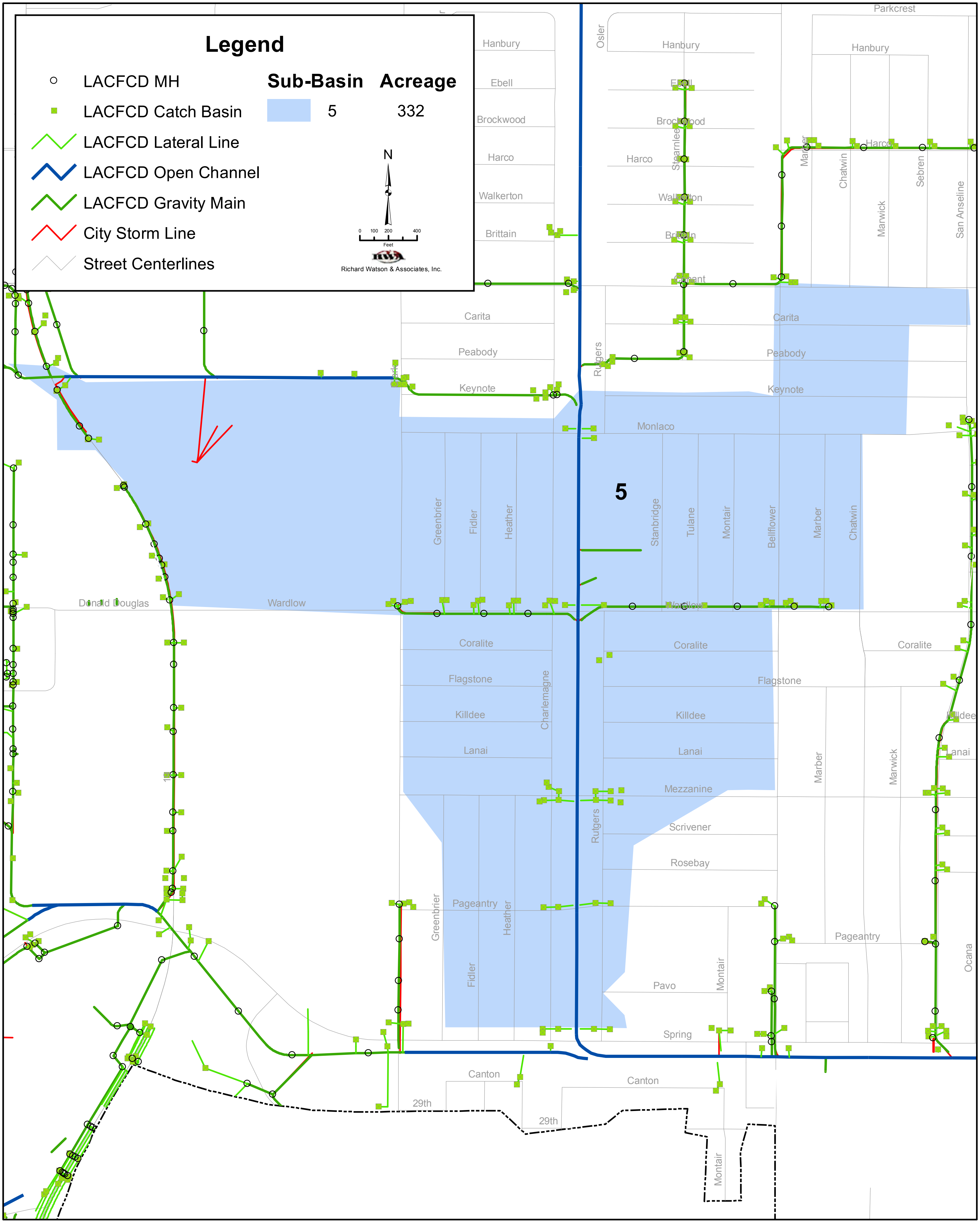
0 6,500 13,000 26,000
Inches

Richard Watson & Associates, Inc.

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

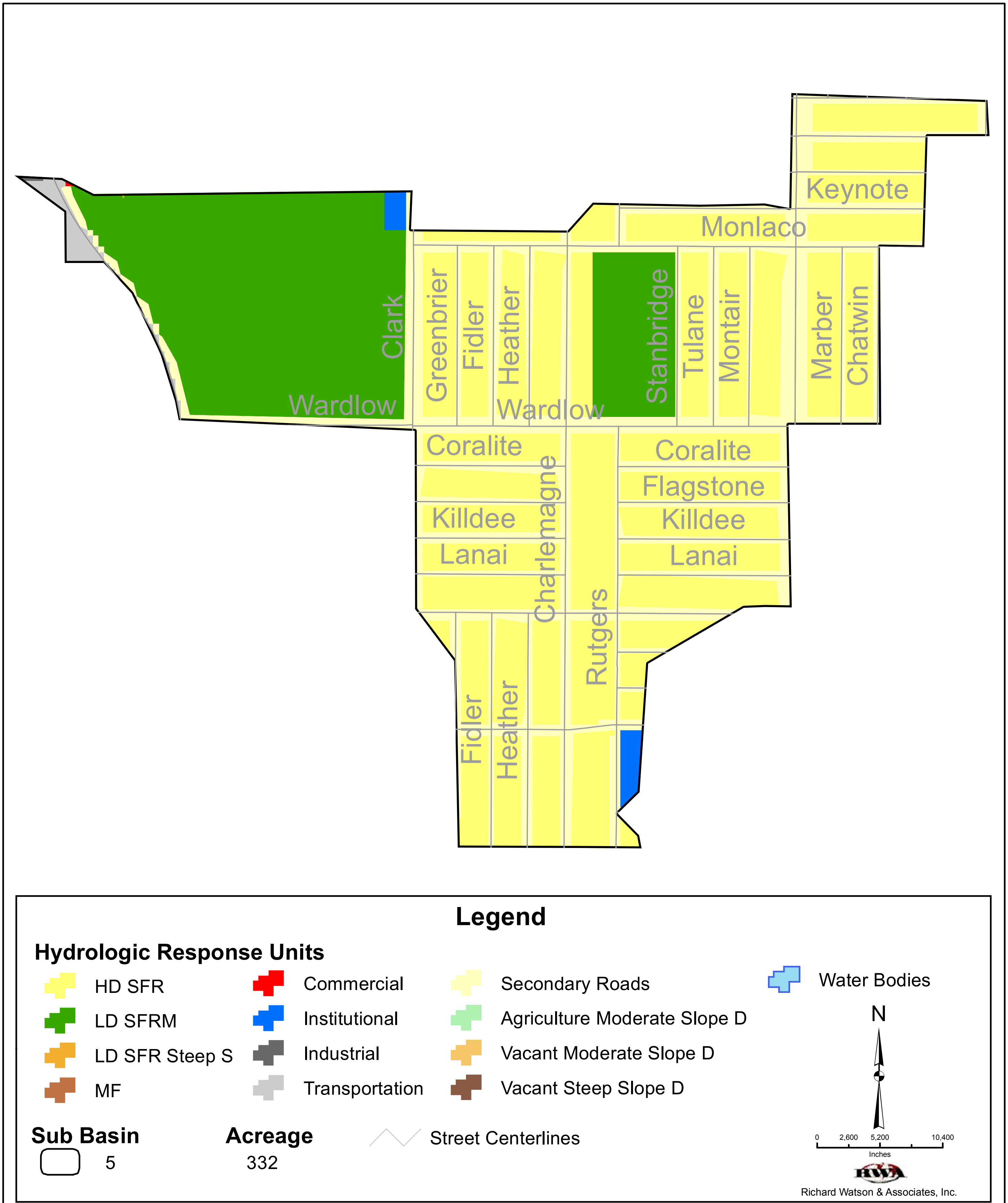
Los Cerritos Channel TMDL Sub-Basin 5



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

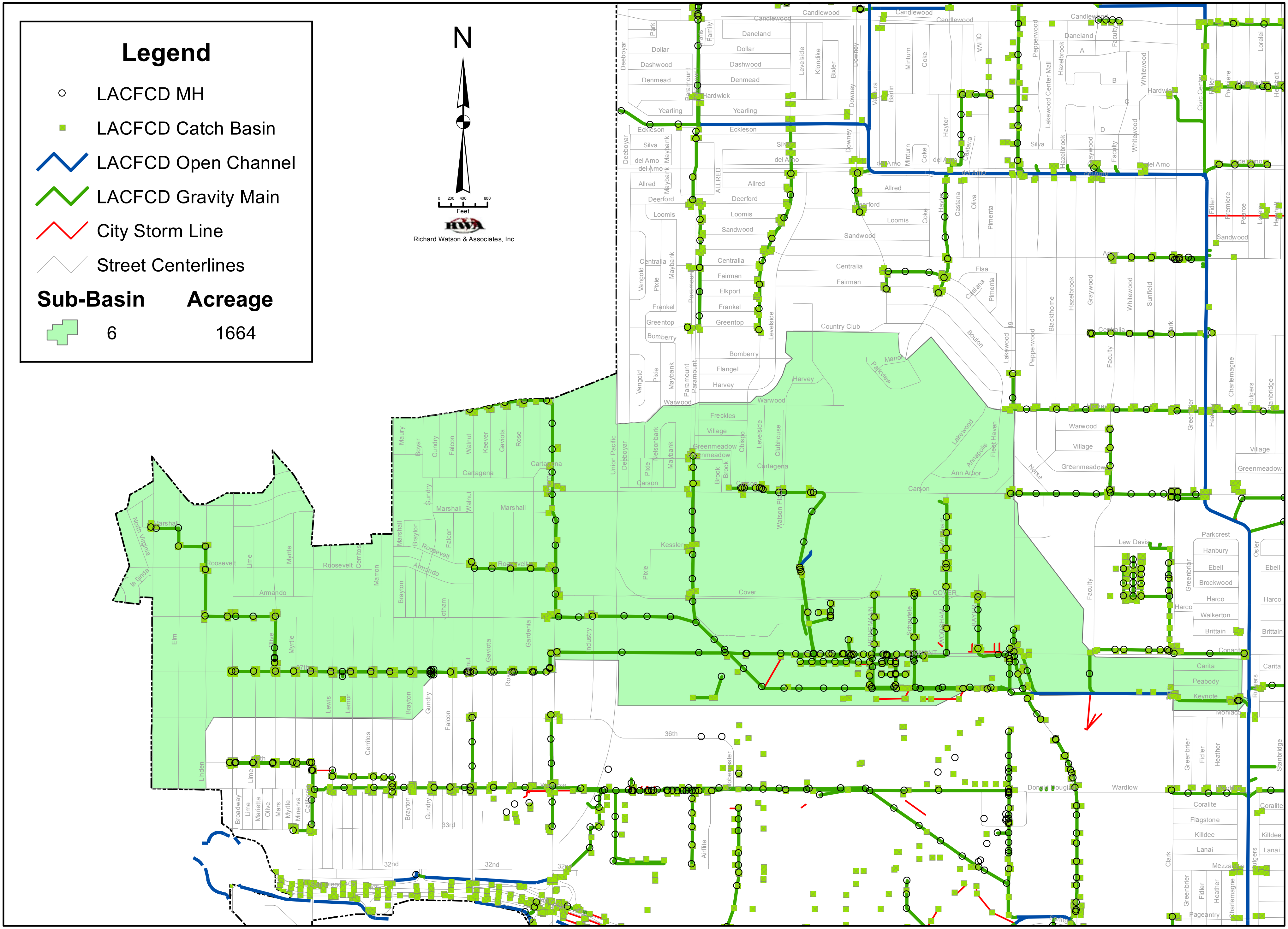
Los Cerritos Channel TMDL Sub Basin 5
Hydrologic Response Units



Prepared by: ECKERSALL, LLC

Date: 3/4/2014

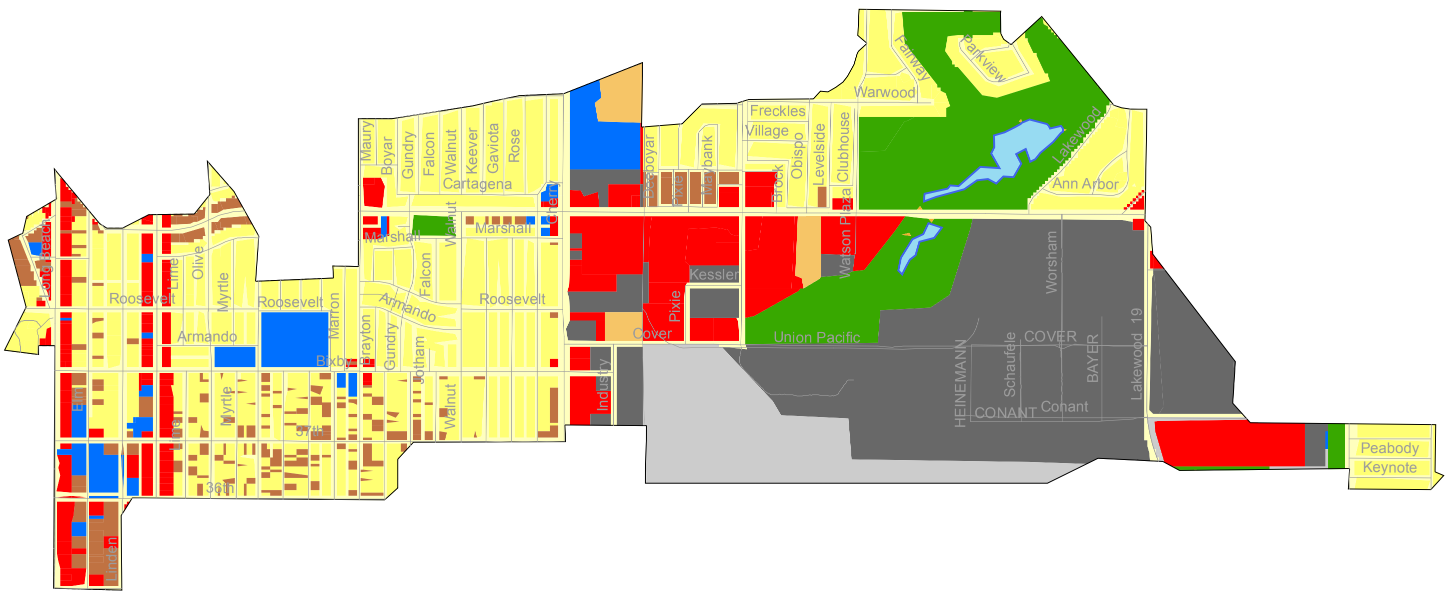
Los Cerritos Channel TMDL Sub-Basin 6



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 6
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
6	1664

Street Centerlines

N

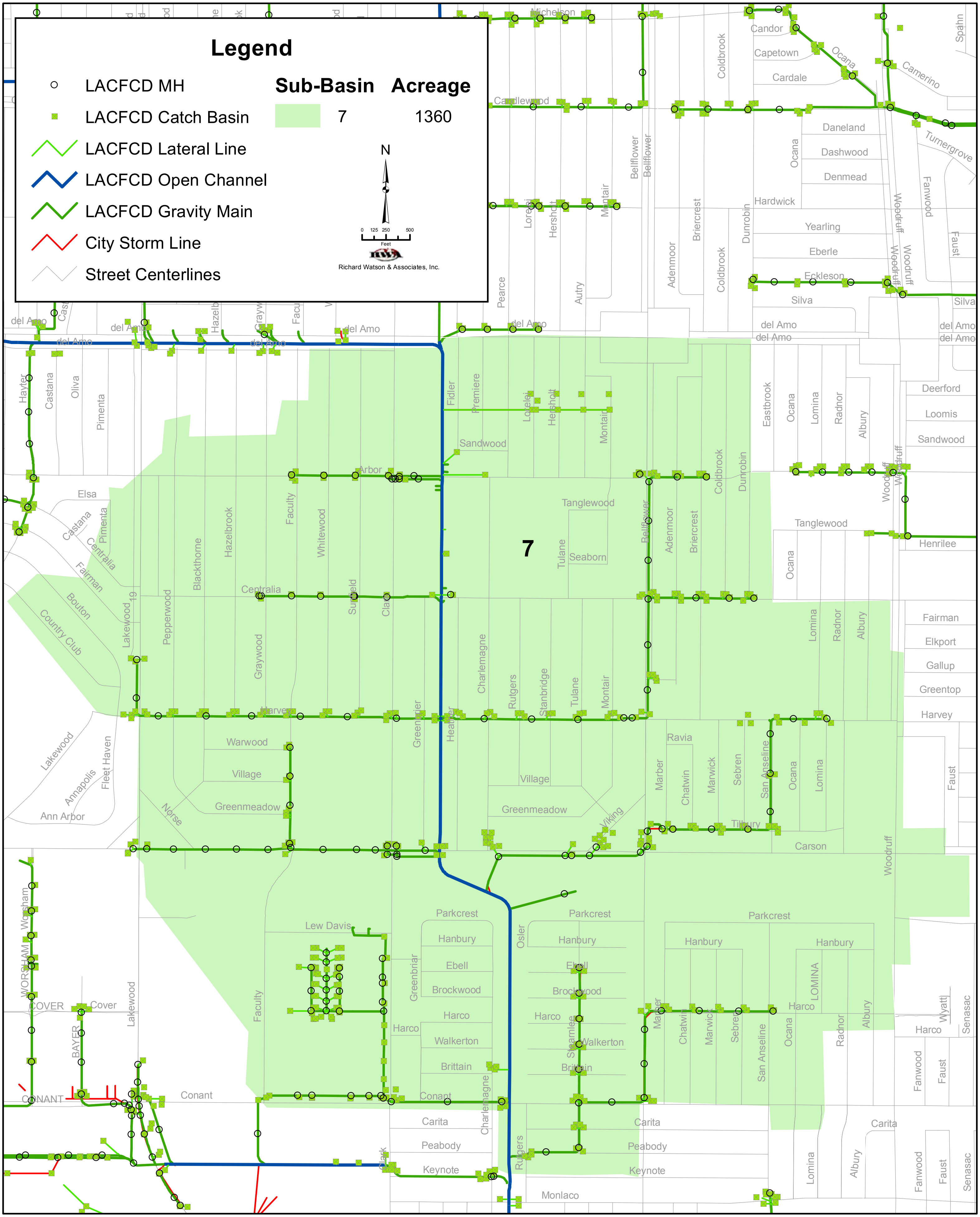
0 7,500 15,000 30,000
Inches

Richard Watson & Associates, Inc.

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

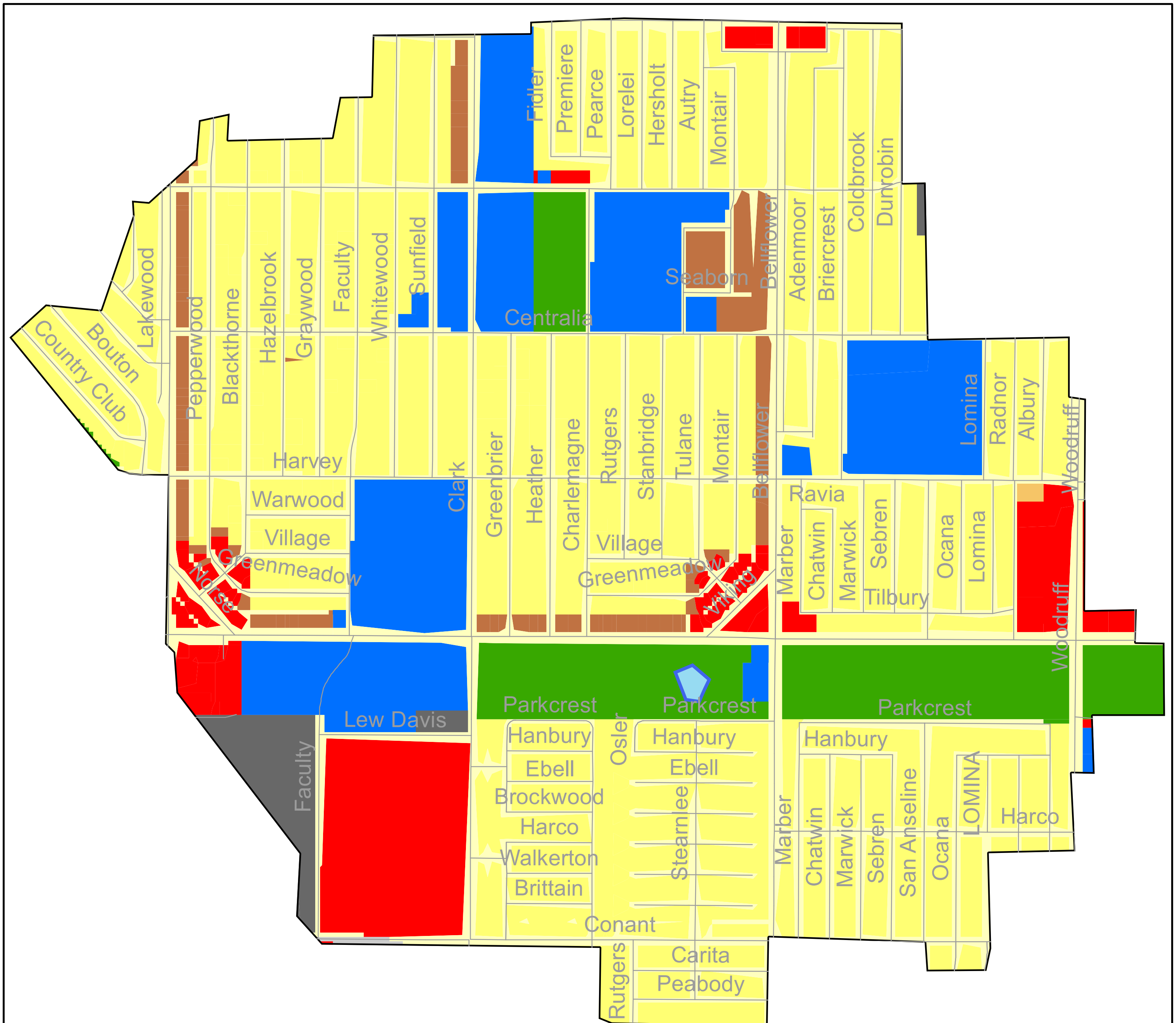
Los Cerritos Channel TMDL Sub-Basin 7



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 7
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	**Acreage**
7	1360

Street Centerlines

N

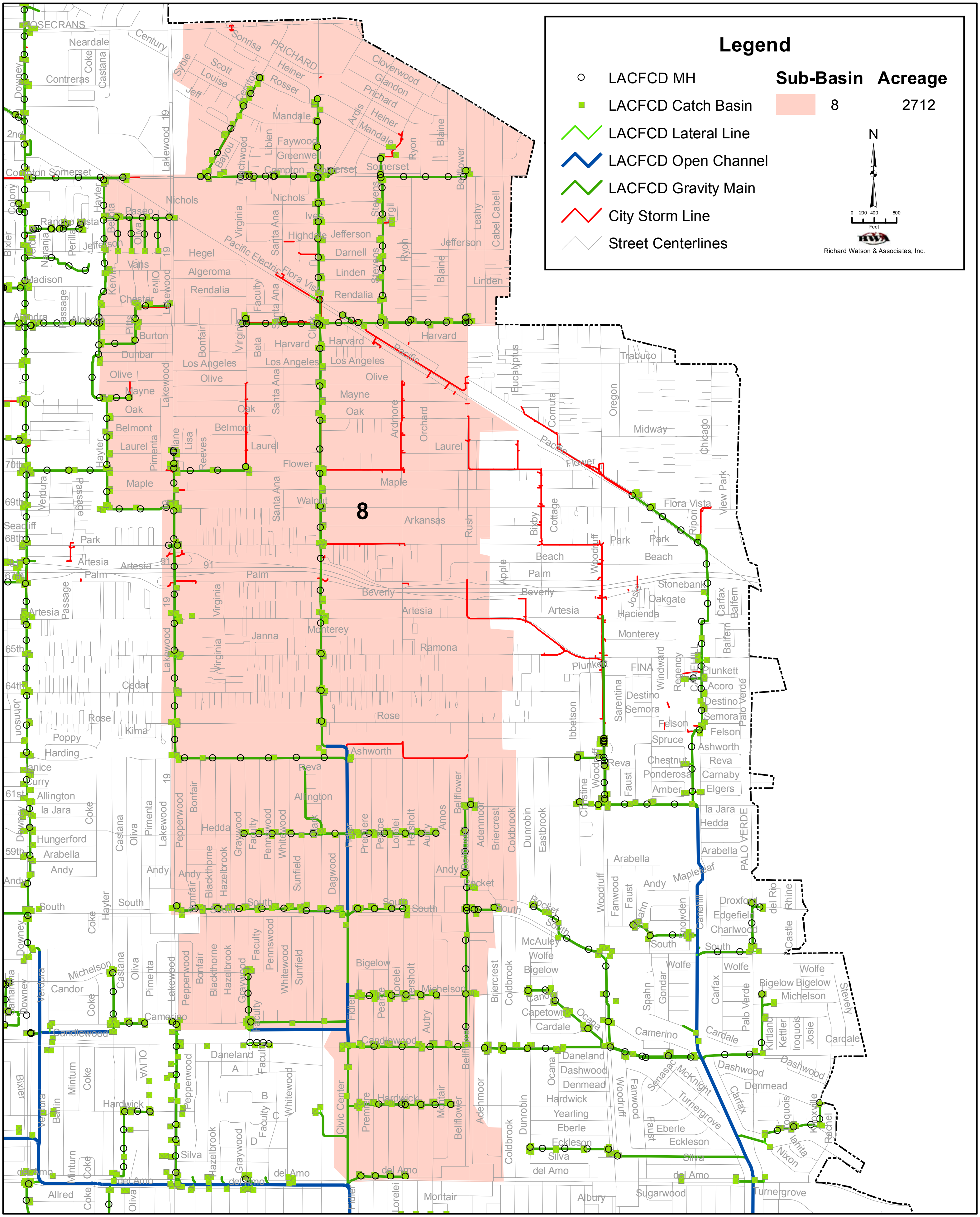
0 3,750 7,500 15,000
Inches

RWA
Richard Watson & Associates, Inc.

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

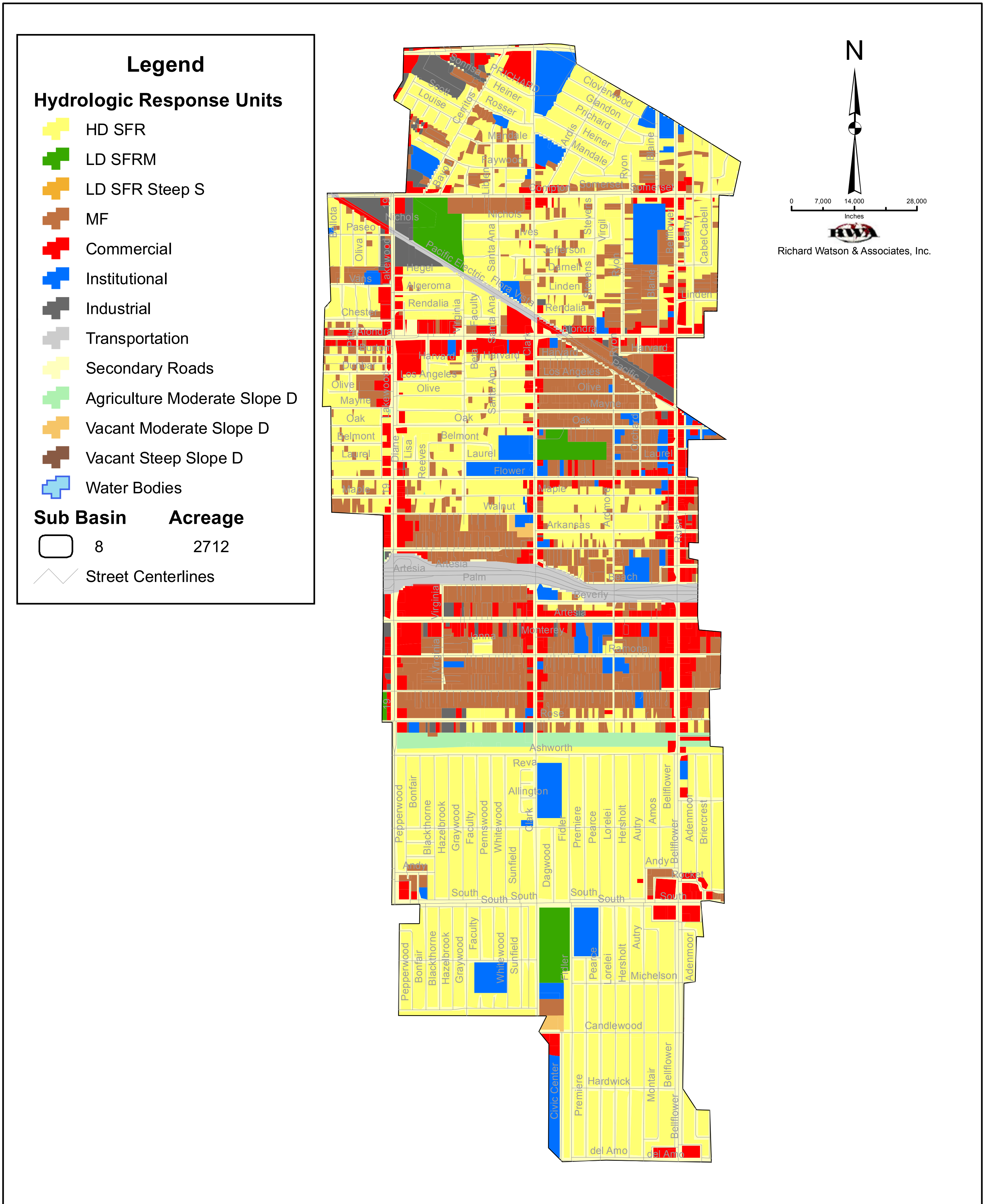
Los Cerritos Channel TMDL Sub-Basin 8



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

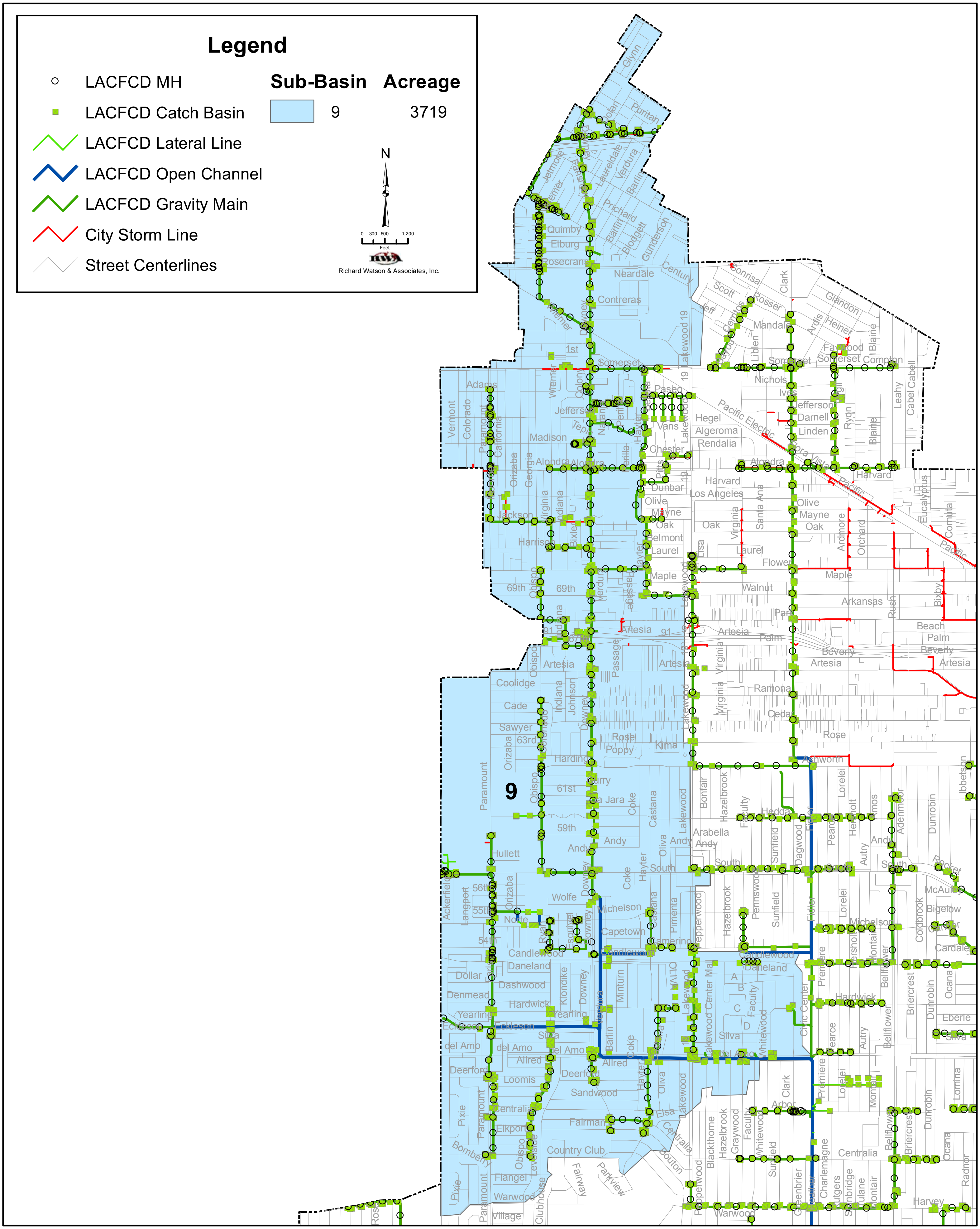
Los Cerritos Channel TMDL Sub Basin 8
Hydrologic Response Units



Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 9



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 9
Hydrologic Response Units

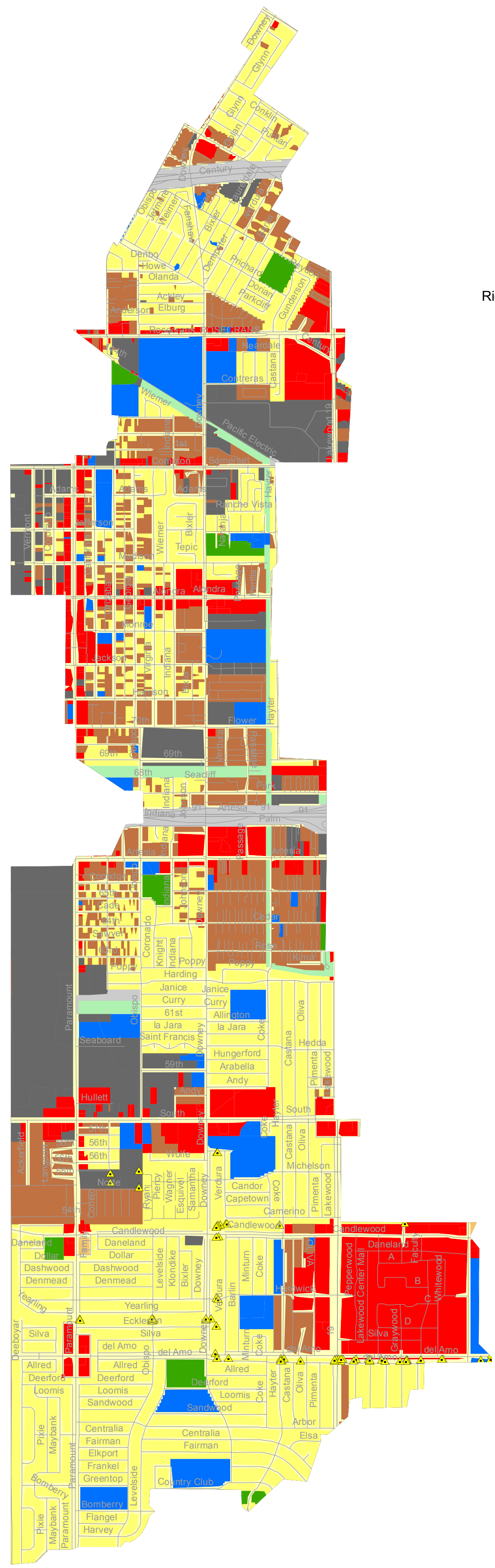
Legend

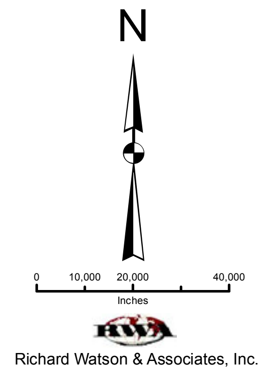
Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
9	3718

Street Centerlines

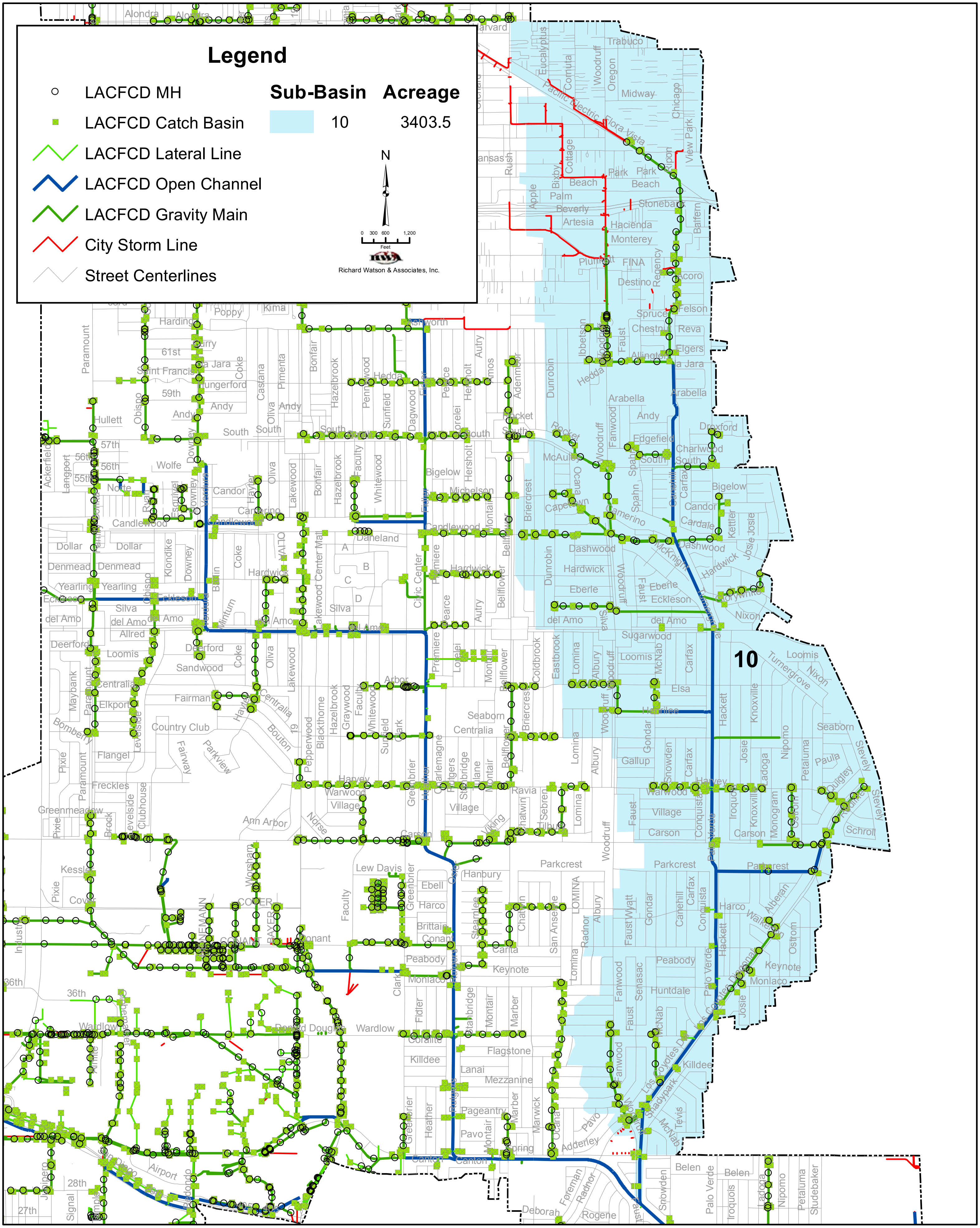




Prepared by: ECKERSALL, LLC

Date: 3/3/2014

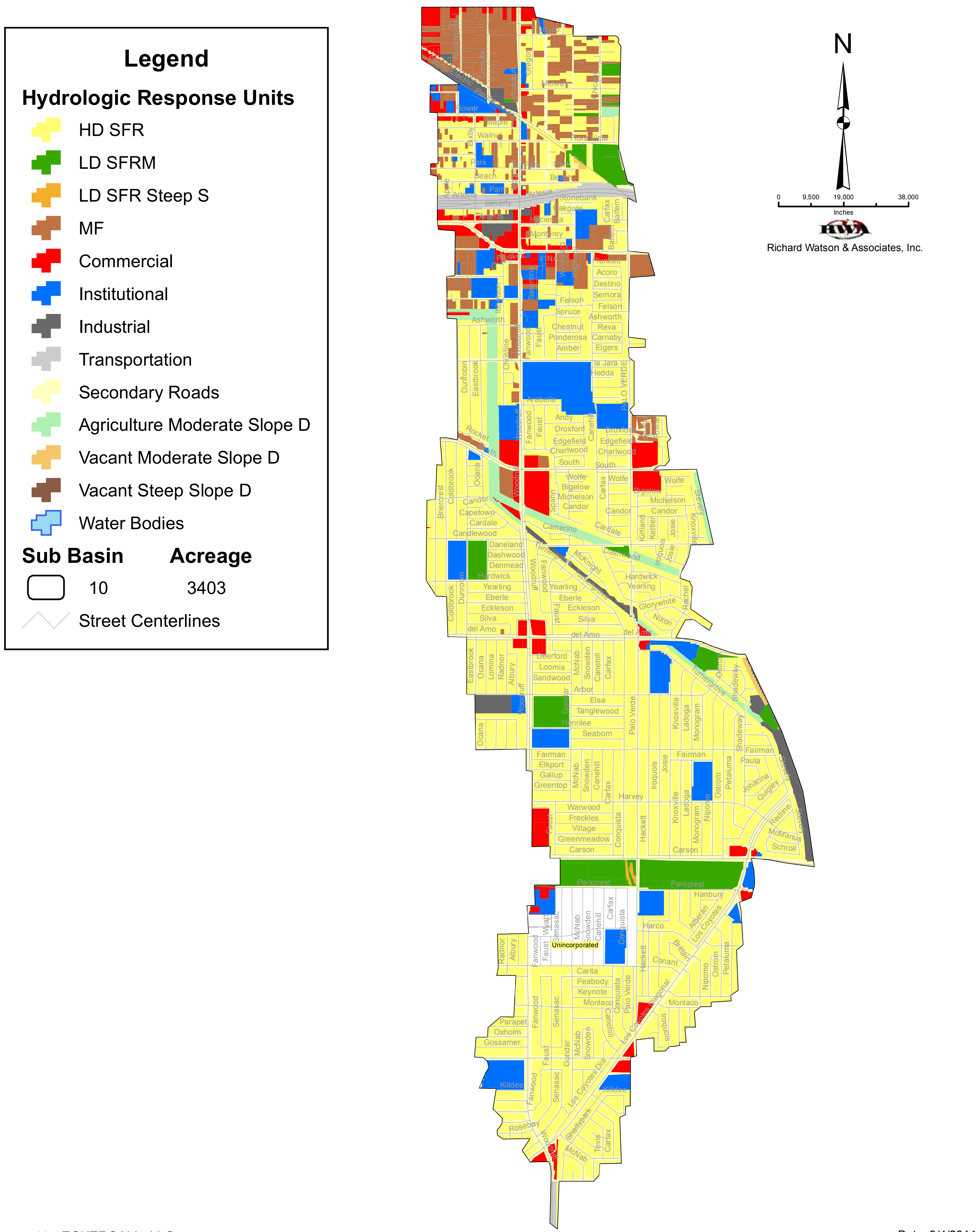
Los Cerritos Channel TMDL Sub-Basin 10



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 10
Hydrologic Response Units



Prepared by: ECKERSALL, LLC

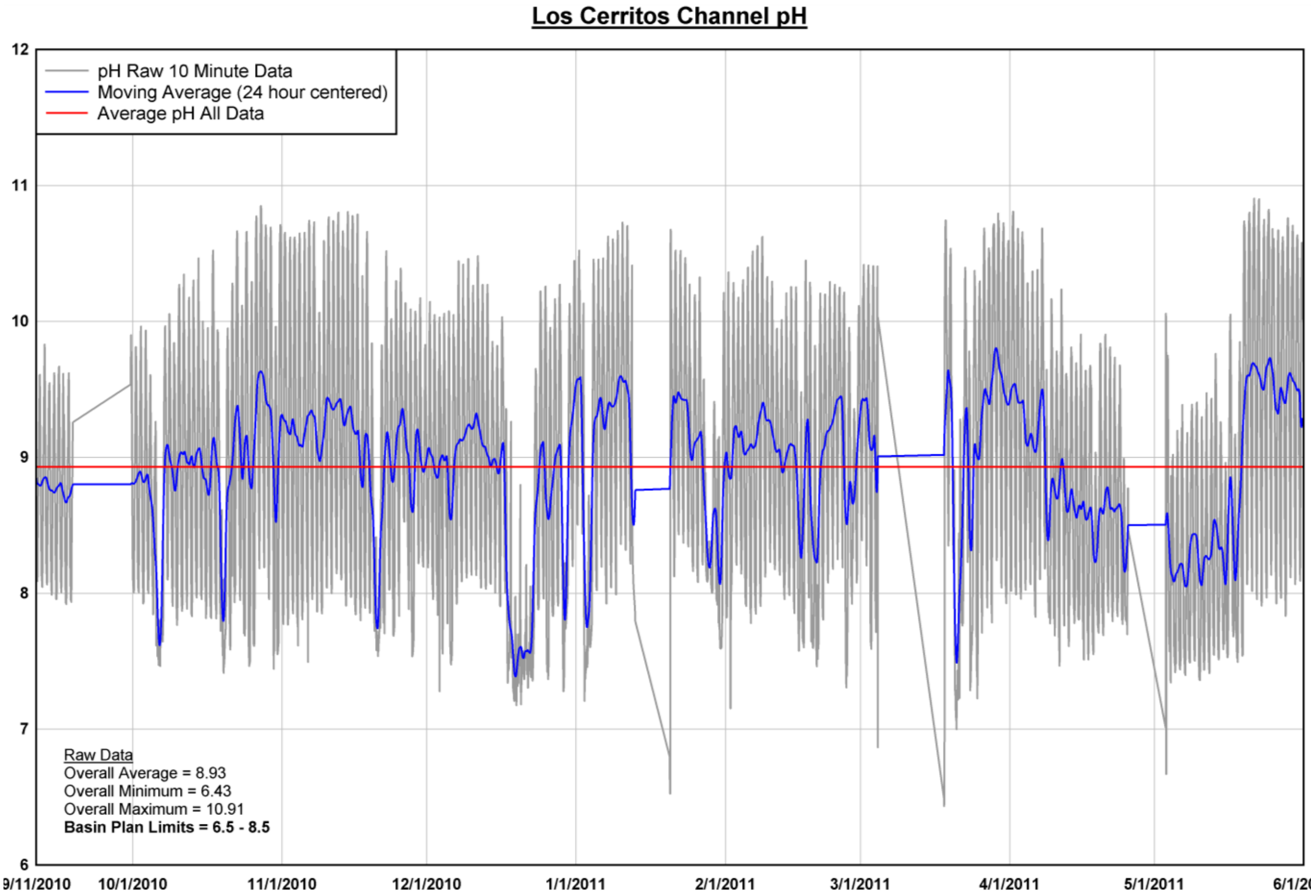
Date: 3/4/2014

ATTACHMENT C:

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

IMPLICATIONS FOR 303d DELISTING



Prepared For:
Los Cerritos Channel Watershed Group

Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District

KINNETIC LABORATORIES INCORPORATED

RWA

January, 2015

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ATTACHMENTS

Attachment 1. Summary of pH and Ammonia Data from City of Long Beach MS4 NPDES Storm Water Monitoring Site on the Los Cerritos Channel at Stearns Street along with Potential Toxicity Calculations (Excel Spreadsheet File).

Attachment 2. Kinnetic Laboratories, Inc. 2005. City of Long Beach Annual Stormwater Monitoring Report (2004/2005. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation

Attachment 3 Kinnetic Laboratories, Inc. 2009. City of Long Beach Annual Stormwater Monitoring Report (2008/2009). Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Attachment 4. Kinnetic Laboratories, Inc. 2011. City of Long Beach Stormwater Monitoring Report. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

IMPLICATIONS FOR 303d DELISTING

Prepared for the Los Cerritos Channel Watershed Group
Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District

Prepared by Kinnetic Laboratories, Inc. and Richard Watson & Associates
January, 2015

1.0 INTRODUCTION AND PURPOSE

The freshwater portion of the Los Cerritos Channel was 303d listed by the Los Angeles Regional Water Quality Control Board for ammonia nitrogen (NH_3-N) in 2002 and pH in 2010. The purpose of this document is to summarize and analyze all available ammonia and pH data for the Los Cerritos Channel in order to consider delisting ammonia and pH.

This document summarizes ammonia and pH data from the Los Cerritos Channel developed as part of the City of Long Beach storm water monitoring program. The data set includes all storm water and dry weather monitoring conducted in the Los Cerritos Channel at the Stearns Street monitoring site since 2001. This site is the TMDL compliance site for the Los Cerritos Channel Metals TMDLs. In addition, several special studies conducted in the Los Cerritos Channel by the City of Long Beach's monitoring program have provided supplemental data on pH in the both the open channel and pipes with flows discharging to the open channel. Analysis of these data is carried out with respect to acute and chronic toxicity criteria as prescribed the Basin Plan amended that uses USEPA, 1999 criteria. In addition, the special studies carried out in the Los Cerritos Channel by the City of Long Beach's monitoring program have provided supplemental data on pH cycling in the concrete channels.

2.0 AVAILABLE DATA

Ammonia and pH values are from composited samples from the wet weather storm events that have been monitored since the year 2001. For dry weather, ammonia values are from 24-hour composite samples taken in the fall and spring of each monitoring year. For dry weather, field measurements of pH and temperature were used to assist in evaluating the criteria. All data has been reported in the City of Long Beach's annual NPDES storm water monitoring reports. These data are attached as Appendices to this document.

Several dry weather surveys taken early in the City of Long Beach's identified occasional high pH values in the open concrete channel at the Stearns Street monitoring site. In 2002 the Regional Board added a requirement to conduct an upstream investigation if pH values of 9.0 or greater were encountered during these dry weather surveys at the Stearns Street monitoring site. Subsequently, elevated pH values measured at Stearns Street prompted an upstream survey initially in the concrete channel just above the monitoring site, and subsequently extending up into the Los Cerritos Channel Watershed tributaries (Kinnetic Laboratories, 2005), (Attachment 1). High pH values (9.45 to 10.9 during the day) were found in all the upstream channels, and furthermore, pH was found to rise during the day and drop at night. The results of this investigation supported the hypothesis that the elevated pH values in the shallow flow in the open concrete channels are caused by photosynthetic activity. Attached algae on the channel bottom in the channel consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths typical of open channels during dry weather conditions cause high concentrations of dissolved oxygen in the water. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions

(H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel cause the CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways. Alkalinity provides buffering capacity such that high alkalinity water should be expected to have less extreme diurnal changes in pH.

A Los Cerritos Channel dry weather copper and bacteria upstream source investigation again documented the occurrence of elevated pH values (Kinnetic Laboratories, 2009, Attachment 2). Importantly it also documented that the elevated pH values occurred only in the open channels, but not in the outfalls draining into the channel as these pipes were not subject to sunshine necessary to support algae growth.

Finally, another special study was conducted (Kinnetic Laboratories, 2011, Attachment 3) to provide better documentation of the daily fluctuations in pH that occur over the course of a year. This study also showed excessively high pH values within the open portions of the channel, not the outfalls. A precision and stable pH logger was calibrated and installed on a bridge abutment under the Stearns Street Bridge to provide a better understanding of pH cycling. The meter was briefly removed and checked with pH standards and a laboratory thermometer during each maintenance visit. Time series records of pH, temperature, solar radiation and rainfall in the Los Cerritos Channel at Stearns Street resulted from this study that extended from September 10, 2010 to June 1, 2011. Results were as follows:

- Both pH and temperature records showed repetitive, pronounced 24-hour sinusoidal oscillations that supported the earlier conclusion that they are controlled by natural biological and physical processes common to all sites with similar conditions within the concrete channels (Figure 1).
- These 24-hour signals are muted and depressed by major storm flows in the Channel, but also immediately continue during the intervening winter dry periods, even in the absence of major filamentous algal mats (Figures 1 and 2).
- Hourly averaged pH values in the channel were pH 7.98 for rain days, pH 9 for dry days, and pH 8.93 as an overall average of all data, but with maximum values during the days of pH 10.49 to 10.91. Minimum values were from pH 6.43 to 7.04 for the various wet/dry categories (Figure 3).
- With the pH average or median just below 9.0 for all days other than during storm events, the upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year during dry weather (inclusive of summer dry and winter dry periods).

Recent inspections of outfalls within the Los Cerritos Channel Watershed (Kinnetic Laboratories, 2015) have provided further evidence that pH (using narrow range pH paper as an indicator) is not elevated in any outfalls with flowing or seeping discharges into the open channel.

3.0 ANALYSIS OF pH and AMMONIA DATA

Toxicity Analysis. Ammonia and pH data have been summarized in spreadsheets together with calculations with respect to toxicity criteria and are provided as Attachment 4. Aquatic life water quality criteria from the USEPA document (USEPA, 1999) were used to calculate acute and chronic toxicity as a function of temperature and pH in order to be consistent with the current Basin Plan. Calculations made with the latest USEPA guidance document (USEPA, 2013) yielded similar results for acute toxicity and only showed a few more chronic violations at a temperature of 15 ^{0}C. These latter calculations are also included in the attached Excel Spreadsheet (Attachment 4).

For wet weather, results of the toxicity calculations show only one exceedance of acute and chronic ammonia criteria occurred out of 45 records obtained at the Stearns Street monitoring site during the last 13 years. These results are summarized in Table 1 below and are fully documented in the Excel spreadsheet provided in Attachment 4.

For dry weather, ammonia concentrations in 24-hour composite samples were paired with field measurements of pH data available from the Stearns Street monitoring station at the lower end of the freshwater portion of the Los Cerritos Channel watershed monitoring. The dry weather results for this site are summarized in Table 2 below as well as in the spreadsheet of Attachment 4.

For dry weather, the data available from this site show that no acute toxicity has been encountered. Ammonia chronic aquatic life criteria were not historically exceeded frequently for dry weather discharges from the Los Cerritos Channel as measured at the Stearns Street monitoring site. However, for the past few years, dry weather chronic exceedances have been observed more frequently with four chronic exceedances having been recorded since 2009 at the higher temperature of 20 ^{0}C. These have been due to slowly rising ammonia concentrations in combination with high pH values in the channel. This increase has been associated with dry weather base flows which have decreased to approximately 10 to 20% of the flows measured in 2009 and decreased by 80% to 90% compared to dry weather flow measurements taken in 2003. One recent winter dry weather survey (January, 2015) resulted in higher flows and lower pH values. These factors resulted in no exceedances of chronic ammonia criteria.

Ammonia Concentrations. Ammonia concentrations of NH_3-N measured in the channel have been low, generally in the range of 0.2 to 0.7 mg/l with higher values generally not exceeding about 1.0 mg/l. In contrast, the Los Angeles River TMDL established WLAs for NH_3-N for a 1-hour average of 8.7mg/l and a 30 day average of 2.4 mg/l.

However, natural pH excursions in the Los Cerritos Channel low-flow summer season can cause dry weather exceedances with respect to chronic toxicity as high pH results in most of the ammonia being converted to unionized ammonia which is the most toxic form.

Flows to the Channel from outfalls during the dry season are well within the limits of the Basin Plan for pH (Kinnetic Laboratories 2009, 2011, 2015). Special upstream studies for copper sources done as part of the Long Beach storm water monitoring program, and recent upstream outfall inspections carried out for the new permit requirements showed that these discharges are almost uniformly close to pH 7.0 to 7.5 (Kinnetic Laboratories, 2015).

The dry weather channel has low flows during the summer which consist of a couple of inches of water running over a bottom attached algae mat. During the dry season, temperature and pH have strong diurnal patterns driven by primary production of the algal mats in the shallow water. During the day the algae causes dissolved oxygen levels to become supersaturated. The removal of CO_2 associated with the algal production causes pH to elevate reaching a peak in the mid-afternoon. Similarly, temperatures also peak around this time. At night, both temperature and pH drop significantly due to microbial consumption and respiration. We expect that our point measurements of pH and temperature are more likely to be biased high relative to 24-hour averages or the 30-day averages that the chronic criteria are expected to use.

These natural diurnal cycles in pH have been documented in the Los Cerritos Channel by use of a precision recording pH meter that was deployed at the Stearns Street monitoring site in early September 2010 and recorded continually until late May 2011, thus covering both dry summer season conditions and winter wet seasons for both storm events and wet weather dry seasons. These data were reported in the 2010-2011 Long Beach annual monitoring report and Appendix D of this annual report is attached to this present document. The results of this study showed that pH varied diurnally in Los Cerritos channel from about 6.5 to 10.8 with an average of about 9.0 unless interrupted by rain events. The amplitude of these pH variations was large because of the low volume of flowing water flowing above a healthy mat of attached algae.

4.0 CONCLUSIONS

From analyses of available data, the following conclusions can be drawn:

- Large excursions of pH occur in the Los Cerritos Channel with the pH average or median just below 9.0 for all days other than during storm events. The upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year during dry weather (inclusive of summer dry and winter dry periods).
- High excursions of pH cause exceedances of the chronic ammonia criteria within the Channel even though ammonia concentrations are generally low.

The Basin Plan states that the pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharges. Data reviewed above show that the high pH excursions are not caused by inputs of high pH wastewaters. Rather, the large pH excursions observed during dry weather flow conditions are the result of natural diurnal pH cycling caused by photosynthesis and respiration processes.

Data from the Long Beach stormwater monitoring program plus that of special studies have shown that exceedances of ammonia chronic aquatic life criteria are not caused by either excessive NH_3-N concentrations nor by waste inputs. The exceedance of chronic ammonia criteria are caused by the natural high excursions of pH due to photosynthesis/respiration cycles in these channels.

5.0 TABLES AND FIGURES

Table 1. WET WEATHER – Ammonia Criteria Exceedances at Stearns Street Compliance Site

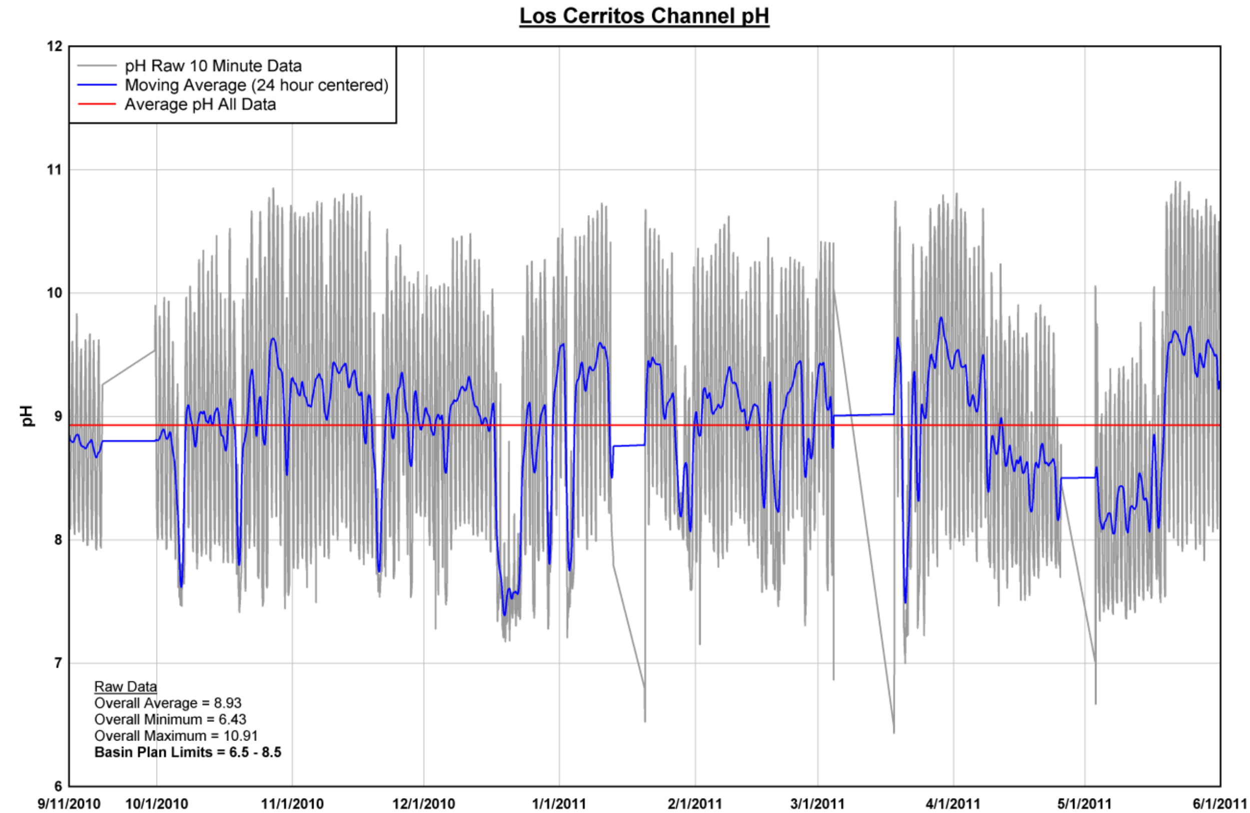
Evaluation of Basin Plan Criteria

Wet Season	Measured Values		Acute Criteria		Chronic Criteria based upon Two Selected Temperatures			
					T=15 degrees C		T=20 degrees C	
Storm Year	NH3-N	pH	1-hour avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)
LB-01	1.20	6.90	39.16	N	5.93	N	4.30	N
LB-01	0.87	7.20	29.54	N	5.22	N	3.78	N
LB-01	0.73	7.00	36.09	N	5.73	N	4.15	N
LB-01	0.54	7.30	26.21	N	4.92	N	3.57	N
LB-01	0.48	7.20	29.54	N	5.22	N	3.78	N
LB-02	1.50	7.40	22.97	N	4.59	N	3.32	N
LB-02	0.69	7.40	22.97	N	4.59	N	3.32	N
LB-03	0.90	6.80	42.00	N	6.10	N	4.42	N
LB-03	0.51	6.70	44.57	N	6.25	N	4.52	N
LB-03	0.29	6.20	53.17	N	6.66	N	4.82	N
LB-03	0.29	6.30	51.97	N	6.61	N	4.79	N
LB-04	0.72	7.08	33.52	N	5.54	N	4.02	N
LB-04	0.39	8.03	7.94	N	2.26	N	1.64	N
LB-04	0.23	6.71	44.32	N	6.23	N	4.52	N
LB-05	2.50	7.07	33.84	N	5.57	N	4.03	N
LB-05	0.19	6.80	42.00	N	6.10	N	4.42	N
LB-05	0.12	7.02	35.46	N	5.68	N	4.12	N
LB-05	0.26	7.02	35.46	N	5.68	N	4.12	N
LB-06	0.73	7.50	19.89	N	4.23	N	3.06	N
LB-06	0.39	8.27	5.00	N	1.55	N	1.12	N
LB-06	0.24	6.80	42.00	N	6.10	N	4.42	N
LB-06	0.31	7.40	22.97	N	4.59	N	3.32	N
LB-07	0.62	8.04	7.79	N	2.23	N	1.61	N
LB-07	0.93	8.87	1.64	N	0.57	Y	0.42	Y
LB-08	1.40	7.07	33.84	N	5.57	N	4.03	N
LB-08	0.48	7.54	18.72	N	4.08	N	2.96	N
LB-08	0.37	6.56	47.67	N	6.41	N	4.64	N
LB-08	0.29	7.82	11.71	N	3.01	N	2.18	N
LB-09	0.29	6.84	40.89	N	6.04	N	4.37	N
LB-09	0.33	7.62	16.49	N	3.78	N	2.74	N
LB-10	0.64	7.39	23.29	N	4.62	N	3.35	N
LB-10	0.51	8.07	7.36	N	2.13	N	1.54	N
LB-10	0.19	7.51	19.59	N	4.19	N	3.04	N
LB-10	0.24	7.48	20.49	N	4.30	N	3.12	N
LB-11	0.80	7.60	17.03	N	3.85	N	2.79	N
LB-11	1.00	7.50	19.89	N	4.23	N	3.06	N
LB-11	0.38	7.80	12.14	N	3.09	N	2.23	N
LB-11	0.16	7.50	19.89	N	4.23	N	3.06	N
LB-12	0.77	7.14	31.54	N	5.39	N	3.90	N
LB-12	0.47	7.50	19.89	N	4.23	N	3.06	N
LB-12	0.66	7.61	16.76	N	3.82	N	2.76	N
LB-12	0.53	7.40	22.97	N	4.59	N	3.32	N
LB-13	0.30	6.92	38.56	N	5.89	N	4.27	N
LB-14	0.50	7.26	27.54	N	5.05	N	3.66	N
LB-14	0.58	7.42	22.34	N	4.52	N	3.27	N
AVG-	**0.59**	**7.30**						

Table 2. DRY WEATHER – Ammonia Criteria Exceedances at Stearns Street Compliance Site

Evaluation of Basin Plan Criteria

Dry Season	Measured Values		Acute Criteria		Chronic Criteria based upon Two Selected Temperatures			
					T=15 degrees C		T=20 degrees C	
Storm Year	NH3-N	pH	1-hour avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)
LB-01	0.74	8.88	1.61	N	0.56	Y	0.41	Y
LB-02	0.58	8.17	6.07	N	1.82	N	1.32	N
LB-02	0.15	8.72	2.13	N	0.73	N	0.53	N
LB-03	0.17	8.40	3.88	N	1.25	N	0.91	N
LB-03	0.16	8.29	4.81	N	1.50	N	1.09	N
LB-04	0.10	8.45	3.53	N	1.15	N	0.83	N
LB-04	0.10	8.82	1.78	N	0.62	N	0.45	N
LB-05	0.14	8.98	1.37	N	0.49	N	0.35	N
LB-05	0.12	8.21	5.62	N	1.71	N	1.24	N
LB-06	0.10	8.31	4.62	N	1.45	N	1.05	N
LB-06	0.10	8.80	1.84	N	0.64	N	0.46	N
LB-07	0.16	8.75	2.01	N	0.69	N	0.50	N
LB-07	0.11	8.52	3.08	N	1.02	N	0.74	N
LB-08	0.13	8.14	6.43	N	1.91	N	1.38	N
LB-08	0.15	8.74	2.05	N	0.71	N	0.51	N
LB-09	0.25	8.69	2.24	N	0.77	N	0.56	N
LB-09	0.10	8.25	5.20	N	1.60	N	1.16	N
LB-10	0.24	9.38	0.80	N	0.29	N	0.21	Y
LB-10	0.22	9.63	0.63	N	0.24	N	0.17	Y
LB-11	0.32	8.15	6.31	N	1.88	N	1.36	N
LB-11	0.11	8.77	1.94	N	0.67	N	0.49	N
LB-12	0.30	9.15	1.06	N	0.38	N	0.28	Y
LB-12	0.24	8.69	2.24	N	0.77	N	0.56	N
LB-13	0.29	8.01	8.25	N	2.33	N	1.68	N
LB-13	0.41	7.52	19.30	N	4.16	N	3.01	N
LB-14	0.44	8.16	6.19	N	1.85	N	1.34	N
LB-14	0.66	8.7	2.20	N	0.75	N	0.55	Y
LB-15	0.10	8.08	7.22	N	2.10	N	1.52	N
AVG-	**0.24**	**8.55**						



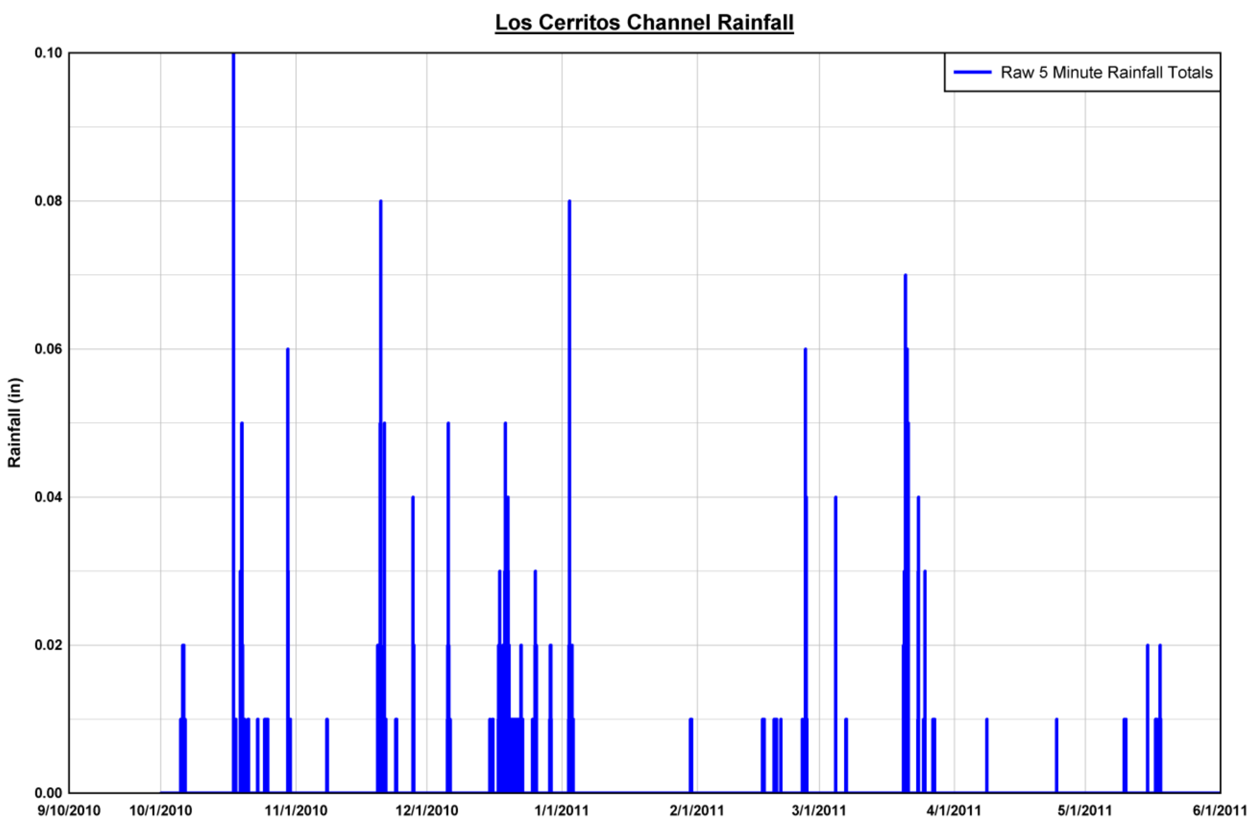


Figure 1. Continuous pH Record at Cerritos Channel Stearns Street Monitoring Site (Above) along with Rainfall (Below), September 10, 2010 to June 1, 2011

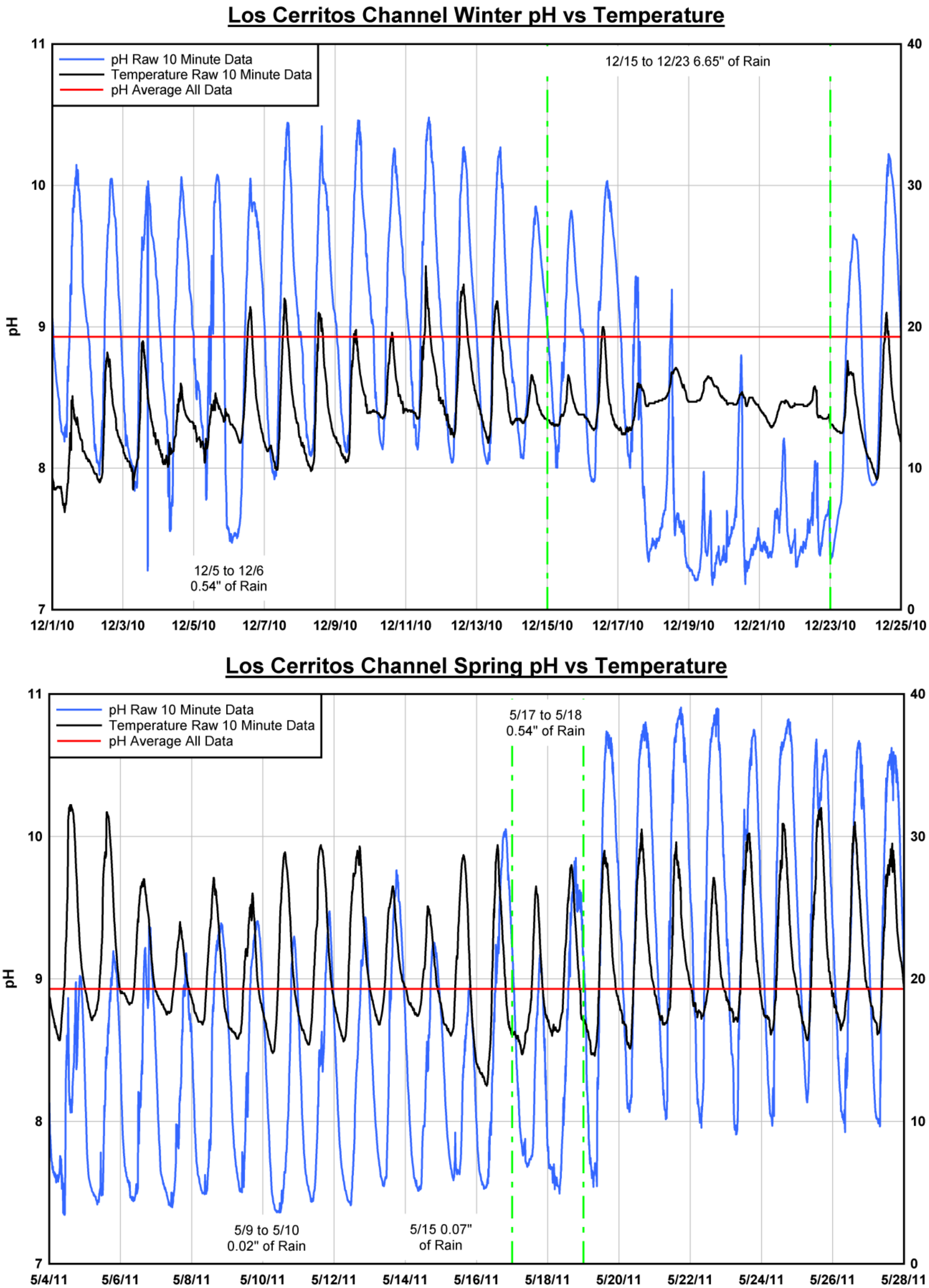
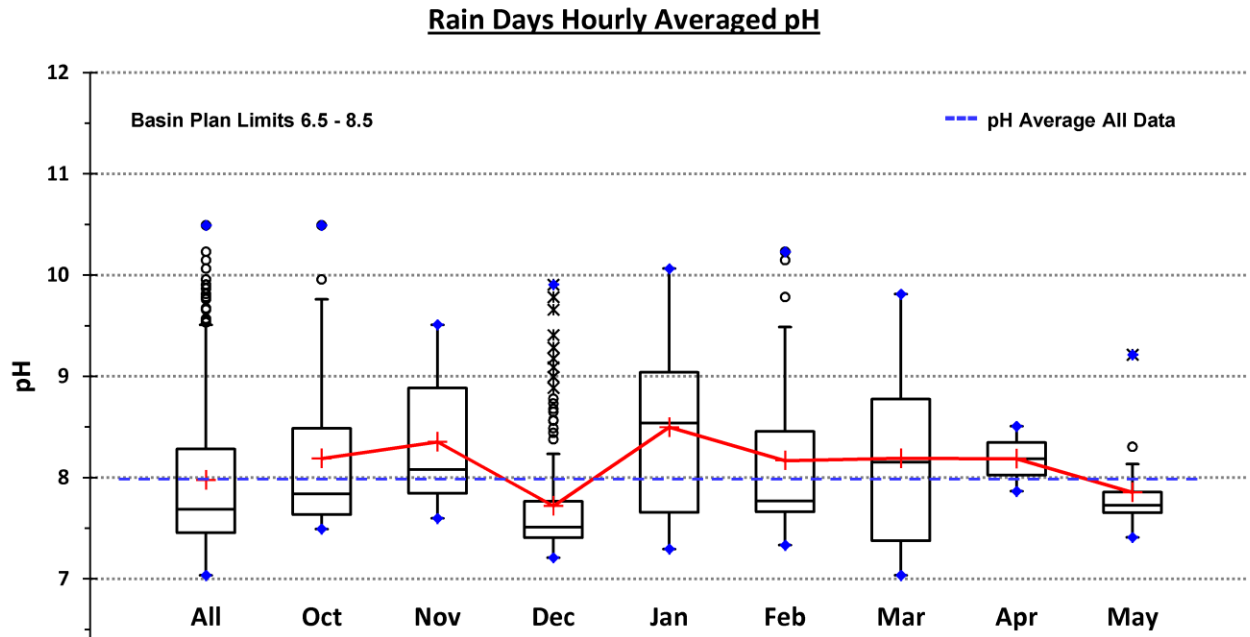


Figure 2. **Cycling of pH and Temperature in Winter and Summer**



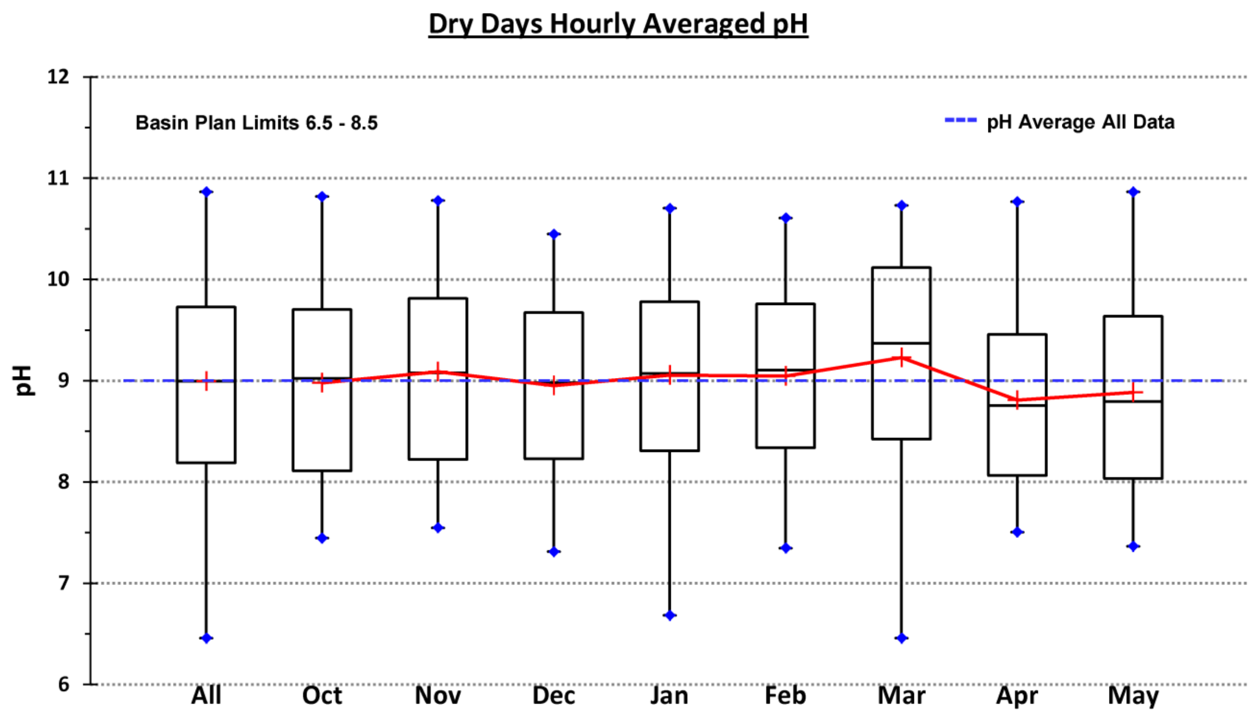


Figure 3. Box Plots of Averaged pH for Rain Days (Above) and for Dry Days (Below)

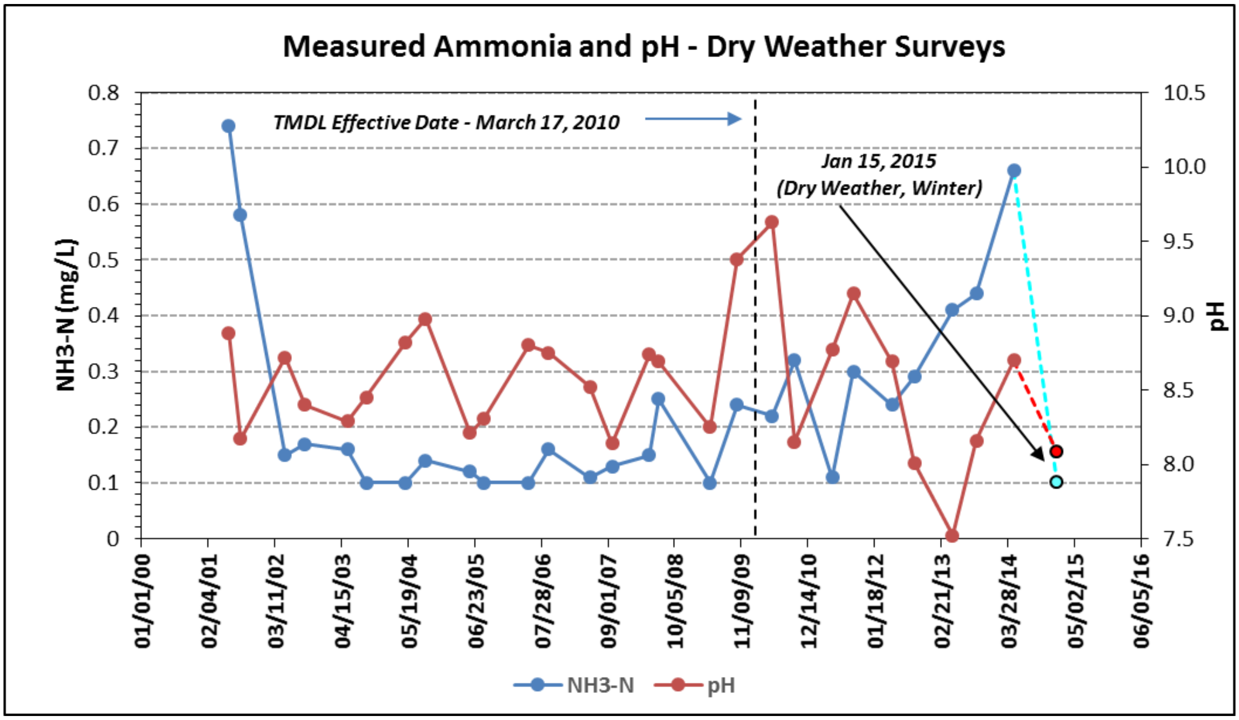


Figure 4. **Los Cerritos Channel Ammonia Nitrogen and pH at Stearns Street**

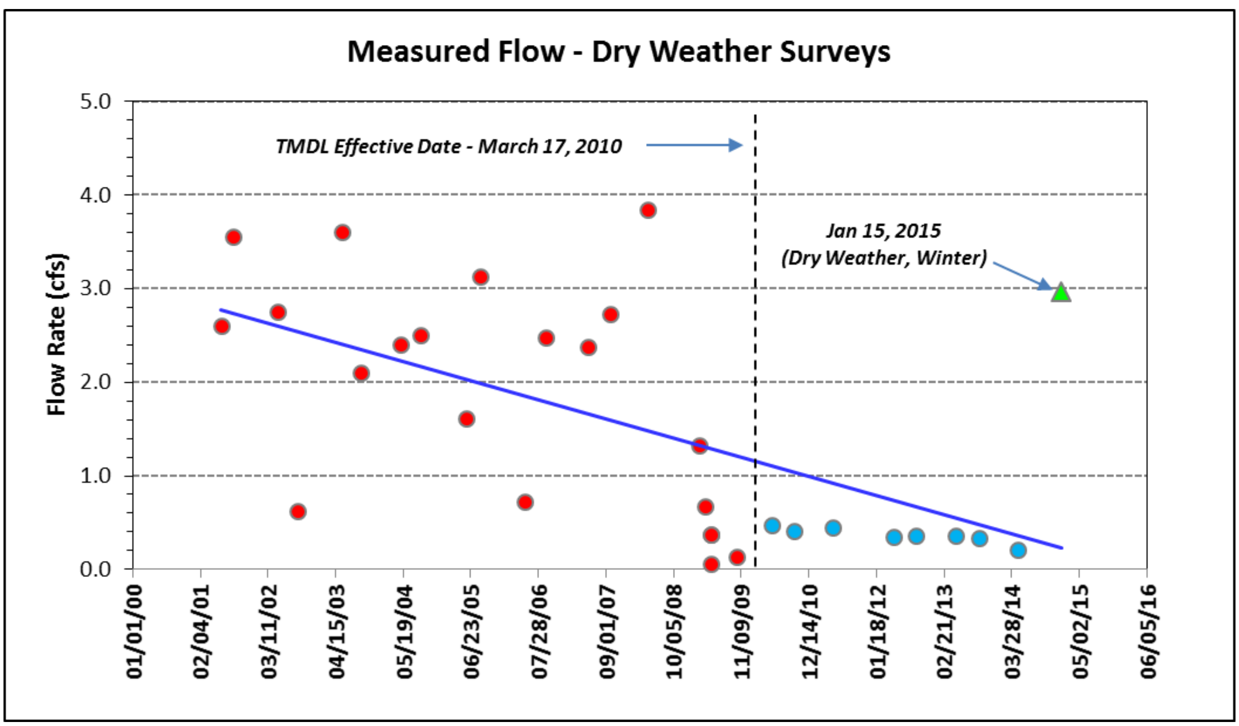


Figure 5. **Measured Dry Weather Flow at Stearns Street in the Los Cerritos Channel.**

6.0 REFERENCES CITED

Kinnetic Laboratories, Inc. 2005. City of Long Beach Stormwater Monitoring Report 2004/2005. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation.

Kinnetic Laboratories, Inc. 2009. City of Long Beach Stormwater Monitoring Report 2008/2009. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Kinnetic Laboratories, Inc. 2011. City of Long Beach Stormwater Monitoring Report 2010/2011. NPDES Permit No. CAS004003. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

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ATTACHMENTS

Attachment 1. **Kinnetic Laboratories, Inc. 2005. City of Long Beach Annual Storm Water Monitoring Report (2004/2005. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation**

Reference: Kinnetic Laboratories, Inc. 2005. City of Long Beach Stromwater Monitoring Report 2004/2005. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation.

Appendix B

Los Cerritos Channel Dry Weather Upstream Investigation

APPENDIX B
LOS CERRITOS CHANNEL DRY WEATHER UPSTREAM INVESTIGATION

1.0 DRY WEATHER UPSTREAM INVESTIGATIONS

Several dry weather surveys conducted early in the program found occasional high pH values at monitoring sites located in open concrete channels. In 2002, the Regional Board added a requirement to conduct upstream investigations if pH values of 9.0 or greater were encountered during the surveys. Elevated pH values were measured in the composite dry weather sample taken at the Los Cerritos Channel station during the August 31, 2004. Upon measurement of the composite bottle pH, an immediate upstream investigation was initiated.

The field crew initially walked approximately 1000 feet upstream in the Los Cerritos Channel to look for possible sources. Measurements of pH tended to increase from 10.02 at the monitoring site to 10.42 to 10.52 at all upstream sites. No sources of water with elevated pH were identified. The crew then went upstream to Spring Street near the junction of the Los Cerritos and Palo Verde Channels. Similar, high pH measurements (10.14 to 10.43) were found in waters above the confluence of these channels, at the mouth of the Palo Verde Channel, and downstream of the confluence. Further investigations were conducted upstream of this site in the vicinity of the Clark Channel. The pH measurements in this region of the Los Cerritos Channel were lower (9.30 to 9.82) but still elevated. Further investigation was halted due to the late hour and approaching darkness.

Since the source could not be quickly located, a follow-up watershed investigation was conducted on September 3, 2004. Eleven sites (Figure 1, Table 1) were visited throughout the watershed including the two major tributaries to the Los Cerritos Channel starting from the Los Cerritos Channel monitoring site (Figure 2). Field estimates of flow were taken using conventional dry weather flow procedures. The average width and depth of the flow were measured for a 10 foot section of the channel. Velocity over the 10-foot section was measured based upon measuring the time required for particles to drift through the segment. Dissolved oxygen was measured with a YSI Model 58 meter. Temperature, salinity and pH were measured with a YSI Model 63 meter. Water samples for measurement of alkalinity were taken for measurement in the laboratory.

Partial measurements were taken at two additional sites. A pH measurement was taken from a trickle flow entering the Clark Channel beneath the Conant Street Bridge (Clark – Outfall; Figure 3). The measured value of 8.17 from this small pipe was the lowest value recorded during the survey. Although pH of water from this outfall was within normal ranges, this site had an unusual mineral formation. In another case only flow was measured at the mouth of the Palo Verde Channel for comparison with flow in the Los Cerritos Channel downstream of the junction of the two conveyances.

The results of this survey are shown in Table 2 and Figures 4 through 8. The survey showed evidence of high pH water throughout the open conveyances of the Los Cerritos Channel and both major tributaries, the Palo Verde and Clark Channels. Measured pH values typically ranged from 9.45 to 10.90. An initial pH check conducted in the morning (0845) at site CC1-A resulted in a pH of 8.93, just under the trigger of 9.0 that was set to initiate upstream investigations. Three hours later (1146), pH had risen to 9.50 and the upstream investigation was started. Flows generally decreased at upstream sites with the exception of flows measured at CC2-A located in the Los Cerritos Channel just downstream of the mouth of the Palo Verde Channel. Total alkalinity ranged from 90 to 173 mg/L. Alkalinity provides an indication of the buffering capacity of the water. Alkalinity values of 100 to 200 would be expected to have a stabilizing effect.

Water temperature and dissolved oxygen were extremely high at all sites. Temperatures ranged from 23.8 to 31.5 °C. Temperatures also tended to increase over the course of the day reaching the higher portion of the range around 1500. Dissolved oxygen levels ranged from just over 11 mg/L to greater than 20 mg/L at several sites.

The results of this investigation support the initial hypothesis that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity. Evidence suggests that pH increases during the day. Algae in the channels consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths typical of open channels during summer, dry weather conditions are shown in a photograph of flows observed during the upstream investigation in the Del Amo Channel (Figure 9) at the upper end of the watershed. Evidence of high photosynthetic activity is typically evident in the form of the high concentrations of dissolved oxygen in the water as well as visual evidence of bubbles being generated as the water becomes oversaturated from oxygen. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions (H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel would cause CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways. Alkalinity provides buffering capacity such that high alkalinity water should be expected to have less extreme diurnal changes in pH.

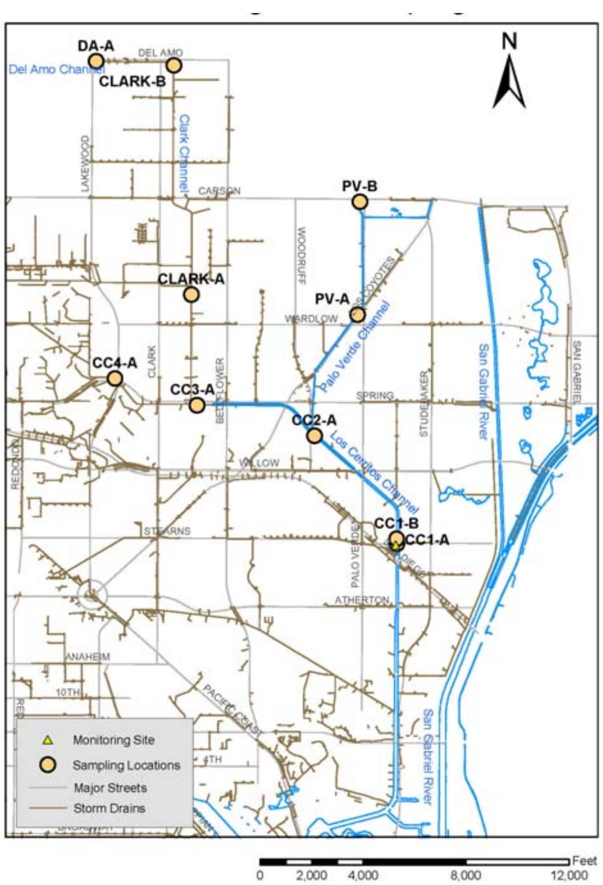


Figure 2. Los Cerritos Channel Watershed Investigation Sites

Figure 1. Dry Weather Flow at the Los Cerritos Monitoring Station, 9/3/04.

Figure 3. Concretions from Outfall into the Clark Channel under the Conant St. Bridge.

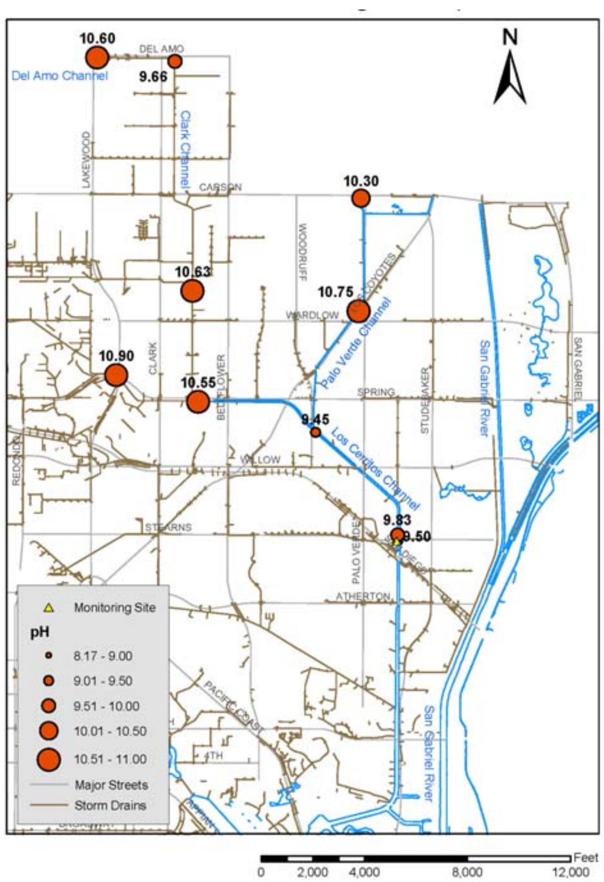


Figure 4. Measured pH at each Los Cerritos Channel Watershed Site.

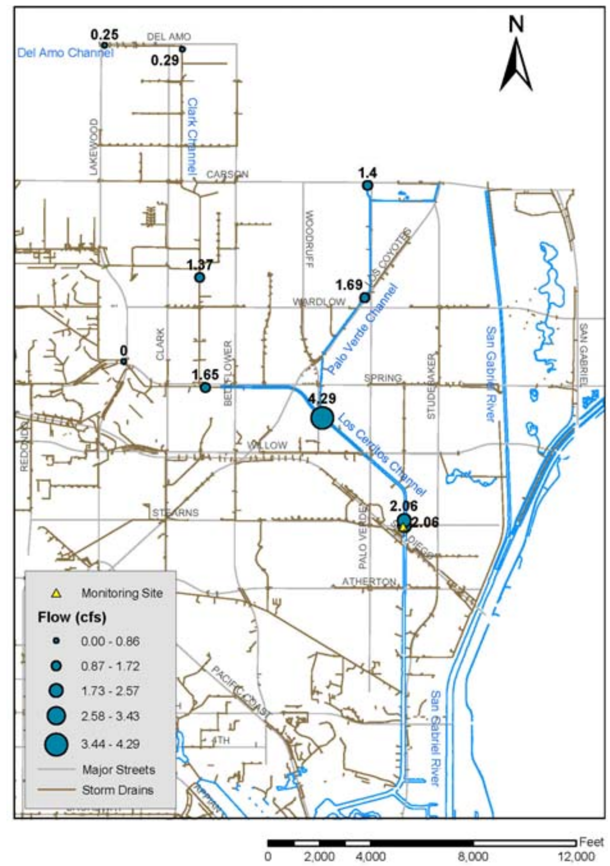


Figure 5. Flow measured at each Los Cerritos Channel Watershed Site.

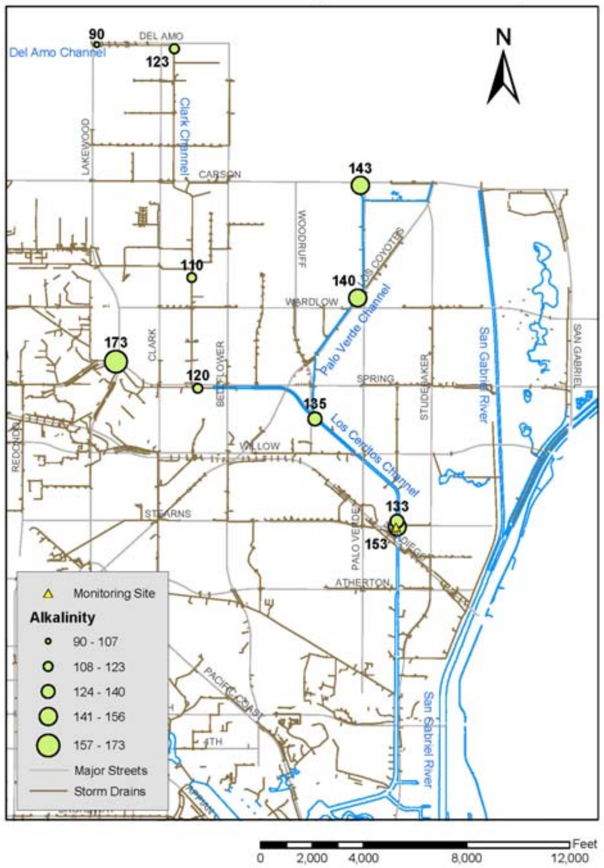


Figure 7. Total Alkalinity measured at each Los Cerritos Channel Watershed Site.

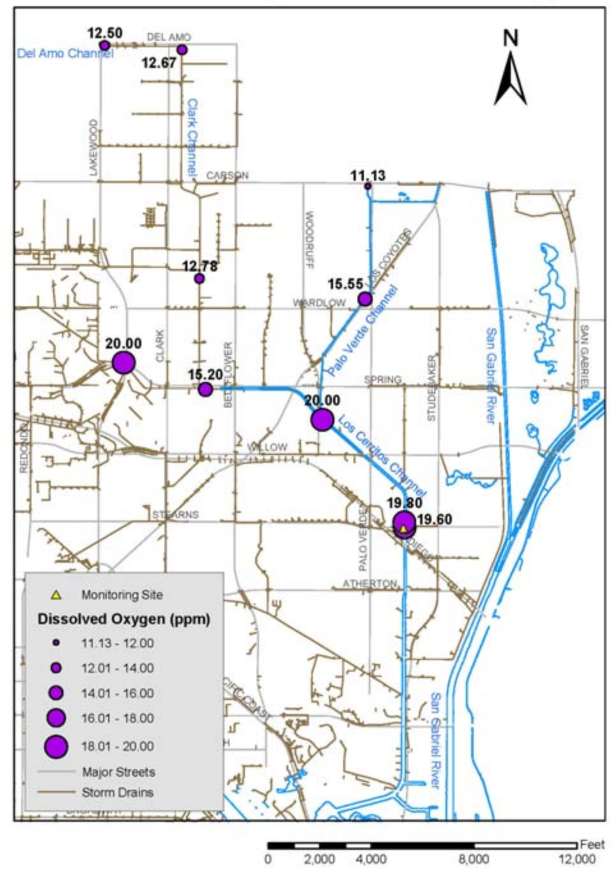


Figure 6. Dissolved Oxygen measured at each Los Cerritos Channel Watershed Site.

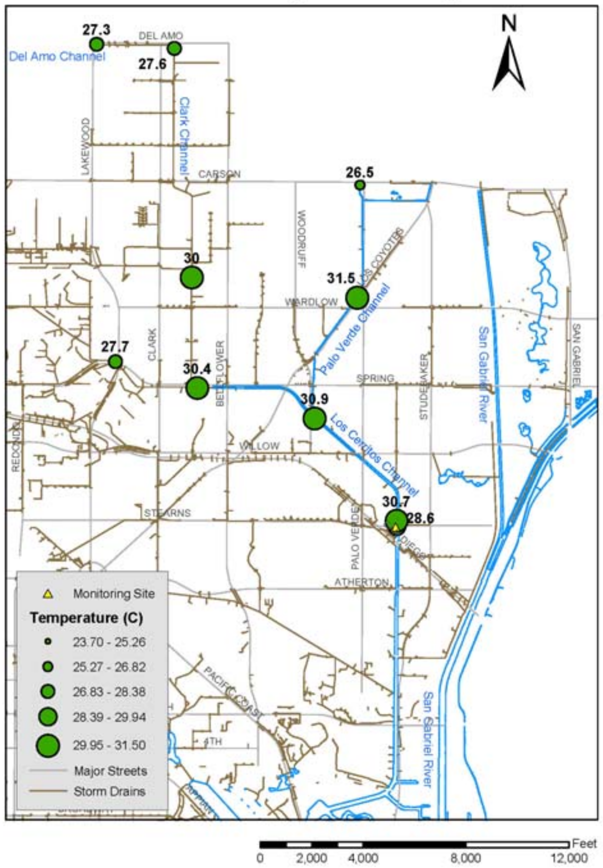


Figure 9. Water Temperature measured at each Los Cerritos Watershed Site.

Figure 8. Dry Weather Flow in the Del Amo Channel showing Typical Dry Season Algal Growth found in Open Channels with Consistent Low Flows.

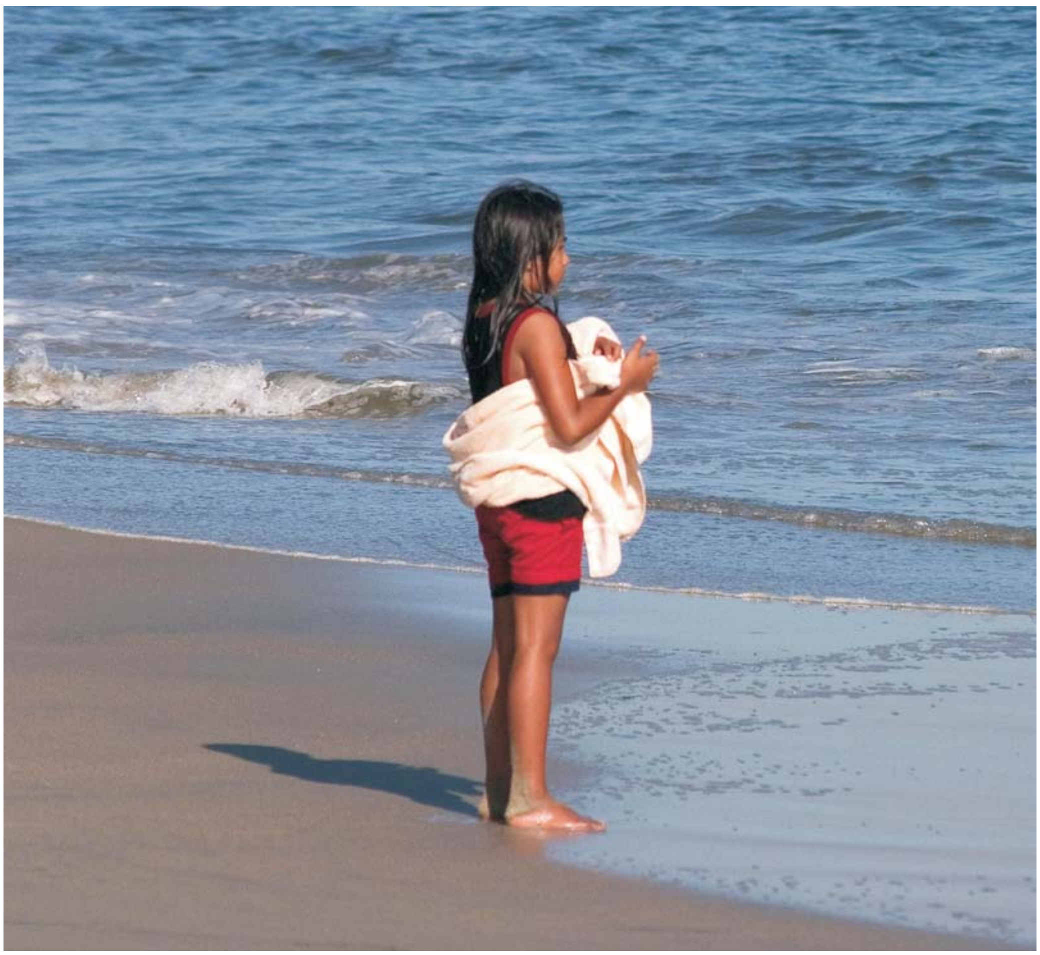
Table 1. Sampling Locations in the Los Cerritos Channel Watershed

Site Name	Site Description	Latitude[1]	Longitude
CC1-A	Los Cerritos Channel Below Stearns St. bridge	33.79544	118.10352
CC1-B	Los Cerritos Channel at first outfall upstream of Stearns	33.79601	118.10356
CC2-A	Los Cerritos Channel below confluence with Palo Verde Channel	33.80695	118.11408
PV-MOUTH	Palo Verde Channel above confluence with Los Cerritos Channel	33.81070	118.11408
PV-A	Palo Verde Channel west of Palo Verde Ave. and Los Coyotes Diagonal	33.81987	118.10862
PV-B	Palo Verde Channel south of Carson St.	33.83192	118.10832
CC3-A	Los Cerritos Channel below confluence w/ Clark Channel	33.81020	118.12907
CLARK-A	Clark Channel below Monlaco Rd.	33.82201	118.12982
CLARK-OUTFALL	39-inch outfall (106+25) into Clark Channel under the Conant St. bridge	33.82509	118.12982
CLARK-B	Clark Channel south of Del Amo Blvd. Below the confluence of the Clark and Del Amo Channels	33.84647	118.13210
DA-A	Del Amo Channel east of Lakewood Ave.	33.84690	118.14201
CC4-A	Los Cerritos Channel west of Lakewood Ave., north of Spring St.	33.81301	118.13953

1. All positions based upon NAD 1983 datum

Table 2. Summary of the Results of the Upstream Investigation in the Los Cerritos Channel Watershed.

Site Name	Arrival Time	Temp °C	pH	DO mg/L	Salinity (ppt)	Flow (cfs)	Alkalinity (mg/L)			
							Bicarbonate	Carbonate	Hydroxide	Total Alkalinity
CC1-A	8:45	23.8	8.93	15.25	0.5	2.06				
CC1-A	11:46	28.6	9.50	19.60	0.4	2.06	95.0	45.0	< 5.0	153
CC1-B	12:16	30.7	9.83	19.80	0.4	2.06	52.0	54.0	< 5.0	133
CC2-A	12:46	30.9	9.45	>20	0.4	4.29	49.0	57.0	< 5.0	135
PV-MOUTH	12:50					1.63				
PV-A	13:21	31.5	10.75	15.55	0.5	1.69	< 5.0	60.0	14.0	140
PV-B	14:00	26.5	10.30	11.13	0.4	1.40	< 5.0	84.0	< 5.0	143
CC3-A	15:35	30.4	10.55	15.20	0.4	1.65	< 5.0	69.0	< 5.0	120
CLARK-A	15:54	30.0	10.63	12.78	0.8	1.37	< 5.0	57.0	5.1	110
CLARK-OUTFALL	16:21	23.7	8.17							
CLARK-B	16:40	27.6	9.66	12.67	0.4	0.29	34.0	51.0	< 5.0	123
DA-A	17:00	27.3	10.60	12.50	0.4	0.25	< 5.0	51.0	< 5.0	90
CC4-A	17:45	27.7	10.90	>20	0.4	0.00	< 5.0	87.0	9.0	173



Attachment 2 **Kinnetic Laboratories, Inc. 2009. City of Long Beach Annual Storm Water Monitoring Report (2008/2009). Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.**

Reference: Kinnetic Laboratories, Inc. 2009. City of Long Beach Stromwater Monitoring Report 2008/2009. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Los Cerritos Channel Dry Weather
Copper and Bacteria Source Investigation

Prepared for:

City of Long Beach
Stormwater Management Program

Prepared by:

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5225 Avenida Encinas, Suite H
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July 2009

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INTRODUCTION

The Los Cerritos Channel was included on the 2006 California 303(d) list as an impaired waterbody for metals (copper, zinc, and lead), ammonia, trash, chlordane (sediment), bis(2ethylhexyl)phthalate/DEHP and coliform bacteria (California State Water Resources Control Boardand 2006.) Although the 303(d) list does not differentiate between the freshwater and estuarine portions of the Los Cerritos Channel, the recent draft metals TMDL (EPA, Region 9, 2008) recognized both differences between the freshwater portion of the Los Cerritos Channel and seasonal differences. Among the listed metals, only copper was considered a concern during periods of dry weather. Although not addressed in the current TMDL coliform bacteria are also often elevated during both wet and dry periods.

This investigation was designed as a special study to investigate sources of copper and fecal indicator bacteria that contribute to the elevated copper and bacteria concentrations and loads in the Los Cerritos Channel during dry weather conditions. The investigation was conducted to better address several of the long term objectives of the City's stormwater monitoring program listed below.

- Estimate annual mass emissions of pollutants discharged to surface waters through the MS4;
- Evaluate water column and sediment toxicity in receiving waters;
- Evaluate impact of stormwater/urban runoff on marine life in receiving waters;
- Determine and prioritize pollutants of concern in stormwater;
- Identify pollutant sources on the basis of flow sampling, facility inspections, and ICID investigations; and
- Evaluate BMP effectiveness.

The Draft Los Cerritos Channel Total Maximum Daily Loads for Metals (TMDL) document dated November, 2008 proposed dry weather numeric targets for copper in the Los Cerritos Channel based upon the long term average hardness (176 mg/L) of dry weather discharges as measured at the mass emission monitoring station for the Los Cerritos Channel (Table 1). The default CTR conversion factor of 0.96 was used to calculate a target for copper measured as total recoverable copper.

Table 1. Dry Weather Numeric Targets in Terms of Dissolved and Total Recoverable Fraction as Proposed in EPA's Draft Metals TMDL.

Metal	Target* (µg/L) Dissolved	Conversion Factor	Target (µg/L) Total Recoverable
Copper	14.3	0.96	14.9

The copper dry-weather loading capacity (TMDL) for Los Cerritos Channel was then calculated as 14.9 µg/L X 2.98 cfs X 0.00539 (conversion factor) = **0.239 lbs/day**, which is **108.4 grams/day**, expressed as total recoverable metals. A small portion of this (0.14 grams/day) was allocated to direct atmospheric deposition leaving an allocation of **108.26 grams/day** of total recoverable copper for stormwater permittees.

The historical flow-weighted mean concentrations of copper in dry weather discharges from the Los Cerritos Channel were 12.66 µg/L (dissolved) and 18.06 (total) at the time the Draft TMDL was developed. These were used to estimate historical dry weather loads of 0.203 lbs/day (dissolved) and 0.290 lbs/day (total). Based upon these estimates of average loads and the proposed TMDL load limit, the historical loads will need to be reduced by more than 21% for the average loading to be able to meet the TMDL limits.

METHODS

FIELD SAMPLING AND CHEMICAL ANALYSIS

Five major channels comprise the Los Cerritos Channel watershed within the City limits (Figure 1). The main stem of the Los Cerritos Channel runs N-S in the vicinity of the Stearns St. mass emission monitoring site. Going upstream, the open channel turns to the west until becoming fully enclosed at the edge of the Long Beach Daugherty Airport. The Palo Verde Channel runs N-S roughly parallel to the San Gabriel River and is the first channel to join the Los Cerritos Channel as one moves upstream from the monitoring site. The Clark Channel also runs N-S and is the next upstream channel that feeds into the main stem of the Los Cerritos Channel. The open portion of the Wardlow Channel is relatively short. A portion of the Wardlow Channel runs E-W along the edge of the Skylinks Municipal Golf Course starting from the northern edge of the Long Beach Airport property and discharging into the Clark Channel after briefly becoming enclosed under a residential area. The Del Amo Channel also runs E-W along the northern edge of the boundary between the City of Long Beach and Lakewood before entering the Clark Channel.

Storm drain inputs and in-channel water were sampled in the open channel portion of the Los Cerritos Channel watershed during each of three synoptic surveys. These were conducted on March 3, April 9 and May 11, 2009. The last rain prior to the March 3 survey occurred 14 days earlier and was measured at 0.48 inches. The April 9 survey was preceded by 18 days of dry weather and the prior rainfall was only 0.06 inches. No rain fell between the April 9 and May 11, 2009 surveys.

Surveys were conducted at intervals of approximately one month. By spacing the surveys roughly one month apart, data from each previous survey could be reviewed and sampling strategies adjusted if necessary. Each of the surveys started in the Los Cerritos Channel downstream of the Stearns Avenue Bridge. The survey proceeded upstream in order to avoid upstream disturbances that might impact sampling. Sampling of the channels was originally planned to be conducted primarily near locations where major segments of the drainage system merged. After the first survey, sampling was increased along each channel to improve spatial resolution. Whenever two major segments of the channel merged, samples were taken in the main channel below the tributary, just upstream of the tributary and within the tributary. A total of 70 in-channel sites and 48 outfalls were sampled during the three surveys. All outfalls with flow were sampled during each survey.

Typical Dry Weather Flow Showing Algal Growth

Differential GPS measurements were used to identify the locations of all sampling sites with the exception of a few sites located beneath bridges where accurate GPS readings could not be attained. At each site flow was measured using the area/velocity method or by the timed volumetric method, depending upon the type of flow and specific conditions at each site. The irregular channel bottom combined with heavy algal growth contributed to low accuracy of flow measurement. Therefore flow measurements in the channel should be considered best estimates.

General water parameters were measured using a Hydrolab Quanta Water Quality Monitoring System. The sonde was equipped with sensors for temperature, specific conductivity, pH, dissolved oxygen, and turbidity. Due to the low flows and shallow depths, the instrument was rarely able to be used for *in situ* measurements. A secondary container was required to collect sufficient volume to obtain measurements. This undoubtedly adds uncertainty to the dissolved oxygen measurements but was considered to still provide valuable information in assessing whether loads from storm drains had caused substantial depressions in oxygen content.

Grab samples were collected for total and dissolved copper, total hardness, total and fecal coliform and enterococcus. Samples were immediately placed on ice and delivered to state certified laboratories within required holding time. Copper and total hardness were analyzed by Soil Control Lab and fecal indicator bacteria were analyzed by CRG Marine Laboratories. Analysis of fecal indicator bacteria was performed using Idexx Quantitray methods with added dilutions to assure that quantitative measurements would be reported in all cases.

Table 2. Analytical Methods and Reporting Limits

Constituent	Method Detection Limit	Reporting Limit	Units	Method
Total Hardness	1.0	10	mg/L	EPA 130.2
Total/Dissolved Copper	0.5	0.098	µg/L	EPA 200.8
Total Coliform	10	24×10^9	MPN/100 ml	Idexx QuantiTray
E. coli	10	24×10^9	MPN/100 ml	Idexx QuantiTray
Enterococcus	10	24×10^9	MPN/100 ml	Idexx QuantiTray

DATA ANALYSIS

Results of the flow and water quality sampling were analyzed for spatial and temporal patterns. All data were plotted using ArcGIS to assist in assessment of spatial and temporal patterns. Loads were calculated for each location to assist in assessing the importance of each outfall or tributary and for comparison with the proposed dry weather TMDL at the Los Cerritos Channel mass emission monitoring site at Stearns St. Means and ranges of flow and concentration for storm drains and in-channel sites were analyzed by survey date and by combining the results of all three sampling dates. Regressions were performed on measured concentrations of total and dissolved copper for each survey in order to evaluate suitability of using the default CTR translator for estimation of daily load limits for total recoverable copper.

RESULTS AND DISCUSSION

The following sections summarize the results of the three dry weather surveys in the open channel portion of the Los Cerritos Channel watershed in Long Beach. Field and laboratory results are summarized for each survey in Table 3 through Table 8. Descriptive statistics of data from the main channels and outfalls are provided in Table 9, Table 10, and Table 11. Instanteous Loads were calculated for each oufall and sampling location within the main channel. These results are summarized in Table 13 through Table 18.

The results are graphically summarized in a series GIS maps in Appendix A. The results of flow measurements; concentrations of total and dissolved copper, concentrations of three fecal indicator bacteria are mapped separately for data from the main channels and outfalls that were discharging to the channels during each survey. These spatial representations of the flow and concentration data are followed by the GIS maps of loading data for copper and fecal indicator bacteria.

FLOW

Low flows were experienced during all three surveys (Table 3, Table 5, and Table 7; Appendix A Figures A-1 through A-3). Flows measured at the Los Cerritos Channel Stearns Street monitoring station were 1.32 cfs during the first survey, 0.67 cfs during the second and 0.37 cfs during the final survey. Flows exceeding those measured at Stearns Street were encountered at upstream locations during both the second and third surveys. During the second survey, the highest flow (1.48 cfs) was measured in the Del Amo Channel along the northern edge of the City limits. Similarly, during the third survey, highest flows occurred in the upper portion of the Clark Channel (0.86 cfs) and in the Del Amo Channel (0.67 cfs).

Each survey took over eight hours to complete such that flow differences could be related to temporal differences. The ability to accurately resolve flows with water depths typically less than an inch, irregular bottoms and heavy algal growth also are major factors impacting the flow measurements. Periods of heavy wind in the channels would occasionally be observed to cause brief flow reversals. The flow measurements within the channels should therefore be considered as reasonable approximations.

Measurements of flow from outfalls were very accurate since most could be determined by the time necessary to fill a 1-liter container. Total flows from outfall comprised just 4% of the flow measured at Stearns Street during the first survey but, during subsequent surveys, flow contributions from outfalls to the open channels became more important. Flow rates from outfalls increased from a total of 0.05 cfs during the first survey to 0.11 cfs during the second. With the lower flow rates in the main channel, contributions from monitored outfalls increased to 16% of flow at the Stearns St. site. By the third survey total flow from outfalls increased to 0.20 cfs accounting for roughly half of the flow measured in the channel. One outfall (WC-07) in the Wardlow Channel was the source of 60% of the total flow from outfalls in the first two surveys and 85% of the flow in the third survey.

WATER QUALITY

The relationship between dissolved and total copper was examined during each survey (Figure 2) by regression. The low concentrations of suspended sediment allowed for direct comparisons without consideration of suspended solids (Figure 2). Within each survey, the proportions of copper in the dissolved form were relatively constant showed variation among surveys. The percentage of copper in the dissolved form ranged from 62% in the second survey to 88% in the first survey. Stein and

Tiefenthaler's (2005) dry weather studies in Ballona Creek indicated that the proportion of dissolved copper in dry weather runoff from both outfalls and open channels was similar and roughly was in the dissolved form. In all cases, the dissolved to total recoverable ratios are notably lower than the default CTR translator value of 0.96.

Dry weather discharges sampled in from the main channels and the outfalls had very different water quality characteristics (Figure 3 and Figure 4; Table 9 through Table 11). .

The differences in water quality characteristics were anticipated and are attributable to exposure to sunlight in the open channels. The exposure to sunlight warms the water and induces the heavy algal growth that is typical of the open channels. The photosynthetic activity removes carbon dioxide from the water and releases oxygen. The uptake of carbon dioxide causes the increase in pH. The extent of the shift is largely dependent on the alkalinity or buffering capacity. The exposure of the water to ultraviolet light also reduces the concentrations of bacteria. At night, respiration of the algae typically reverses the process causing oxygen levels and pH to drop.

Exceedances of the CTR chronic criterion for dissolved copper occurred commonly during all three dry weather surveys (Table 12). Overall 23 of the 70 samples taken in the main channels exceeded the chronic CTR criterion. Six of these exceeded the acute CTR criterion. A similar fraction of the 48 outfall samples also exceeded the CTR chronic criterion. Six of the outfall samples also exceeded the acute criterion. No one particular segment of the watershed had obviously higher levels of exceedences but the Wardlow Channel was unique in not having any samples with exceedences. Part of the reason for this condition was likely the result of relatively high volumes of very clean water that are pumped into the channel from a groundwater treatment facility near Lakewood Blvd. As noted earlier, water from this site can, at times, represent a large proportion of the measured flows from outfalls.

A few cases of exceptionally high concentrations of total recoverable and dissolved copper were encountered during the study but no systematic pattern was evident through all surveys. During the first survey, copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach. The water also had other unique water quality characteristics. The water was high in conductivity (4.92 mS/cm) and hardness (1800 mg/L). The water also had the lowest pH (7.7) of any channel site. The water temperature was among the lowest measured in the open channels but comparable to other channel sites where water was exiting a closed conveyance. Flow measurements could not be taken at this site due to darkness combined with shallow, braided flow through dense algae. Based upon the general water quality characteristics, this discharge was suspected to have been from a swimming pool but this hypothesis could not be verified.

Total recoverable copper concentrations measured at the Stearns Street monitoring site were below the TMDL concentration-based limit of 14.9 ug/L during the first and third surveys but exceeded the concentration limit during the second survey. Some unusually high concentrations of total recoverable copper (as high as 540 ug/L at CC-12) were measured at several outfalls into in the Los Cerritos Channel during the third survey (Table 8). Upon analysis of the data from this survey, four outfall sites in the Los Cerritos Channel had substantially different ratios of dissolved to total recoverable copper. A review of the field notes indicated that flap gates at these sites would have prevented any measurement of flow or collection of water because of dispersed leakage around the flap gate. The field crew propped open the flap gates at these sites and allowed what they perceived to be adequate time for flows to restabilize before sampling. It is clear that the brief increase in flow caused by this procedure caused resuspension of fine particulate copper at these sites. The time required for flows to stabilize was not nearly sufficient to allow equilibrium conditions to be achieved in terms of water quality. The total recoverable copper values for each site sampled in this manner were identified and excluded from the previous analysis of the ratios of dissolved to total recoverable copper. The dissolved copper concentrations at these sites are believed to be relatively unimpacted based upon their similarity with concentrations measured at other outfall locations. The ease with which the reservoir of particulate copper was disturbed in the pipes suggests that similar increases would occur with episodic increases in flow or first flush storm events. Since the mass of the reservoir of particulate copper in any one of these pipes is unknown, it is difficult to assess the significance of brief flow increases/disturbances on total recoverable copper loads.

As expected, concentrations of fecal indicator bacteria were highly variable. Concentrations of all fecal indicator bacteria were lowest during the first survey (Table 3 and Table 4). Total coliform and *E. coli* measured at the Stearns Street monitoring location during the first survey were below Rec-1 water quality standards. During the second survey (Table 5 and Table 6), bacterial levels were broadly elevated throughout most of the watershed but were exceptionally high at the Stearns Street sampling location and several open channel sites located just upstream. Several sites in the upper reaches of the Wardlow and Del Amo channels also had notably high levels of bacteria. Both *E. coli* and enterococcus concentrations exceeded 2000 MPN/100 ml at these sites and total coliform was in excess of 12,000,000 MPN/100 ml at the Del Amo channel site.

LOADS

Calculations of loads for total and dissolved copper as well as fecal indicator bacteria are presented in Table 13 through Table 18. Loads from outfalls are summed for comparisons to those measured at the Stearns Street mass emission monitoring station. This station was the first site sampled in the Los Cerritos Channel during each survey and the first channel station listed on all tables. Load data are also graphically displayed on GIS maps in Appendix A (Figures A-34 to A-63).

Total copper loads measured at the Stearns Street monitoring site were 38.6 g/day during the first survey, 31.3 g/day during the second survey and just 6.8 g/day during the third survey. Slightly higher loading rates were measured at upstream locations in the watershed during the second survey. Loading rates in the Del Amo Channel reached 43.3 g/day. Loading rates for total copper in the lower Clark Channel and the intersection of the Los Cerritos Channel and Palo Verde Channel were 36.7 g/day and 42.9 g/day. The exceptionally low loading rates measured during the third survey were also low at most locations throughout the watershed except for one site in the Clark Channel just below the junction with the Del Amo Channel. The loading rate at this site was measured at 22.4 g/day.

In all cases, loading rates for total copper were far below the proposed TMDL Waste Load Allocation of 108.26 g/day. Thus the highest loading rate measured anywhere in the watershed during all three surveys was still just 40% of the proposed dry weather WLA for the stormwater permittees.

Although the total copper loads measured in the main channels decreased substantially from the first to the third surveys, the total loads from outfalls generally increased. During the first survey, only 0.181 g/day of copper was attributable to outfalls. Outfall loading rates increased to 1.079 g/day during the second survey. Increases in loading rates during the third survey (7.5 g/day) were impacted by elevated concentrations of total recoverable copper measured at sites where flap gates were opened. Eliminating those sites from the calculations still results in roughly 3 g/day which represents a substantial proportion of the 6.8 g/day of total copper measured at the Stearns Street monitoring site.

Loads of fecal indicator bacteria coming from monitored outfalls during the first survey accounted for roughly 20% of the total load at the downstream Stearns Street monitoring site. During the second survey, loads from outfalls represented 10 to 20 percent of the *E. coli* and total coliform loads and 5 percent of the enterococcus loads. The relative importance of inputs from local outfalls increased during the third survey. In the final survey loads from outfalls represented roughly half of the *E. coli* and total coliform loads at the channel compliance site (Stearns Street) but loads of total coliform from outfalls were three times the load in the channel.

SUMMARY AND CONCLUSIONS

Three dry weather surveys were conducted in open channel portion of the Los Cerritos Channel Watershed located within the City of Long Beach.

- Flows measured at the Los Cerritos Channel Stearns Street monitoring station were 1.32 cfs during the first survey, 0.67 cfs during the second and 0.37 cfs during the final survey. These reflect a general decrease in dry weather runoff at this location.
- The percentage of copper in the dissolved form ranged from 62% in the second survey to 88% in the first survey. This compares to the roughly 80% dissolved copper in Ballona Creek dry weather investigations but is far less than the CTR default value of 96% used for developing the draft TMDL limits in terms of total recoverable copper.
- Dry weather discharges sampled in from the main channels and the outfalls had very different water quality characteristics. Water in the main channels was typically warmer by 2-3°C, had pH levels in excess of 1 full unit higher, had twice the oxygen content and twice the turbidity. There was no consistent pattern of differences between dry weather flows sampled in the main channel and water from outfalls. Concentrations of fecal indicator bacteria were consistently higher in water sampled from the outfalls but this was most evident in the case of total coliform where the geometric mean of water from outfalls was an order of magnitude greater than in water from the main channels.
- Copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach. The water was high in conductivity (4.92 mS/cm) and hardness (1800 mg/L). The water also had the lowest pH (7.7) of any channel site. The water temperature was among the lowest measured in the open channels but comparable to other channel sites where water was exiting a closed conveyance.
- Exceedances of the CTR chronic criterion for dissolved copper occurred commonly during all three dry weather surveys (Table 12). Overall 23 of the 70 samples taken in the main channels exceeded the chronic CTR criterion. Six of these exceeded the acute CTR criterion. A similar fraction of the 48 outfall samples also exceeded the CTR chronic criterion. Six of the outfall samples also exceeded the acute criterion.
- A few cases of exceptionally high concentrations of total recoverable and dissolved copper were encountered during the study but no systematic pattern was evident through all surveys. During the first survey, copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach.
- Total copper loads measured at the Stearns Street monitoring site were 38.6 g/day during the first survey, 31.3 g/day during the second survey and just 6.8 g/day during the third survey**. In all cases, loading rates for total copper were far below the proposed TMDL Waste Load Allocation of 108.26 g/day**. Thus the highest loading rate measured anywhere in the watershed during all three surveys was still just 40% of the proposed dry weather WLA for the stormwater permittees.

REFERENCES

California State Water Resources Control Board, 2006. 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments Requiring TMDLs. (Approved by USEPA June 28, 2007.)

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Stein, E.D. and L. Tiefenthaler. 2005. Dry Weather Metals and Bacteria Loading in an Arid Urban Watershed: Ballona Creek, California. Water, Air, and Soil Pollution (2005) 164:367-382

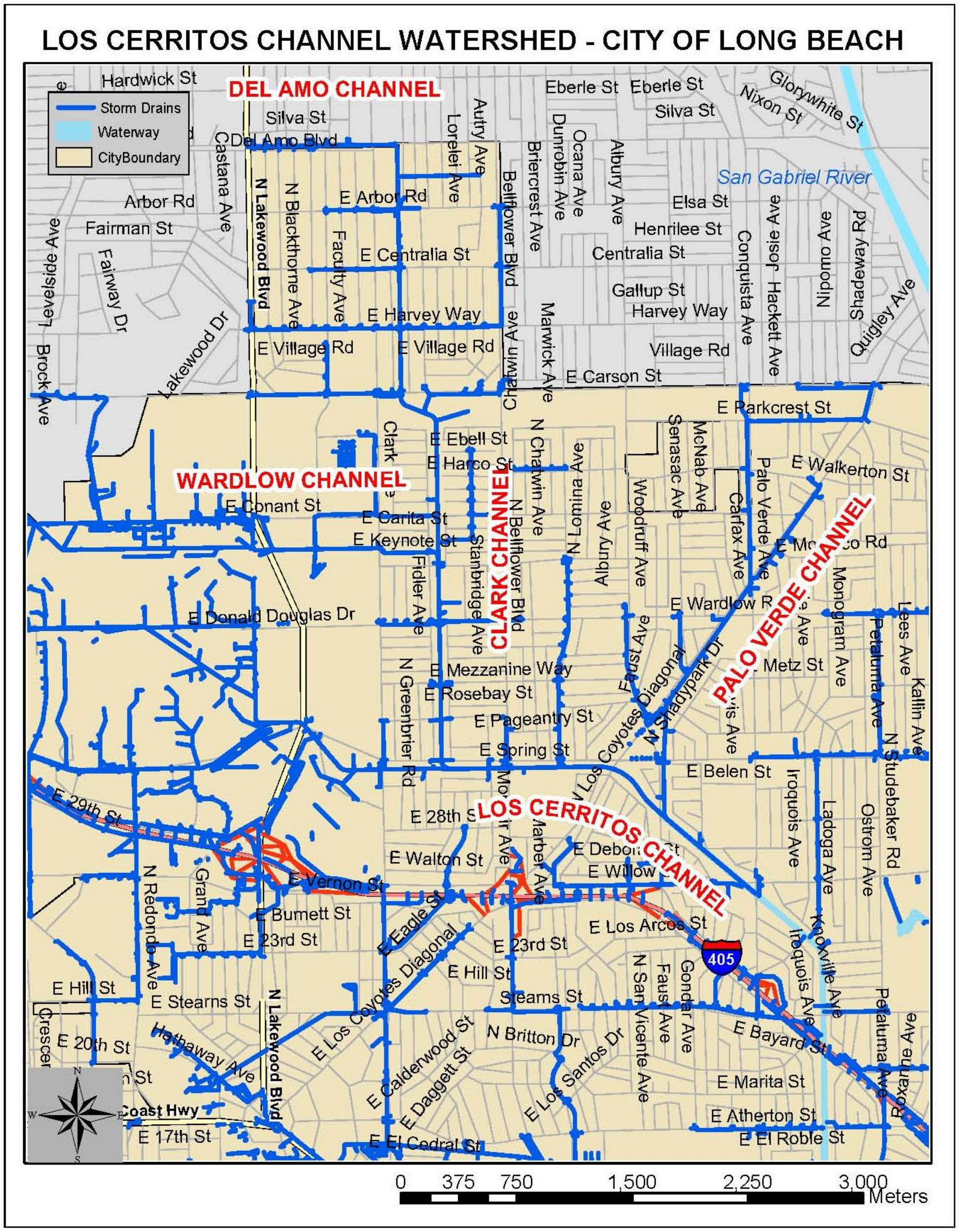

Figure 1. **City of Long Beach, Los Cerritos Channel Watershed.**

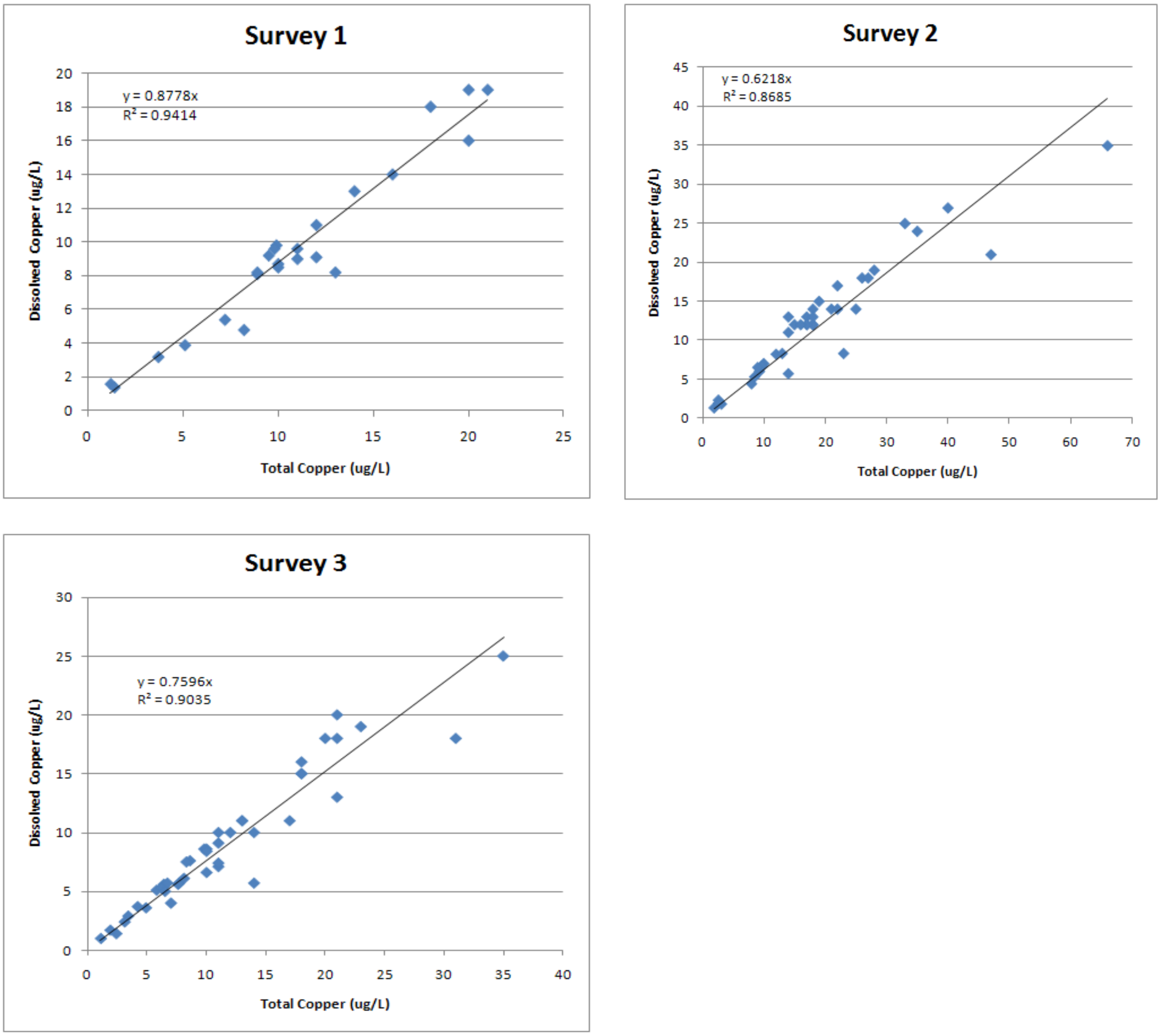

Figure 2. Regressions of All Total and Dissolved Copper Measurements taken during the Three Surveys.

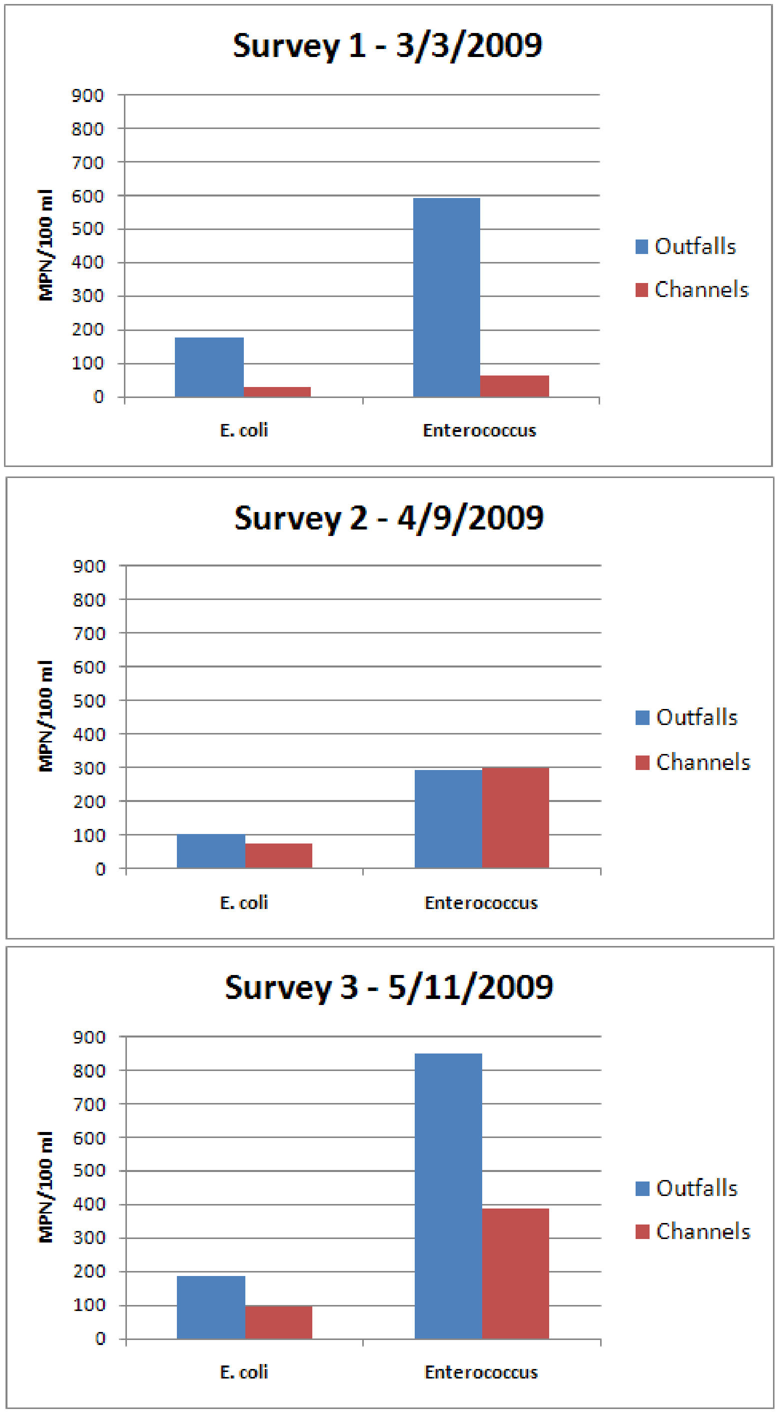

Figure 3. **Comparison of Geometric Mean Concentrations of *E. coli* and Enterococcus in Water from Outfalls and the Main Channels during Each Survey.**

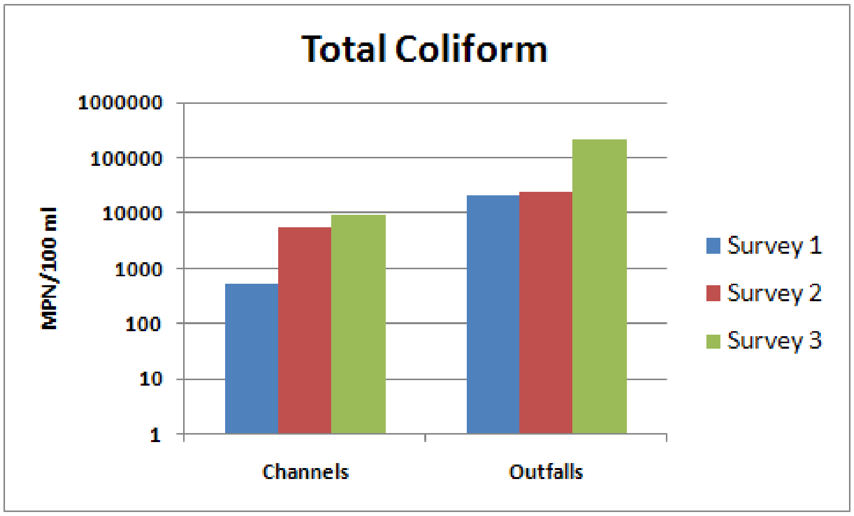

Figure 4. Comparison of Geometric Mean Concentrations of Total Coliform Measured in the Channels and Outfalls during Each Survey.

Table 3. Results of Measurements Taken in the Main Channels during Survey 1 - 3/03/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-01-A	33.79529	-118.10359	0.14	1.31503	20.0	9.3	0.730	14.8	8.5	120	12	11	134	109	4106
CC-02-A	33.80701	-118.11418	0.1	1.07143	23.0	9.2	0.964	14.9	5.4	180	10	9.0	122	63	2613
CC-02-B	33.08757	-118.11485	0.1	0.80662	24.2	9.3	0.974	15.5	15.0	180	11	9.0	120	20	4611
CC-02-D	33.08757	-118.11485	0.1	0.80662	24.2	9.3	0.974	15.5	15.0	180	12	9.0	73	5	3282
CC-03-A	33.81073	-118.12917	0.07	0.34955	26.0	10.4	1.065	10.2	60.0	140	9.0	8.0	5	20	52
CC-03-B	33.81017	-118.12967	0.06	0.11324	27.1	10.8	0.648	15.9	20.5	94	18	18	5	5	31
CC-04	33.81302	-118.13950		DND	14.5	10.1	0.523	9.3	273	120	25	12	759	754	17850
PALO VERDE															
PVMOUTH-01	33.80762	-118.11437	0.04	0.05063	28.2	10.5	0.531	16.1	3.3	110	10	10	5	85	5
PVMOUTH-01	33.80762	-118.11437	0.04	0.05063	28.2	10.5	0.531	16.1	3.3	110	10	9.0	5	108	5
PV-02	33.83182	-118.10837	0.02	0.02350	18.6	10.7	1.034	9.8	8.0	110	10	9.0	5	108	776
CLARK															
CLK-01-A	33.81031	-118.12958	0.015	0.09449	26.1	10.5	1.115	12.5	20.0	140	10	9.0	5	31	131
CLK-02-A	33.82259	-118.12985	0.06	0.06443	17.9	9.5	1.450	13.2	2.0	250	9.0	8.0	5	31	1333
CLK-02-B	33.82279	-118.12980	0.055	0.15696	17.1	9.4	1.452	12.6	3.9	250	10	10	5	62	1236
CLK-04-B	33.84691	-118.13225		DND	15.0	7.7	4.92	7.2	87.1	1800	1500	750	404	359	2382
WARDLOW															
WC-01-B	33.82277	-118.12989	0.65	DND	14.5	9.7	0.569	9.6	21.1	64	7.0	5.0	908	97	4106
DEL AMO															
DA-01-A	33.84682	-118.13137		DND	17.6	10.1	0.542	6.6	38.1	150	11	10	10	96	1850

Table 4. Results of Measurements Taken in the Flowing Outfalls during Survey 1 - 3/03/2009

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CCO-02-A	3/3/2009	33.79329		0.00109	16.4	8.1	1.406	7.75	1.2	200	8.0	5.0	5	839	46110
CCO-09-A	3/3/2009	33.79944		0.00020	17.3	8.2	0.742	7.12	11.0	130	14	13	111990	127400	204600
CCO-14-A	3/3/2009	33.80306		0.00060	19.2	8.2	0.711	9.06	0.0	130	20	16	5	110	5200
CCO-24-A	3/3/2009	33.81033		0.00014	17.4	8.1	0.569	6.92	41.2	110	13	8.0	173	197	4611000
CLARK															
CKO-09-A	33.81862	-118.12987		0.00051	17.9	8.2	0.641	7.52	4.8	110	5.0	4.0	4106	1317	54750
CKO-17-A	33.82349	-118.12981		0.00017	15.2	7.9	0.945	8.42	10.1	140	20	19	54750	16580	512000
CKO-20-A	33.82499	-118.12981		0.01201	17.4	8.1	2.00	8.25	11.0	570	1.2	1.6	5	63	3873
CKO-22-A	33.83118	-118.13060		0.00145	14.8	8.5	0.703	9.58	2.7	160	16	14	86	1616	43520
PALO VERDE															
PV-08	33.81327	-118.11408		0.00127	19.2	8.1	0.970	7.91	1.7	240	4.0	3.0	135	209	3076
WARDLOW															
WC-26	33.82333	-118.14131		0.03310	17.6	8.5	0.560	8.99	0.0	94	1.4	1.4	5	5	5

Table 5. Results of Measurements Taken in the Main Channel during Survey 2 - 4/09/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-A	33.79503	-118.10355	0.14	0.67299	13.9	7.85	1.122	6.71	7.1	110	19	15	7409	26460	478973
CC-B	33.80697	-118.11405	0.1	1.03079	14.79	8.67	1.215	7.8	5.7	130	17	12	25572	86955	448898
CC-C	33.80803	-118.11543	0.1	0.38622	15.02	8.68	1.266	9.44	10.1	150	15	12	595	1635	212323
CC-D	33.81025	-118.12920	0.1	0.61074	18.38	9.3	1.09	16.29	26.0	180	14	11	1644	6037	129460
CC-E	33.81020	-118.12967	0.07	0.07232	20.38	9.58	0.779	18.41	35.1	140	21	14	172	172	57593
CC-F	33.81038	-118.13350	0.06	0.19097	21.7	9.36	0.81	19.17	30.1	160	18	12	1126	1593	161098
CC-H	33.81038	-118.13350		0.19097	21.7	9.36	0.81	19.17	30.1	160	18	12	561	939	152081
CC-G	33.81305	-118.13958		0.06002	26.25	10.75	0.701	21.42	19.5	120	17	13	7	7	76
PALO VERDE															
PV-A	33.80768	-118.11436	0.04	0.00576	17.24	9.31	0.48	16.01	8.6	130	18	14	860	1170	27550
PV-B	33.83168	-118.10841	0.04	0.02571	24.1	9.57	0.647	12.6	11.2	190	33	25	233	934	112600
PV-D	33.83168	-118.10841	0.02	0.02571	24.1	9.57	0.647	12.6	11.2	190	35	24	253	1081	48700
PV-C	33.82005	-118.10852		0.00666	22.57	9.61	0.655	14.28	35.1	140	28	19	20	108	29090
CLARK															
CK-A	33.81089	-118.12985	0.015	1.07180	28.18	10.14	0.994	16.78	9.4	130	14	13	131	524	3120
CK-B	33.81900	-118.12983	0.06	0.21309	26.42	10.59	1.043	17.86	235.0	130	17	12	26	386	52
CK-C	33.82259	-118.12986	0.055	0.39932	21.75	10.02	0.859	15.44	9.8	150	16	12	49	830	98
CK-D	33.82296	-118.12981		0.11219	25.74	10.76	1.152	16.42	5.7	150	18	13	14	173	14
CK-E	33.83268	-118.13227		0.08571	19.35	10.95	1.048	13.17	13.4	140	22	14	63	5777	277
CK-F	33.84665	-118.13214		0.56018	19.54	10.04	0.948	15.24	51.4	180	22	17	562	3303	4215703
CK-G	33.84695	-118.13225		0.01313	15.66	8.49	1.171	8.5	396	250	26	18	72	393	63811
CK-H	33.84695	-118.13225		0.01313	15.66	8.49	1.171	8.5	396	260	27	18	97	270	45412
WARDLOW															
WC-A	33.82279	-118.12987	0.65	DND	15.24	9.31	0.826	12.45	12.8	140	13	8.3	0	0	0
WC-B	33.82275	-118.12984		0.07576	15.03	9.77	0.793	9.09	10.8	120	9	6.0	222	949	8547
WC-C	33.82330	-118.13420		0.09155	25.3	10.98	0.883	15.35	32.9	100	10	7.0	11	92	11
WC-D	33.82332	-118.13682		0.03371	24.28	10.97	0.866	15.79	109	110	10	6.6	4	8	4
WC-E	33.82331	-118.14165		0.20652	17.42	8.4	0.6	9.04	40	150	8	4.4	2092	2062	64372
DEL AMO															
DA-A	33.84685	-118.13236		0.41963	19.58	10.62	0.799	12.37	67.4	98	25	14	51	883	796681
DA-B	33.84687	-118.14217		1.47578	18.66	10.28	0.516	8.8	9.7	76	12	8.2	2239	14009	12449388

Table 6. Results of Measurements Taken in the Flowing Outfalls during Survey 2 - 4/09/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-02	33.79333	-118.10361		DND	14.59	7.54	1.113	4.61	80.7	230	16	4.3	85	389	79800
CC-04	33.79568	-118.10326		0.00019	15.75	8.15	0.786	7.27	7.5	140	9.7	6.7	121	1616	2755000
CC-06	33.79597	-118.10371		0.00177	16.96	7.92	0.582	7.21	4.7	100	8.5	5.3	5	5	4106
CC-07	33.79791	-118.10330		0.00012	16.15	7.66	0.711	5.02	8.8	110	14	5.7	5794	9804	275500
CC-14	33.80306	-118.10894		0.00012	18.02	8.03	0.905	7.25	8.6	190	120	81	10	97	198630
CC-14.5	33.80468	-118.11061		0.00045	18.22	8.42	1.001	9.73	3.5	160	2.6	2.3	5	10	63
CC-19	33.81036	-118.12134		0.00353	16.27	7.91	0.919	6.08	8.4	180	23	8	11870	14136	435200
CC-24	33.81037	-118.12524		0.00106	18.08	8.15	0.71	7.5	2.3	130	9	7	8164	3255	173290
CLARK															
CK-06	33.81520	-118.12981		0.00006	19.29	8.02	8.4	7.03	32.0	1000	47	21	256	980	2143000
CK-17	33.82354	-118.12981		0.00039	16.49	7.8	0.981	6.49	7.1	190	66	35	1789	2909	32550
CK-20	33.82501	-118.12986		0.00706	19.07	8.12	1.96	6.73	0.8	670	1.9	1.3	5	450	2046
PALO VERDE															
PV-08	33.81334	-118.11408		0.00090	16.56	8.02	1.093	8.57	3.7	320	3.1	1.8	10	31	19350
PV-22	33.82111	-118.10794		0.00044	17.47	7.91	1.318	7.8	6	160	40	27	75	134	6488
WARDLOW															
WC-07	33.82331	-118.14136		0.09775	21.02	8.49	0.522	9.36	2.2	99	2.6	1.9	5	5	5

Table 7. Results of Measurements Taken in the Main Channel during Survey - 5/11/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-A	33.79530	-118.10352	0.14	0.371399	17.63	7.37	1.540	4.04	4.00	300	7.7	5.7	350	1607	54600
CC-B	33.80688	-118.11394	0.1	0.216654	17.56	7.57	1.58	4.60	6.90	310	6.4	5.4	474	171	28800
CC-C	33.80758	-118.11484	0.1	0.404367	17.52	7.9	1.55	5.48	5.60	300	5.8	5.1	63	63	34500
CC-D	33.81025	-118.12936	0.1	0.659095	18.34	8.59	1.313	10.09	24.90	290	6.4	5.6	171	228	68670
CC-E	33.81017	-118.12966	0.07	0.097693	18.78	8.85	0.866	11.63	18.80	200	6.2	5.3	4611	789	52900
CC-F	33.81036	-118.13358	0.06	0.181429	18.63	8.59	0.783	10.19	21.20	190	11	7.1	3873	1723	70600
CC-G	33.81306	-118.13958		0.164550	20.17	9.42	0.665	17.35	37.90	150	7.6	5.6	933	98	72700
CC-H	33.79530	-118.10352		0.371399	17.63	7.37	1.540	4.04	4.00	300	10	6.6	355	1515	75400
PALO VERDE															
PV-A	33.80309	-118.10883	0.04	0.063158	21.5	9.04	1.171	15.91	45.50	250	18	16	3448	1850	54750
PV-B	33.83165	-118.10835	0.04	0.052419	28.11	10.26	1.029	13.74	40.00	190	20	18	158	6131	1918
PV-C	33.82011	-118.10851		0.057874	28.87	10.28	1.243	12.90	17.80	180	21	20	5	134	71
PV-D	33.83165	-118.10835	0.02	0.052419	28.11	10.26	1.029	13.74	40.00	190	21	18	341	5475	4611
CLARK															
CK-A	33.81032	-118.12962	0.015	0.175781	18.22	8.66	1.357	10.37	6.00	310	6.5	5.0	480	368	22470
CK-B	33.81913	-118.12984	0.06	0.330999	22.9	9.13	1.473	14.39	9.90	320	8.6	7.6	573	299	81640
CK-C	33.82257	-118.12984	0.055	0.253102	23.43	9.13	0.817	11.15	4.90	170	4.2	3.7	121	272	27000
CK-D	33.82280	-118.12978		0.207334	31.36	10.23	1.38	14.15	8.10	230	9.8	8.6	5	5	31
CK-E	33.83251	-118.13232		0.160506	31.63	10.65	1.281	12.44	11.40	190	10	8.6	5	41	5
CK-F	33.84658	-118.13220		0.855652	32.22	10.02	0.86	13.55	8.50	140	12	10	10	243	20140
CK-H	33.84658	-118.13220		0.855652	32.22	10.02	0.86	13.55	8.50	140	11	10	10	435	9208
CK-G	33.84695	-118.13225		0.043824	19.38	8.08	1.66	5.89	6.20	440	14	10	4352	2014	228200
WARDLOW															
WC-A	33.84685	-118.13236	0.65	DND	18.63	8.57	0.778	7.38	14.70	170	7.0	4.0	10	288	12960
WC-B	33.82275	-118.12984		0.059761	18.45	8.86	0.716	7.56	3.40	160	3.4	2.9	226	364	24890
WC-C	33.82329	-118.13418		0.096330	27.65	10.62	0.791	12.08	18.40	93	10	8.4	5	1187	2909
WC-D	33.82335	-118.14137		0.155102	24.34	9.42	0.8	15.40	61.80	180	11	9.1	5	5	5
DEL AMO															
DA-A	33.84679	-118.13234		0.436813	32.4	10.11	0.955	12.25	11.30	140	13	11	5	771	18500
DA-C	33.84679	-118.13234		0.436813	32.4	10.11	0.955	12.25	11.30	150	13	11	10	1119	10170
DA-B	33.84686	-118.14210		0.673923	28.52	9.94	0.706	13.19	3.90	120	8.3	7.5	52	1616	81640

Shaded lines are field duplicates of preceding site.

Table 8. Results of Measurements Taken in the Flowing Outfalls during Survey 3 - 5/11/2009

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-02	33.79333	-118.10369		0.008977	17.08	7.49	1.082	2.16	9.60	190	**7.0**[1]	5.7	414	288	32550
CC-04	33.79564	-118.10331		0.000233	19.05	7.96	0.867	4.09	10.40	180	4.8[1]	3.7	63	12033	410600
CC-05	33.79591	-118.10333		0.000007	DND	DND	DND	DND	DND				149	331	30100
CC-06	33.79594	-118.10365		DND	DND	DND	DND	DND	DND	200	8.1	6.1	201	583	275500
CC-09	33.79942	-118.10358		0.000306	18.6	7.64	0.9	3.40	38.20	180	**35**[1]	12	1246	8664	6015000
CC-11	33.80006	-118.10430		0.000088	DND	DND	DND	DND	DND	170	**37**[1]	15	145	211	46110
CC-12	33.80004	-118.10472		0.001914	19.61	8.02	1.436	5.73	22.60	270	**540**[1]	15	8664	3076	2987000
CC-14	33.80307	-118.10885		0.004032	20.67	8.08	0.824	7.20	27.80	160	**210**[1]	24	836	7330	275000
CC-19	33.81035	-118.12130		0.007063	19.32	7.79	0.808	6.31	21.10	150	6.7	5.7	201	31	86640
CC-22	33.81016	-118.12230		0.000706	19.6	7.79	0.652	5.82	5.50	140	4.9	3.6	5	63	100600
CC-24	33.81036	-118.12532		0.005297	21.4	7.95	0.79	6.37	112.00	160	14	5.7	86	5172	435200
CC-29	33.81015	-118.12663		0.000118	18.93	8.06	1.223	6.78	5.50	180	23	19	1421	4080	1046200
CLARK															
CK-01	33.81076	-118.12995		0.000118	18.76	8.12	0.986	7.80	16.60	180	11	7.4	10	331	197000
CK-06	33.81517	-118.12980		0.000942	19.13	7.9	1.58	5.57	67.20	270	180	73	6867	34100	4611000
CK-08	33.81866	-118.12980		0.000824	19.11	7.92	1.1	6.30	5.00	200	17	11	2359	10500	457000
CK-15	33.82228	-118.12990		0.003531	23.9	7.87	0.616	6.34	2.40	120	3.1	2.4	2987	631	613100
CK-17	33.82354	-118.12981		0.000471	18.72	8.42	1.186	5.69	23.10	200	21	13	624	836	104620
CK-20	33.82501	-118.12968		0.010594	21.01	7.98	1.94	7.73	0.00	650	1.1	1.0	10	5	2481
CK-22	33.83117	-118.13067		0.000589	18.17	8.4	0.752	8.15	1.90	180	18	15	153	2359	4611000
CK-34	33.83607	-118.13214		0.014832	19.15	8.43	0.725	7.87	3.10	200	18	15	393	1000	22820
CK-48	33.84486	-118.13212		0.000153	21.84	8.6	0.965	9.17	7.30	170	35	25	10	1210	34480
PALO VERDE															
PV-08	33.81333	-118.11406		0.001695	19.3	7.92	1.038	6.99	7.20	300	2.4	1.4	328	1243	1872000
PV-10	33.81342	-118.11406		0.010373	21.7	7.52	0.972	7.34	85.00	180	31	18	10	8664	3448000
WARDLOW															
WC-07	33.82332	-118.14133		0.125000	23.67	8.35	0.616	8.28	5.50	140	1.9	1.7	185	317	10710
DEL AMO															
DA-14	33.84687	-118.14127		0.000216	18.73	8.83	1.039	8.67	2.60	370	110	88	5	5	18600

1. Sites were disturbed prior to sampling by propping open the tide gate. Gates were opened since leaking flows around the tide gate could not otherwise be collected or quantified. Water was allowed to reach an equilibrium flow prior to sampling but analysis of the data from these sites indicates that the opening of the tide gate disturbed particulate copper that did not settle. Most of these sites had elevated total recoverable copper with normal levels of dissolved copper.

Table 9. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 1

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.023	14.5	7.7	0.523	6.6	2	64	7	5	5	5	5
Maximum	1.315	28.2	10.8	4.92	16.1	273	1800	1500	750	908	754	17850
1st Quartile	0.072	17.2	9.3	0.589	9.6	6.1	113	10	9	5	31	72
Median	**0.135**	**19.3**	**9.9**	**0.969**	**12.6**	**17.5**	**140**	**10**	**10**	8	74	1592
3rd Quartile	0.692	25.5	10.5	1.103	14.9	33.9	180	12	11	131	105	3733
Mean	0.405	20.7	9.8	1.18	12	40.4	265	118	63	178	131	2879
Geometric mean	0.187	20.1	9.8	0.949	11.6	15.9	165	16	13	**30**	**64**	**530**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	10	10	10	10	10	10	10	10	10	10	10	10
Minimum	0.00014	14.8	7.9	0.56	6.9	0	94	1.2	1.4	5	5	5
Maximum	0.0331	19.2	8.5	2	9.6	41.2	570	20	19	111990	127400	4611000
1st Quartile	0.00028	16.6	8.1	0.657	7.6	1.3	115	4.3	3.3	5	132	4205
Median	**0.00084**	**17.4**	**8.2**	**0.727**	**8.1**	**3.8**	**135**	**10.5**	**6.5**	111	524	44815
3rd Quartile	0.00141	17.8	8.2	0.964	8.8	10.8	190	15.5	13.8	3123	1541	167138
Mean	0.00505	17.2	8.2	0.925	8.2	8.4	188	10.3	8.5	17126	14834	548413
Geometric mean	0.00102	17.2	8.2	0.849	8.1		161	7.1	6	**178**	**593**	**20969**

Table 10. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 2

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.006	13.9	7.7	0.48	6.7	5.7	76	8	4	5	5	5
Maximum	1.476	28.2	11.0	1.266	21.4	396	260	35	25	2239	14009	12449388
1st Quartile	0.040	16.5	9.3	0.740	9.3	10.3	125	14	11.5	13	91	125
Median	**0.152**	**19.6**	**9.6**	**0.859**	**14.3**	**19.5**	**140**	**18**	**13**	110	404	27550
3rd Quartile	0.415	24.1	10.4	1.069	16.4	88.2	160	22	14.5	278	1007	80650
Mean	0.309	20.3	9.7	0.885	13.7	60.3	148	18.6	13	1633	5806	722442
Geometric mean	0.122	19.9	9.6	0.856	13.0	24.8	142	17.4	12	**73**	**297**	**5564**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.00014	14.6	7.5	0.522	4.6	0.8	99	1.9	1.3	5	5	5
Maximum	0.0331	21.0	8.5	8.400	9.7	80.7	1000	120	81	11870	14136	2755000
1st Quartile	0.00019	16.3	7.9	0.730	6.6	3.6	132.5	4.5	2.8	6	48	4702
Median	**0.00045**	**17.2**	**8.0**	**0.950**	**7.2**	**6.6**	**170**	**11.9**	**6.1**	80	420	56175
3rd Quartile	0.00177	18.2	8.1	1.108	7.7	8.6	220	37.8	17.8	1406	2586	256283
Mean	0.00505	17.4	8.0	1.500	7.2	12.6	263	26.0	14.9	2014	2416	437502
Geometric mean	0.00079	17.4	8.0	1.070	7.1	6.2	200	12.5	7.1	**102**	**294**	**23999**

Table 11. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 3

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.044	17.3	7.4	0.665	4.0	3.4	93	3.4	2.9	5	5	5
Maximum	0.856	32.4	10.7	1.66	17.4	61.8	440	21	20	4611	6131	228200
1st Quartile	0.097	18.5	8.6	0.809	8.8	6.1	155	6.8	5.5	13	91	126
Median	**0.194**	**22.9**	**9.1**	**1.029**	**12.3**	**11.3**	**190**	**10**	**7.6**	110	404	27550
3rd Quartile	0.396	28.7	10.1	1.369	13.6	20.0	295	12.5	10	278	1008	80650
Mean	0.286	24.0	9.2	1.100	11.1	16.9	215	10.5	8.7	765	1067	39233
Geometric mean	0.196	23.3	9.2	1.055	10.3	11.9	201	9.5	7.8	**98**	**387**	**9018**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	24	22	22	22	22	22	24	24	24	25	25	25
Minimum	0.000007	17.1	17.5	0.616	2.2	0.0	120	1.1	1.0	5	5	2481
Maximum	0.12500	23.9	8.8	1.94	9.2	112	650	540	88	8664	34100	6015000
1st Quartile	0.00023	18.8	7.9	0.795	5.8	5.1	167	6.3	5.2	63	317	34480
Median	**0.00088**	**19.2**	**8.0**	**0.969**	**6.6**	**8.5**	**180**	**17.5**	**11.5**	201	1000	275000
3rd Quartile	0.00574	20.9	8.3	1.096	7.8	23.0	200	35	15.8	836	5172	1046200
Mean	0.00825	19.9	8.1	1.000	6.5	21.8	214	55.8	16.1	1095	4122	1109732
Geometric mean	0.00110	19.8	8.0	0.961	6.3		199	16.6	9.0	**188**	**850**	**218568**

Table 12. Summary of Sample Counts from the Open Channels and Outfalls Compared with Frequency of Exceedances of Dissolved Copper Water Quality Criteria.

SURVEY NUMBER	LOCATION	# OF SAMPLES	# >CTR CHRONIC	# >CTR ACUTE
Survey 1 3/3/2009	**Channels**	**16**	**5**	**2**
	Los Cerritos	7	3	1
	Palo Verde	3	1	0
	Clark	4	1	1
	Wardlow	1	0	0
	Del Amo	1	0	0
	Outfalls	**10**	**4**	**1**
	Los Cerritos	4	2	0
	Palo Verde	1	0	0
	Clark	4	2	1
	Wardlow	1	0	0
	Del Amo	0	0	0
Survey 2 4/9/2009	**Channels**	**27**	**15**	**4**
	Los Cerritos	8	4	1
	Palo Verde	4	4	2
	Clark	8	5	0
	Wardlow	5	0	0
	Del Amo	2	2	1
	Outfalls	**14**	**3**	**2**
	Los Cerritos	8	1	1
	Palo Verde	2	1	0
	Clark	3	1	1
	Wardlow	1	0	0
	Del Amo	0	0	0
Survey 3 5/11/2009	**Channels**	**27**	**3**	**0**
	Los Cerritos	8	0	0
	Palo Verde	4	3	0
	Clark	8	0	0
	Wardlow	4	0	0
	Del Amo	3	0	0
	Outfalls	**24**	**8**	**3**
	Los Cerritos	11	3	1
	Palo Verde	2	1	0
	Clark	9	3	1
	Wardlow	1	0	0
	Del Amo	1	1	1
ALL SURVEYS COMBINED	**Channels**	**70**	**23**	**6**
	Los Cerritos	23	7	2
	Palo Verde	11	8	2
	Clark	20	6	1
	Wardlow	10	0	0
	Del Amo	6	2	1
	Outfalls	**48**	**15**	**6**
	Los Cerritos	23	6	2
	Palo Verde	5	2	0
	Clark	16	6	3
	Wardlow	3	0	0
	Del Amo	1	1	1

Table 13. Loads of Fecal Indicator Bacteria and Copper from all Main Channels – Survey 1

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-01-A[3]	4311	3507	132103	35.4	38.6
CC-02-A	3198	1651	68495	22.3	26.2
CC-02-B	2368	395	90996	17.8	21.7
CC-02-D[1]	1441		64769	18.0	23.7
CC-03-A		171	445	6.9	7.6
CC-03-B			86	5.0	5.0
CC-04					
PALO VERDE					
PVMOUTH-01		105		1.2	1.2
PVMOUTH-01		134		1.1	1.2
PV-02		168	446	1.1	1.2
CLARK					
CLK-01-A		72	303	2.0	2.3
CLK-02-A		49	2101	1.3	1.4
CLK-02-B		238	4746	3.7	3.8
CLK-04-B					
WARDLOW					
WC-01-B[4]					
DEL AMO					
DA-01-A[4]					

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-01-A located at the Stearns St. mass emission monitoring site.
4. Flow rates could not be determined at these sites which prohibited load calculations

Table 14. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 1

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS					
CCO-02-A		22	1229	0.013	0.022
CCO-09-A	558	635	1020	0.006	0.007
CCO-14-A		1.6	76	0.023	0.029
CCO-24-A	0.6	0.7	15493	0.003	0.004
subtotal	**559**	**660**	**17818**	**0.045**	**0.062**
CLARK					
CKO-09-A	51	16	683	0.005	0.006
CKO-17-A	233	70	2175	0.008	0.008
CLK-20-A		19	1138	0.047	0.035
CLK-22-A	3.1	57	1546	0.050	0.057
subtotal	**287**	**163**	**5542**	**0.110**	**0.107**
PALO VERDE					
PV-08	4.2	6.5	95.6	0.010	0.011
subtotal	**4.2**	**6.5**	**95.6**	**0.010**	**0.011**
WARDLOW					
WC-26				0.113	0.113
subtotal				**0.113**	**0.113**
TOTAL OUTFALLS	**850**	**829**	**23455**	**0.165**	**0.181**

Table 15. Loads of Fecal Indicator Bacteria and Copper from all Main Channels – Survey 2

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-A[3]	7409	26460	478973	24.7	31.3
CC-B	25572	86955	448898	30.3	42.9
CC-C	595	1635	212323	11.3	14.2
CC-D	1644	6037	129460	16.4	20.9
CC-E	172	172	57593	2.5	3.7
CC-F	1126	1593	161098	5.6	8.4
CC-H[1]	561	939	152081	5.6	8.4
CC-G			76.4	1.9	2.5
PALO VERDE					
PV-A	121	165	3881	0.2	0.3
PV-B	147	588	70839	1.6	2.1
PV-D	159	680	30638	1.5	2.2
PV-C	3.3	18	4740	0.3	0.5
CLARK					
CK-A		524	3120	34.1	36.7
CK-B		386	52	6.3	8.9
CK-C		830	98	11.7	15.6
CK-D		173		3.6	4.9
CK-E	63	5777	277	2.9	4.6
CK-F	562	3303	4215703	23.3	30.2
CK-G	72	393	63811	0.6	0.8
CK-H	97	270	45412	0.6	0.9
WARDLOW					
WC-A					
WC-B	222	949	8547	1.1	1.7
WC-C		92		1.6	2.2
WC-D		8.2		0.5	0.8
WC-E	2092	2062	64372	2.2	4.0
DEL AMO					
DA-A		883	796681	14	26
DA-B	2239	14009	12449388	30	43

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-A located at the Stearns St. mass emission monitoring site.

Table 16. **Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 2**

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS					
CC-02					
CC-04	0.6	7.4	12695	0.003	0.004
CC-06	0.0	0.0	177	0.023	0.037
CC-07	17.4	29.4	825	0.002	0.004
CC-14	0.0	0.3	572	0.023	0.035
CC-14.5	0.0	0.1	0.7	0.003	0.003
CC-19	1026	1221	37601	0.072	0.199
CC-24	212	84.4	4492	0.017	0.023
subtotal	**1255**	**1343**	**56362**	**0.142**	**0.305**
CLARK					
CK-06	0.4	1.4	3086	0.003	0.007
CK-17	17.2	27.9	312	0.034	0.063
CK-20	0.0	77.8	354	0.022	0.033
subtotal	**17.5**	**107.1**	**3752**	**0.059**	**0.103**
PALO VERDE					
PV-08	0.2	0.7	428	0.004	0.007
PV-22	0.8	1.4	69	0.029	0.043
subtotal	**1.0**	**2.1**	**496.9**	**0.033**	**0.050**
WARDLOW					
WC-07				0.454	0.622
subtotal				**0.454**	**0.622**
TOTAL OUTFALL	**1274**	**1452**	**60611**	**0.688**	**1.079**

Table 17. Loads of Fecal Indicator Bacteria and Copper from all Main Channels - Survey 3

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-A[3]	3092	14602	496126	5.0	6.8
CC-H[1]	3136	13766	685126	5.8	8.8
CC-B	2443	906	152658	2.8	3.3
CC-C	606	623	341313	4.9	5.6
CC-D	2681	3677	1107322	8.8	10.0
CC-E	10715	1886	126439	1.2	1.4
CC-F	16714	7648	313378	3.1	4.7
CC-G	3652	395	292678	2.2	3.0
PALO VERDE					
PV-A	5180	2859	84600	2.4	2.7
PV-B	197	7863	2460	2.2	2.5
PV-D	425	7022	5914	2.2	2.6
PV-C	7	190	101	2.8	2.9
CLARK					
CK-A	2007	1583	96635	2.1	2.7
CK-B	4511	2421	661132	6.0	6.8
CK-C	728	1684	167193	2.2	2.5
CK-D	25	25	157	4.2	4.8
CK-E	19	161	20	3.3	3.8
CK-F	204	5087	421614	20.4	24.4
CK-H	204	9106	192762	20.4	22.4
CK-G	4537	2159	244676	1.0	1.5
WARDLOW					
WC-A					
WC-B	321	532	36392	0.4	0.5
WC-C	11	2798	6856	1.9	2.3
WC-D	18	19	19	3.4	4.1
DEL AMO					
DA-A	52	8240	197709	11.4	13.5
DA-C	104	11959	108686	11.4	13.5
DA-B	834	26645	1346084	12.0	13.3

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-A located at the Stearns St. mass emission monitoring site.

Table 18. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 3

Site Number	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
CERRITOS					
CC-02	88.4	63.2	7149	0.122	0.149
CC-04	0.35	68.5	2338	0.002	0.003
CC-05	0.03	0.06	5		
CC-06					
CC-09	9.1	64.9	45039	0.009	0.025
CC-11	0.30	0.46	100	0.003	0.008
CC-12	394	144	139858	0.068	2.458
CC-14	80	723	27125	0.230	2.014
CC-19	34	5.4	14971	0.096	0.113
CC-22	0.08	1.1	1738	0.006	0.008
CC-24	10.8	670	56401	0.072	0.176
CC-29	4.0	11.7	3013	0.005	0.006
subtotal	**621**	**1753**	**297739**	**0.6**	**5.0**
CLARK					
CK-01	0.03	0.95	567	0.002	0.003
CK-06	154	786	106235	0.164	0.403
CK-08	46	212	9213	0.022	0.033
CK-15	251	55	52971	0.020	0.026
CK-17	7.0	9.6	1205	0.015	0.024
CK-20	2.5	1.3	643	0.025	0.028
CK-22	2.1	34.0	66397	0.021	0.025
CK-34	139	363	8281	0.529	0.635
CK-48	0.04	4.5	129	0.009	0.013
subtotal	**601**	**1465**	**245642**	**0.8**	**1.2**
PALO VERDE					
PV-08	13.2	51.5	77634	0.006	0.010
PV-10	2.47	2199	875086	0.444	0.765
subtotal	**16**	**2250**	**952720**	**0.4**	**0.8**
WARDLOW					
WC-07	550	969	32754	0.505	0.565
subtotal	**550**	**969**	**32754**	**0.5**	**0.6**
DEL AMO					
DA-14	0.03	0.03	98	0.045	0.056
subtotal	**0.03**	**0.03**	**98**	**0.05**	**0.06**
TOTAL OUTFALLS	**1788**	**6438**	**1,528,952**	**2.4**	**7.5**

APPENDIX A

GIS Plots of Flow, Concentration and Calculated Loads Measured
in
The Main Channel and Flowing Outfalls

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Figures

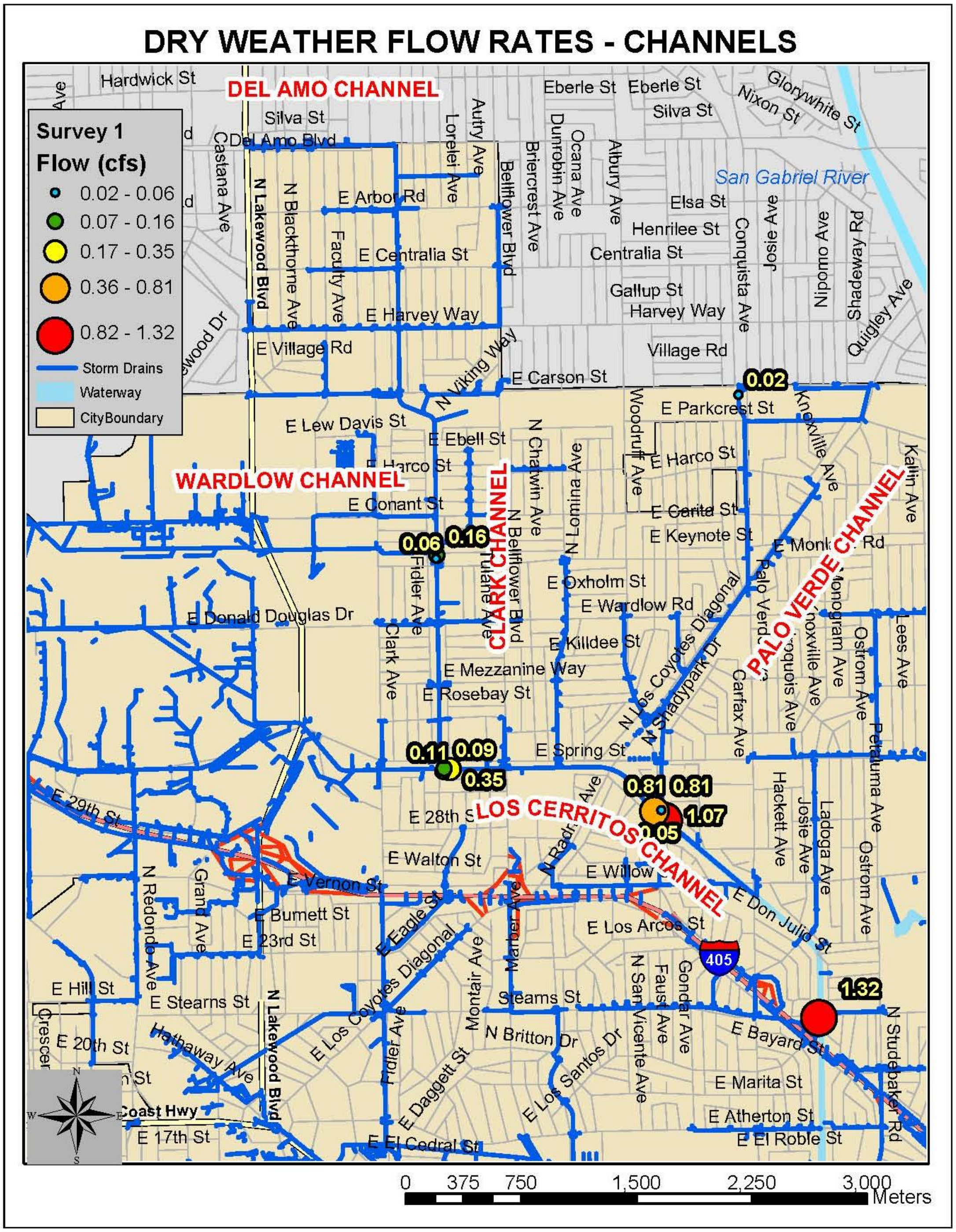

Figure A 1. **Flow (cfs) Measured in the Main Channel during Survey 1.**

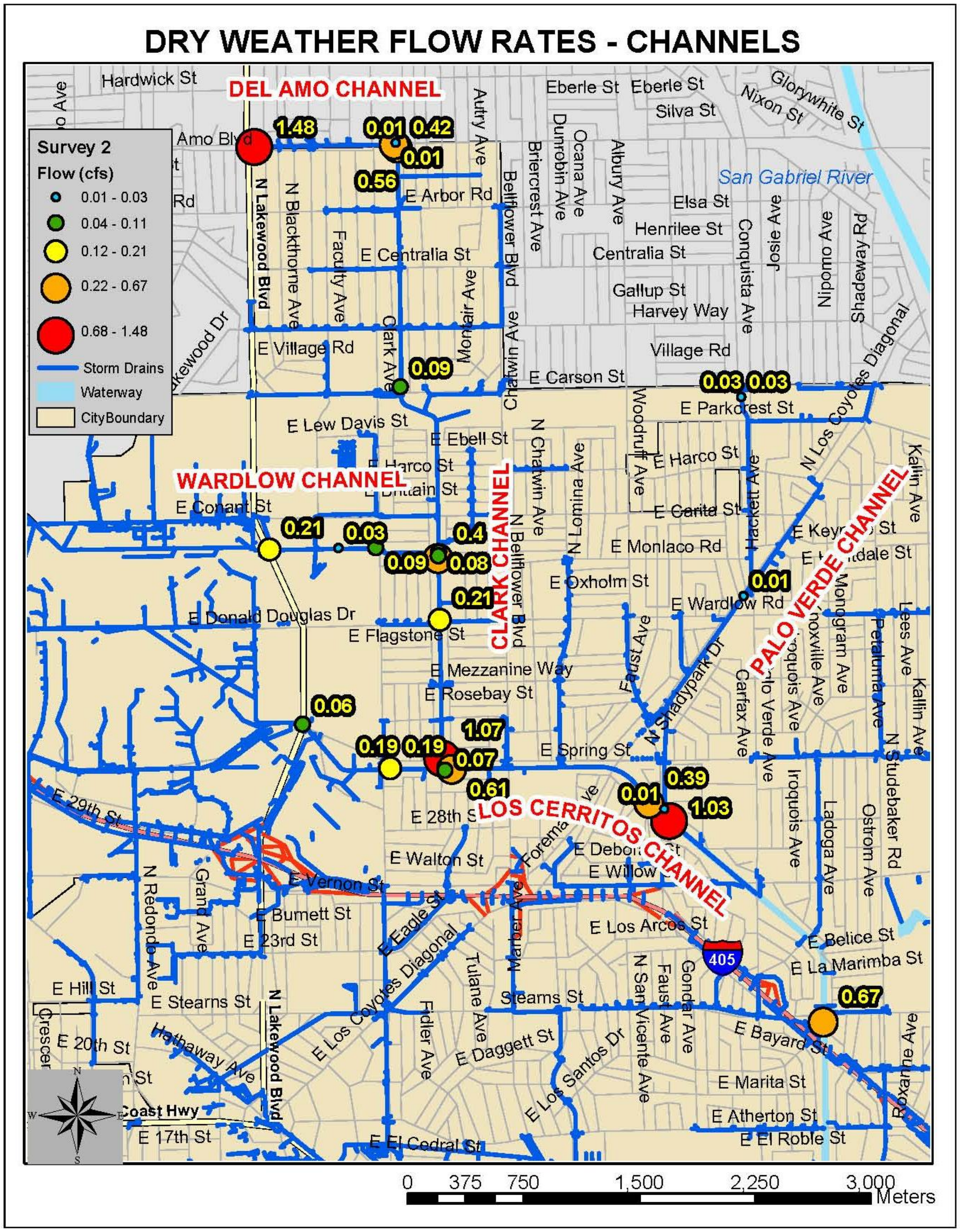

Figure A-2. **Flow (cfs) Measured in the Main Channel during Survey 2.**

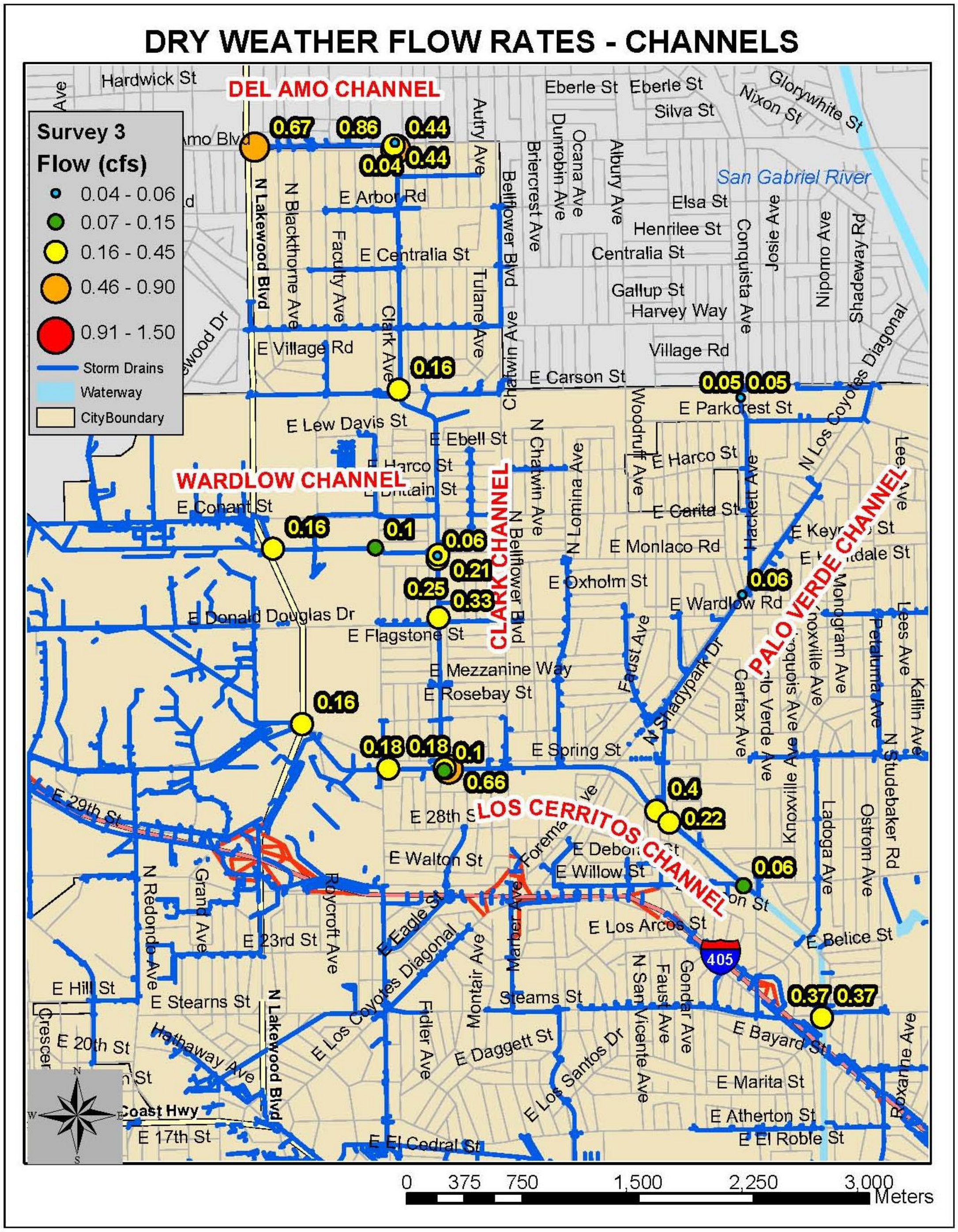

Figure A-3. **Flow (cfs) Measured in the Main Channel during Survey 3.**

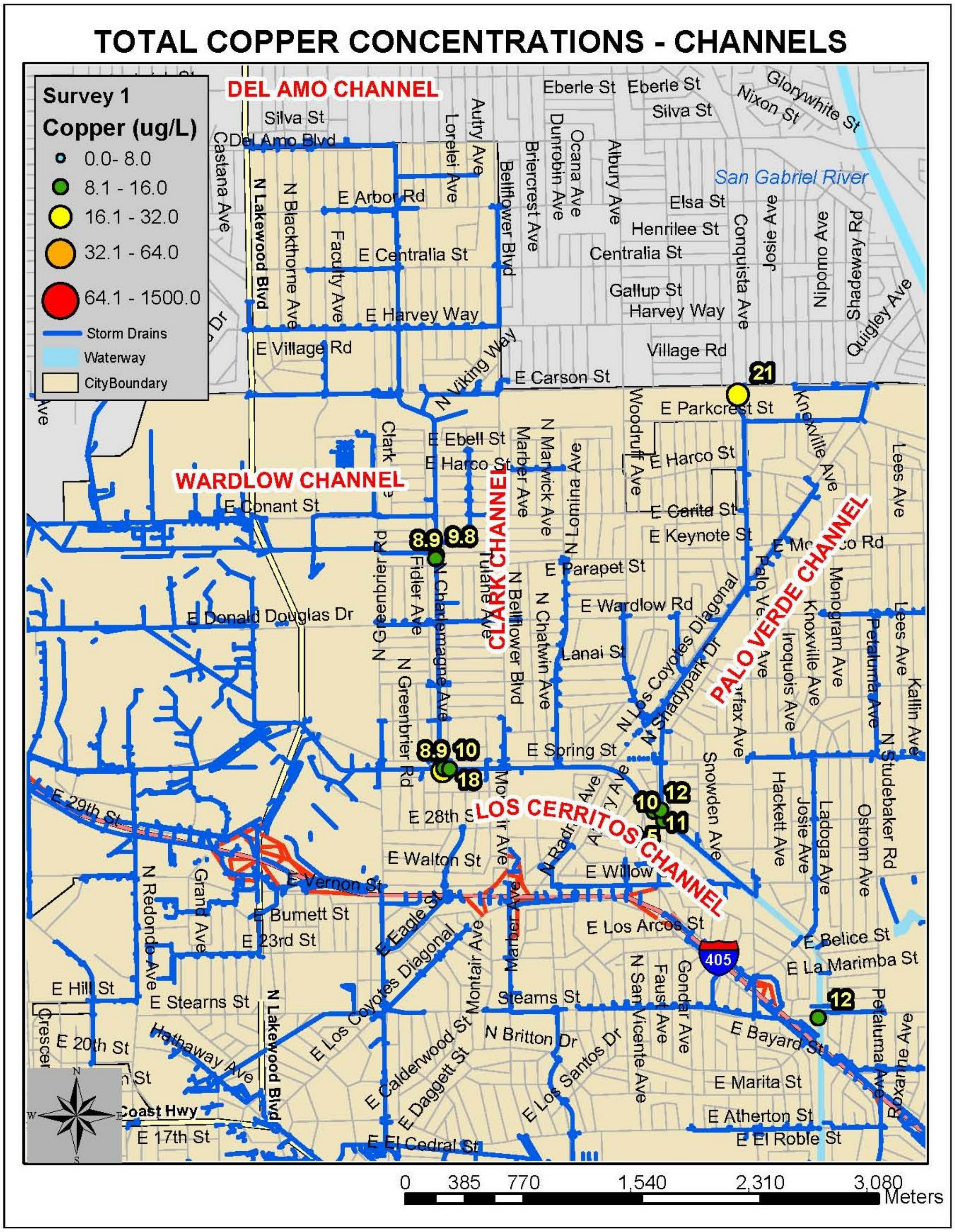

Figure A-4. **Concentrations of Total Copper Measured in the Main Channel during Survey 1.**

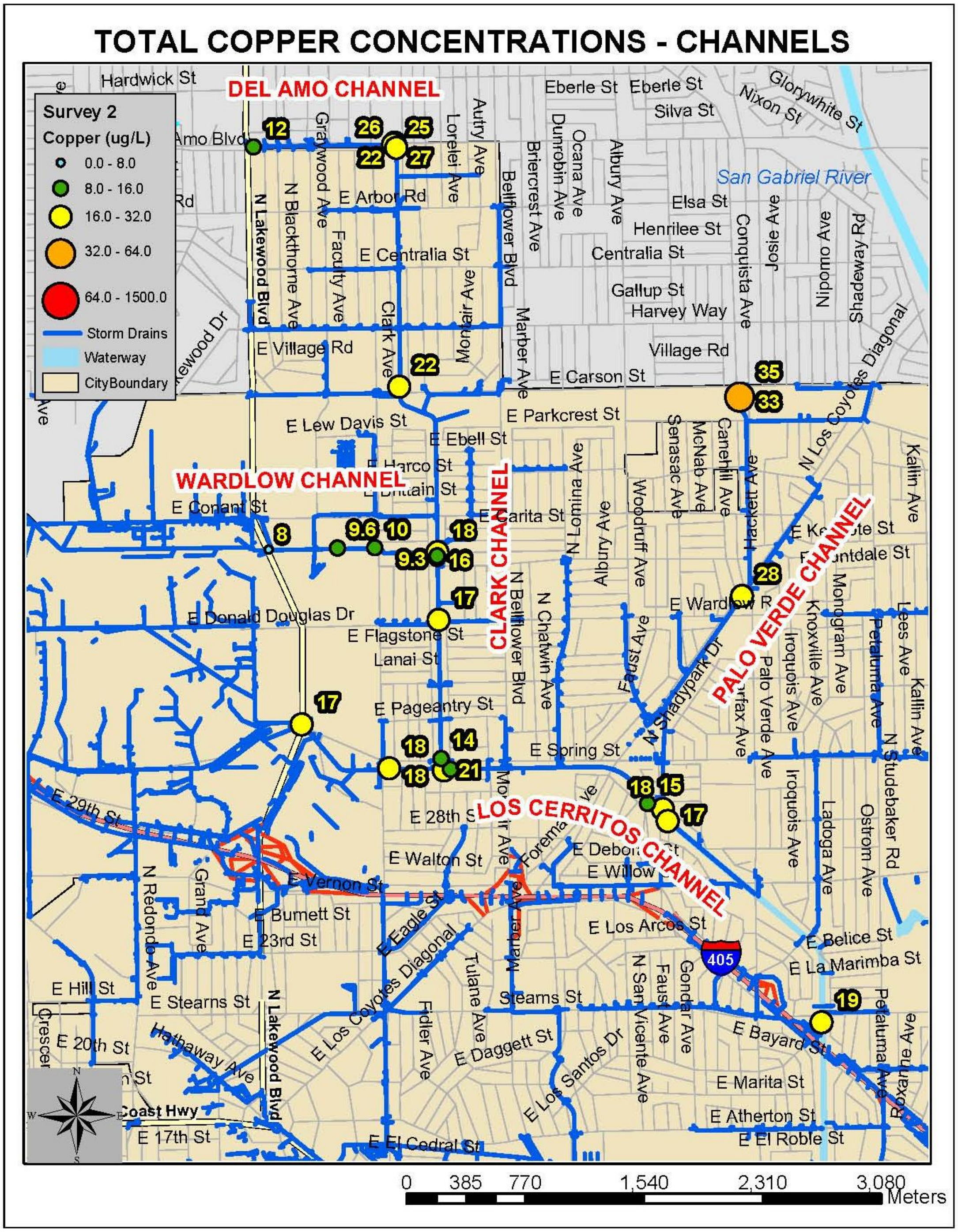

Figure A-5. **Concentrations of Total Copper Measured in the Main Channel during Survey 2.**

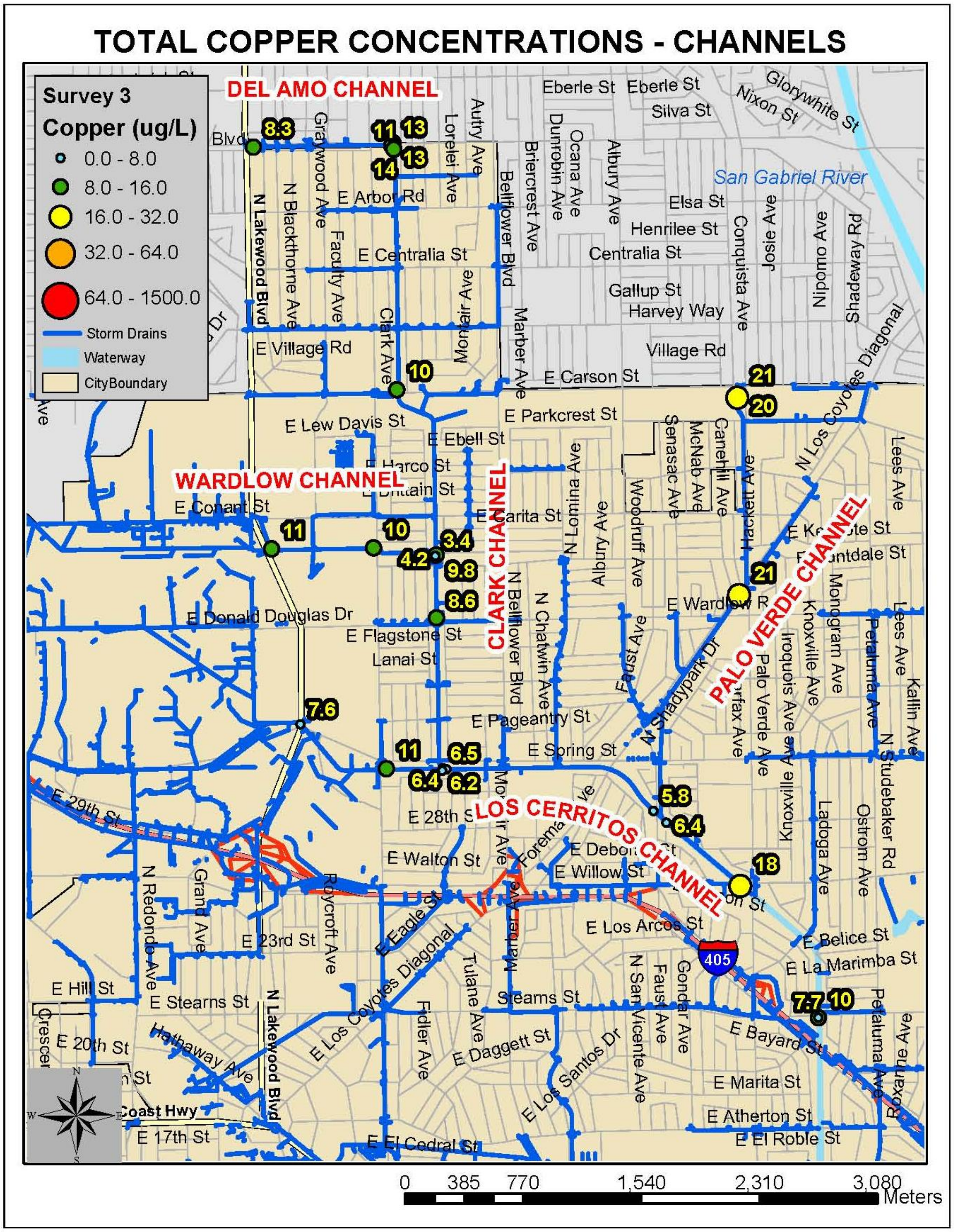

Figure A-6. Concentrations of Total Copper Measured in the Main Channel during Survey 3.

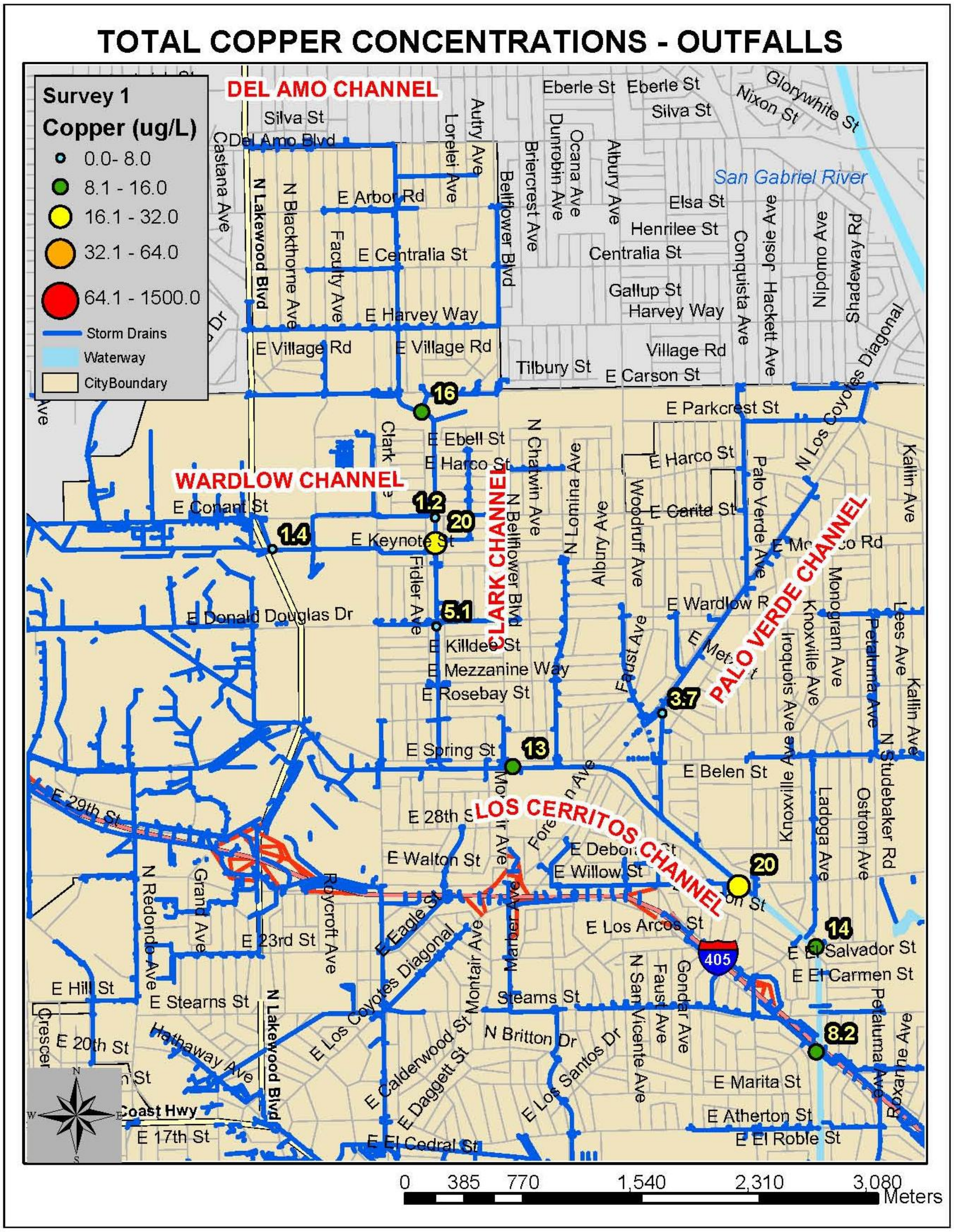

Figure A-7. **Concentrations of Total Copper Measured at Flowing Outfalls during Survey 1.**

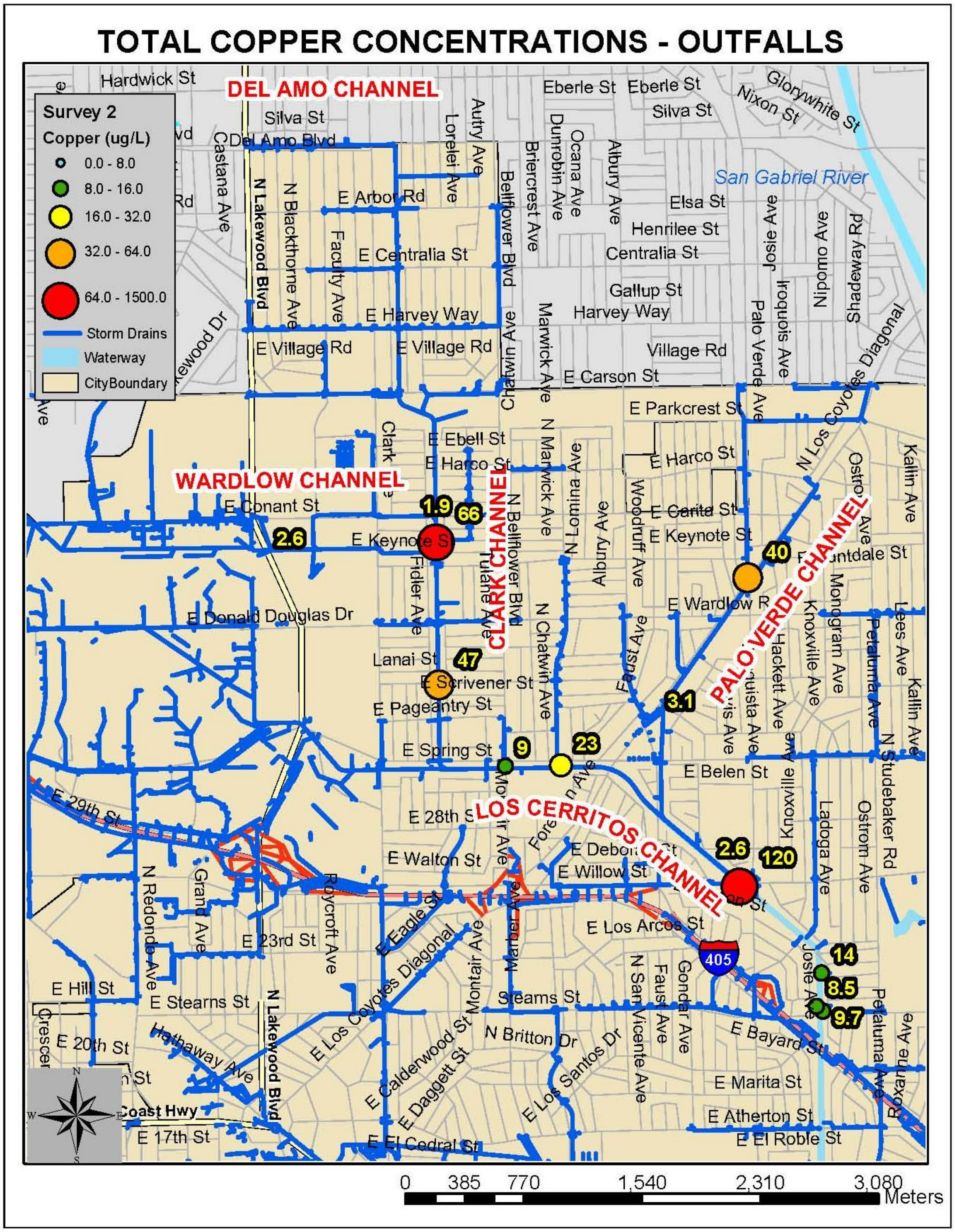

Figure A-8. **Concentrations of Total Copper Measured at Flowing Outfalls during Survey 2.**

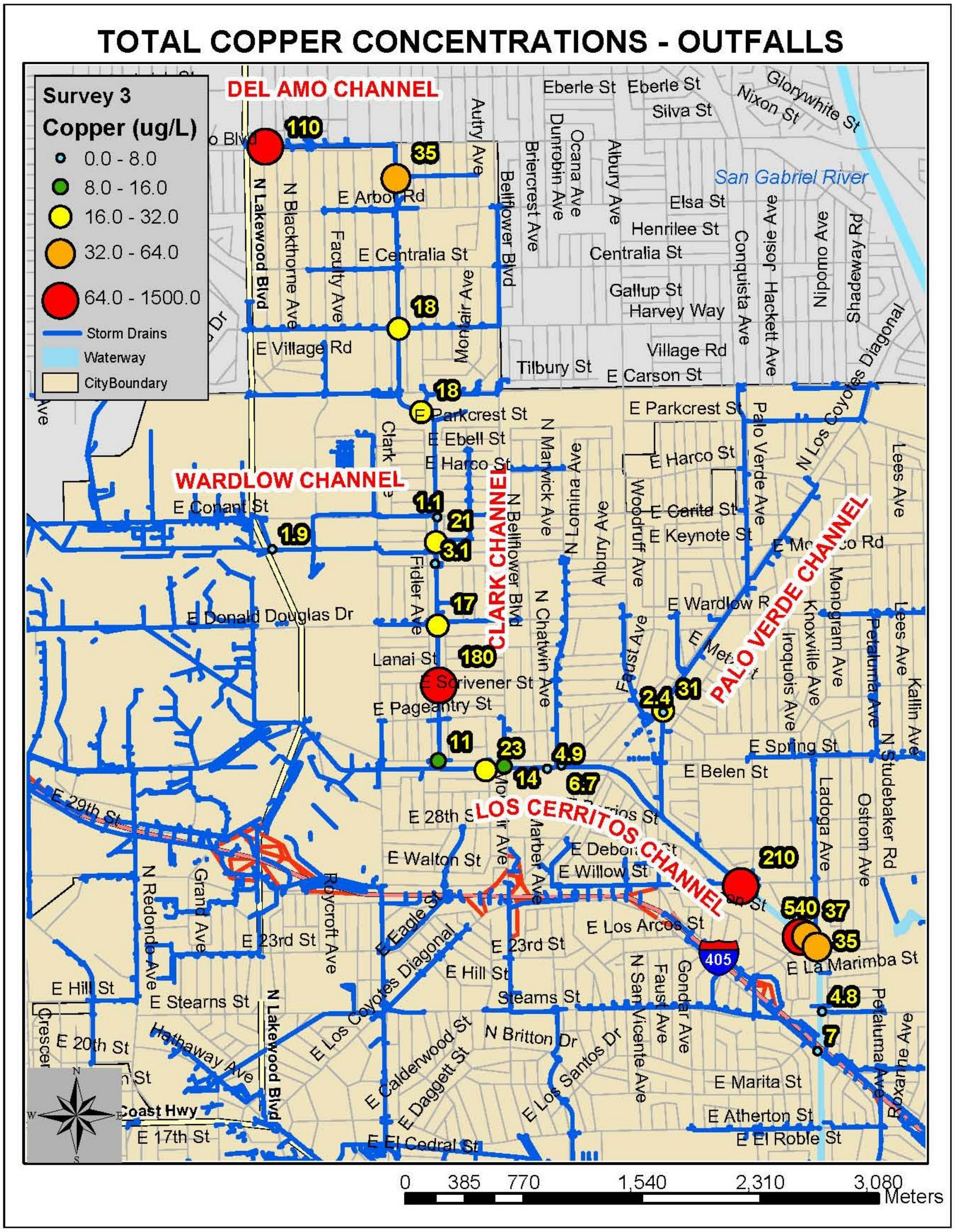

Figure A-9. Concentrations of Total Copper Measured at Flowing Outfalls during Survey 3.

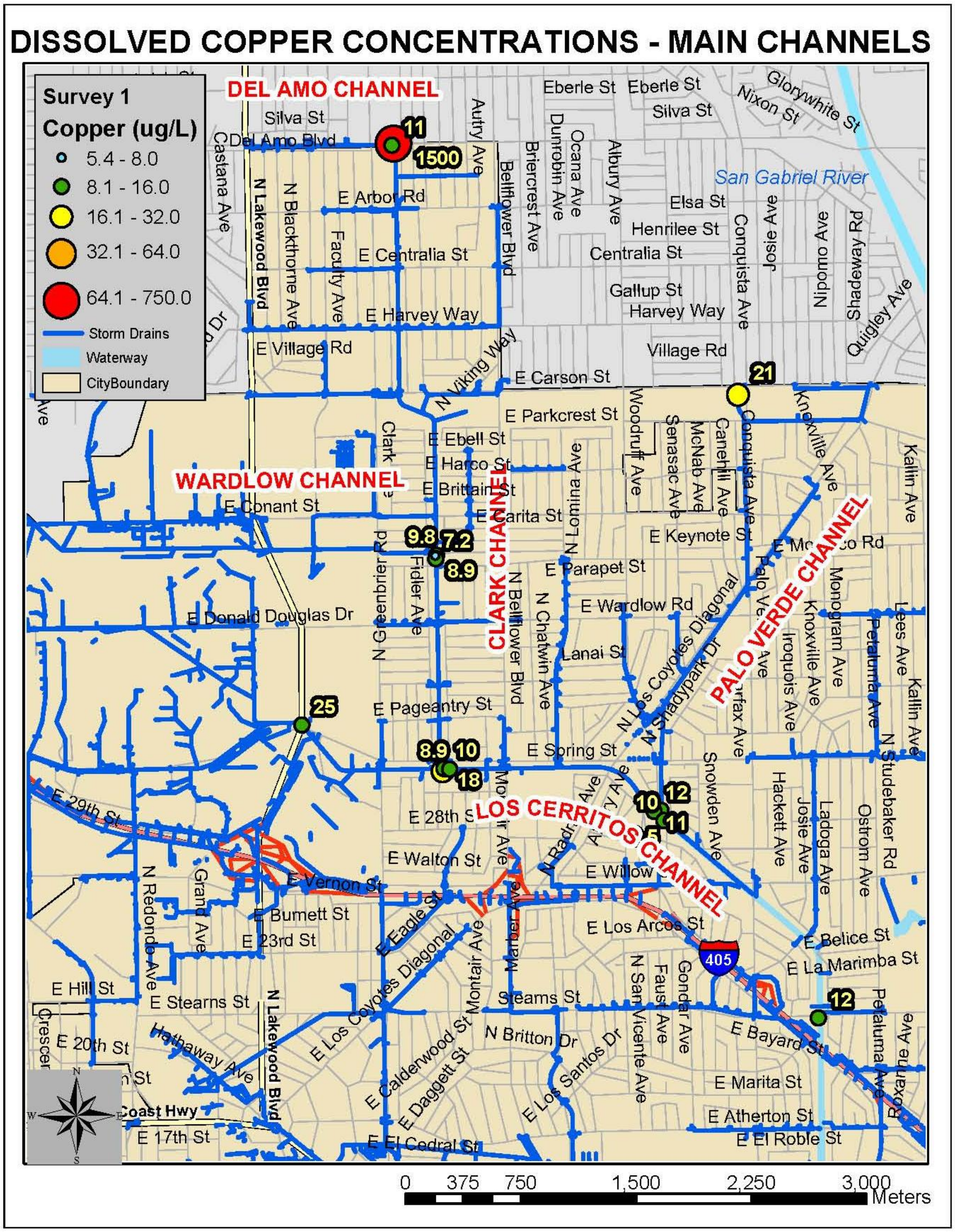

Figure A-10. Concentrations of Dissolved Copper Measured in the Main Channel during Survey 1.

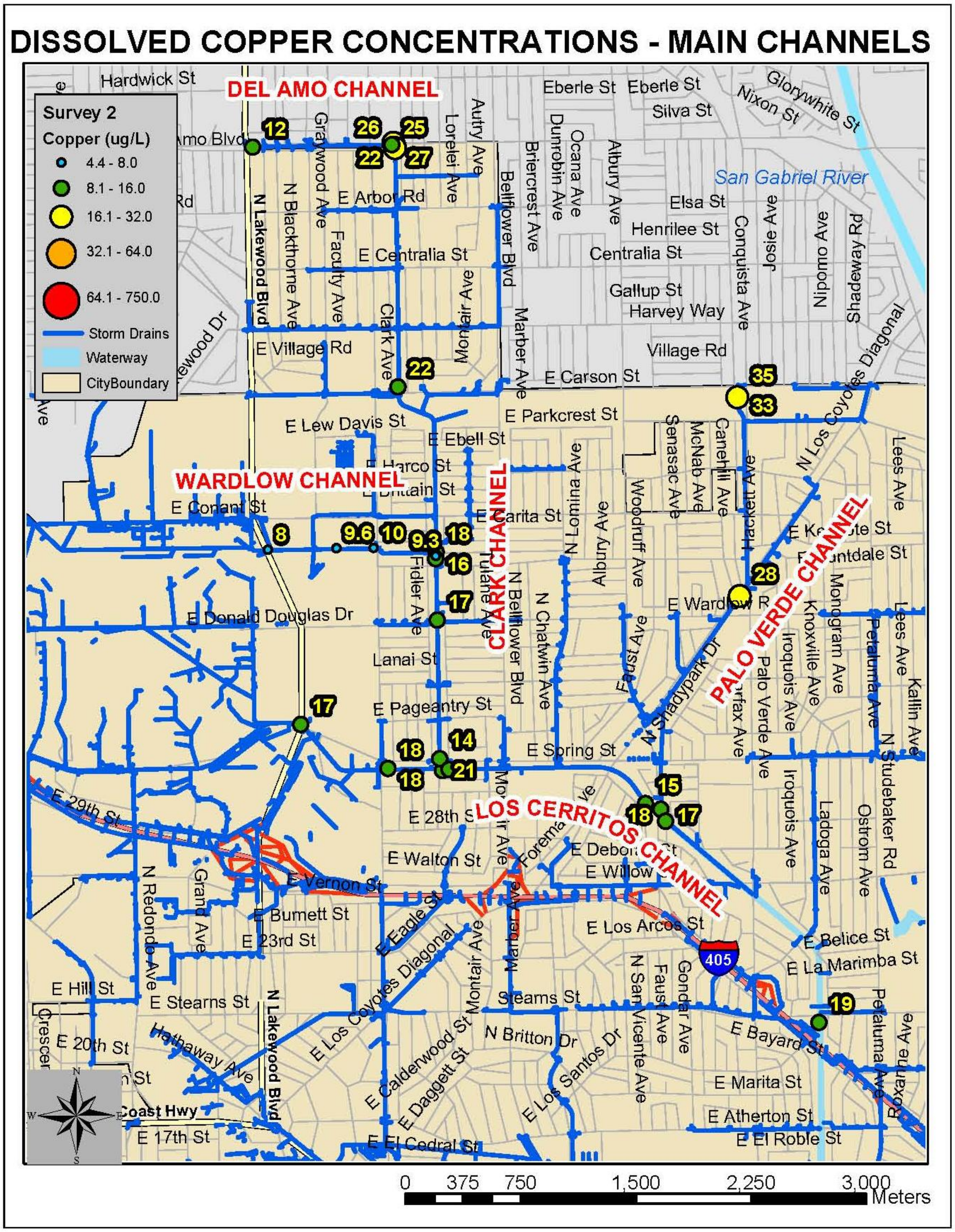

Figure A-11. Concentrations of Dissolved Copper Measured in the Main Channel during Survey 2.

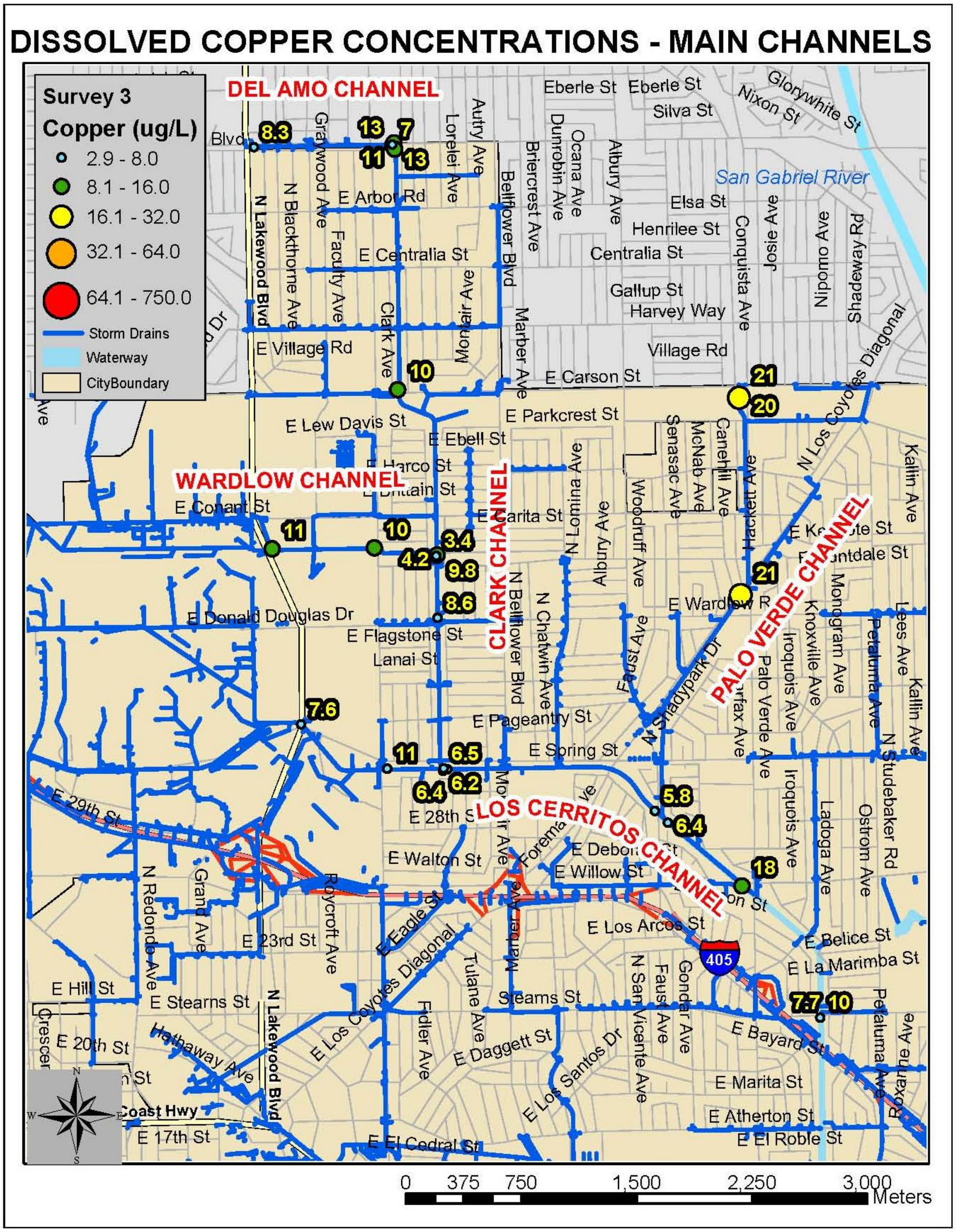

Figure A-12. **Concentrations of Dissolved Copper Measured in the Main Channel during Survey 3.**

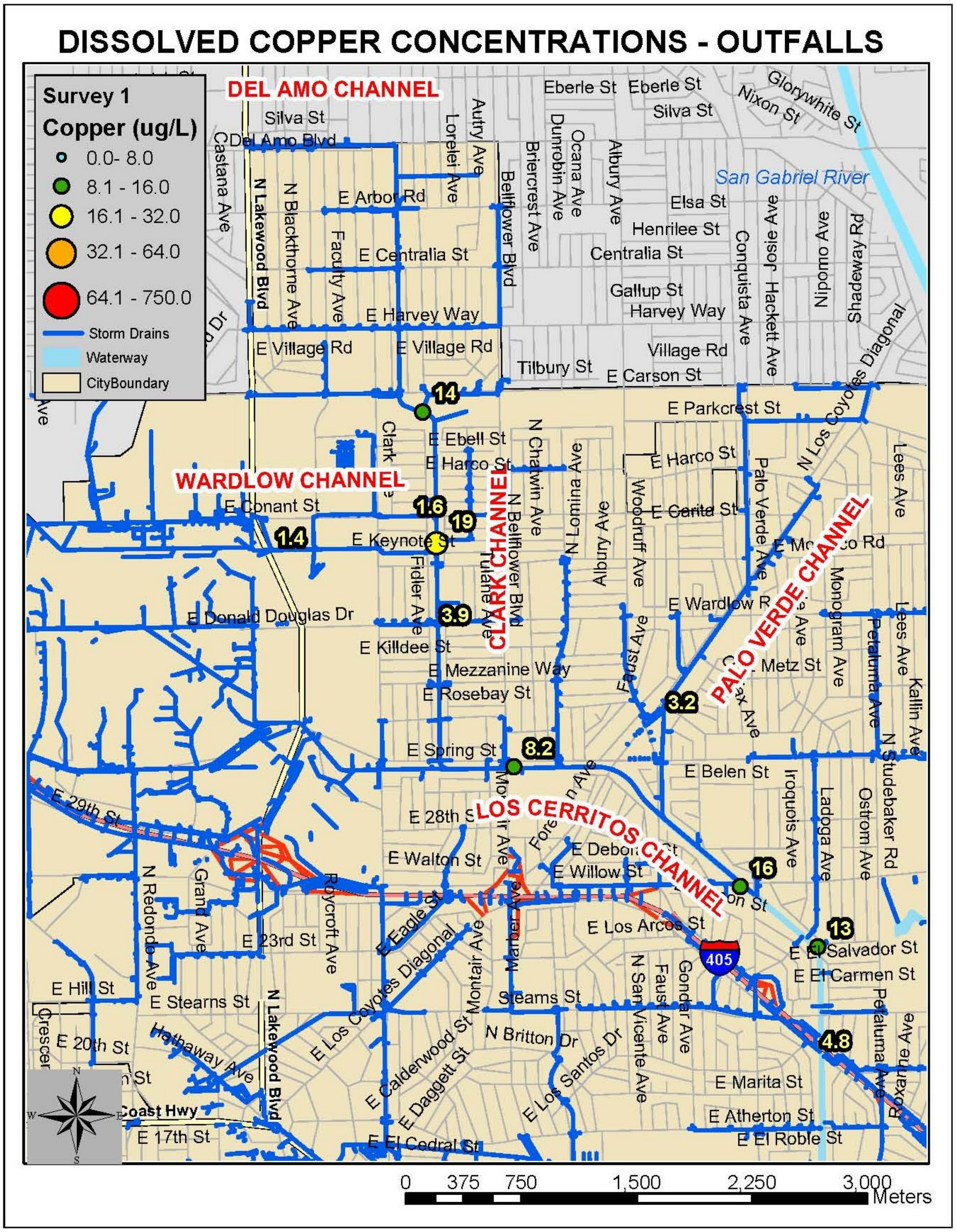

Figure A-13. Concentrations of Dissolved Copper Measured in Flowing Outfalls during Survey 1.

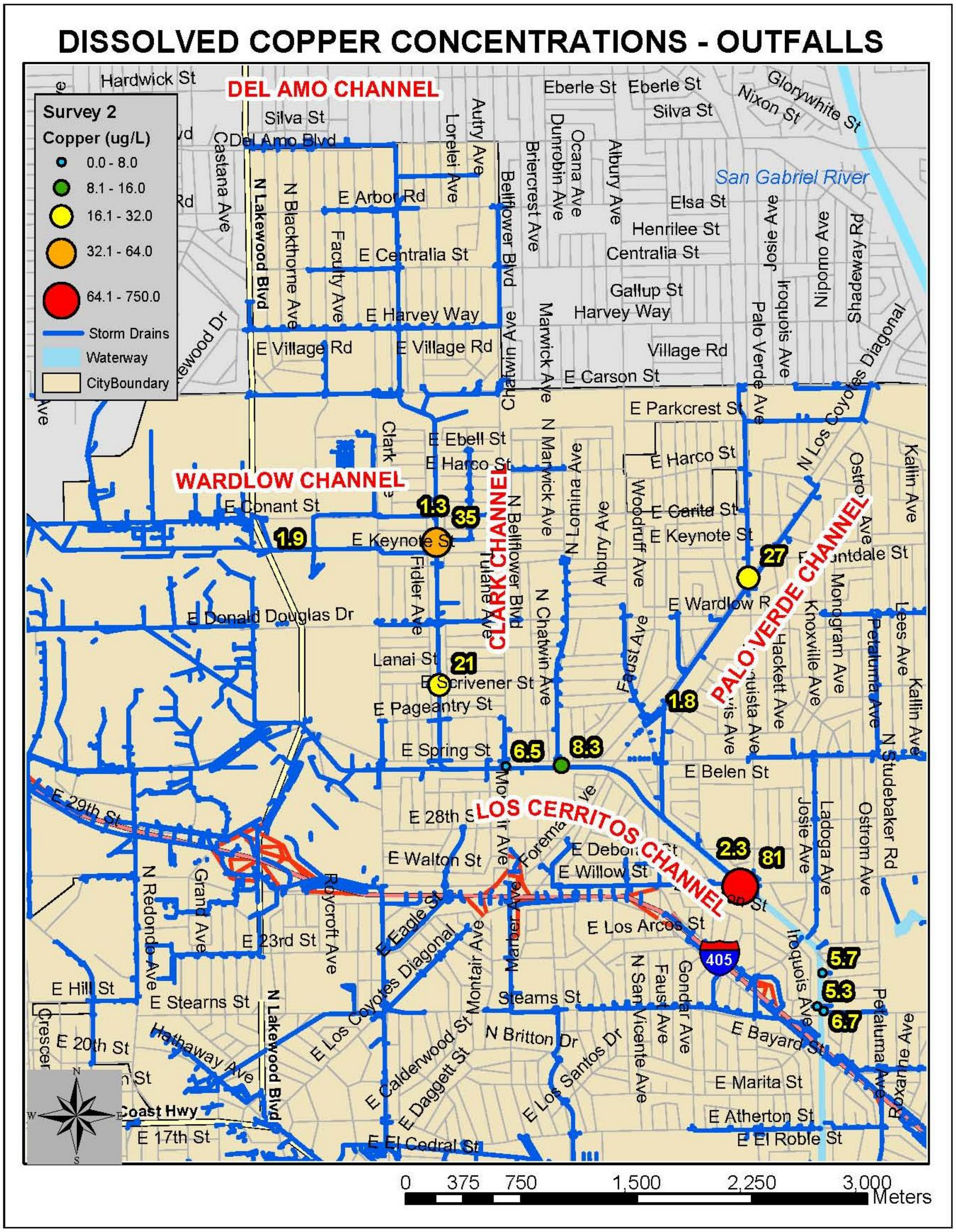

Figure A-14. Concentrations of Dissolved Copper Measured in Flowing Outfalls during Survey 2.

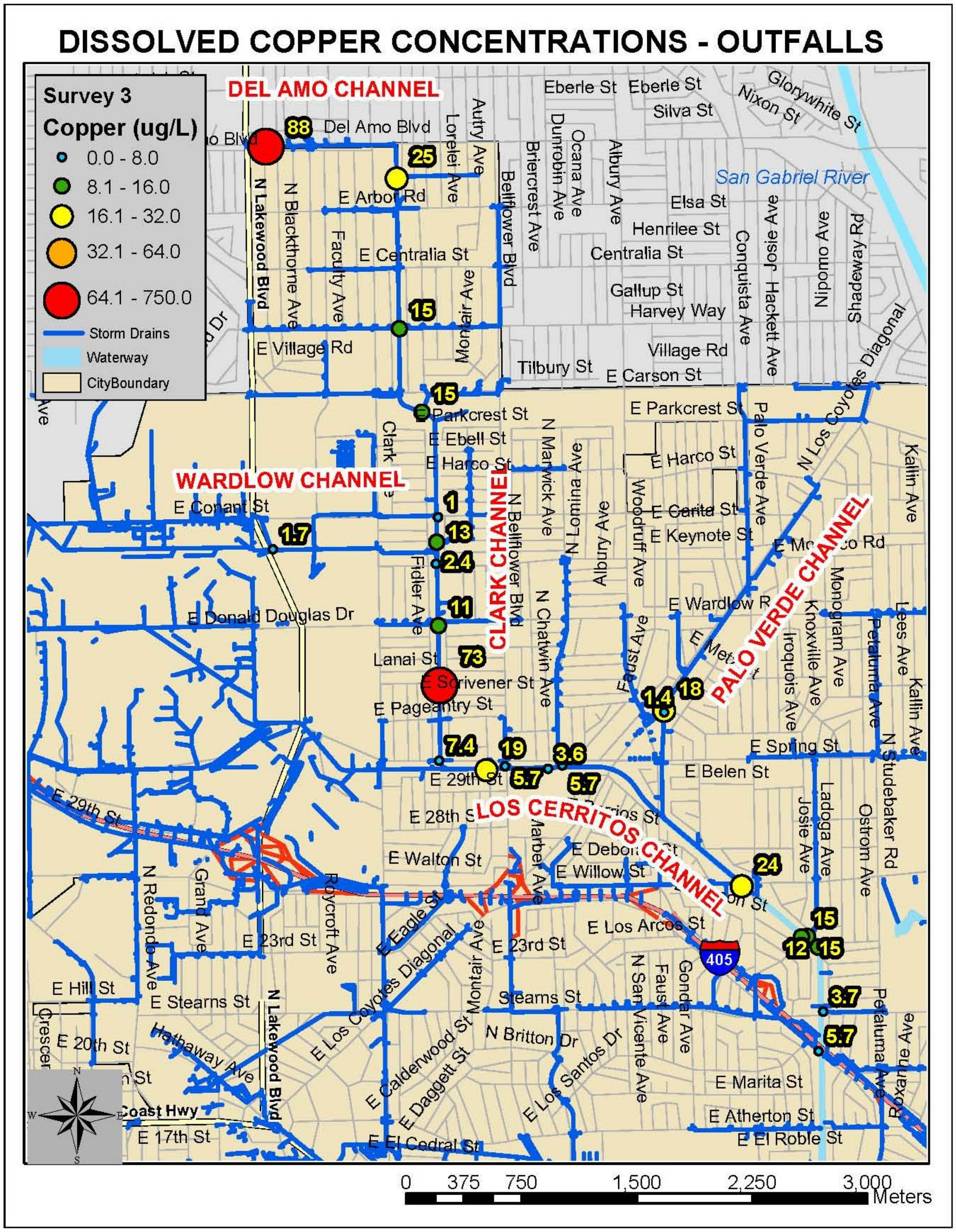

Figure A-15. Concentrations of Dissolved Copper Measured in Flowing Outfalls during Survey 3.

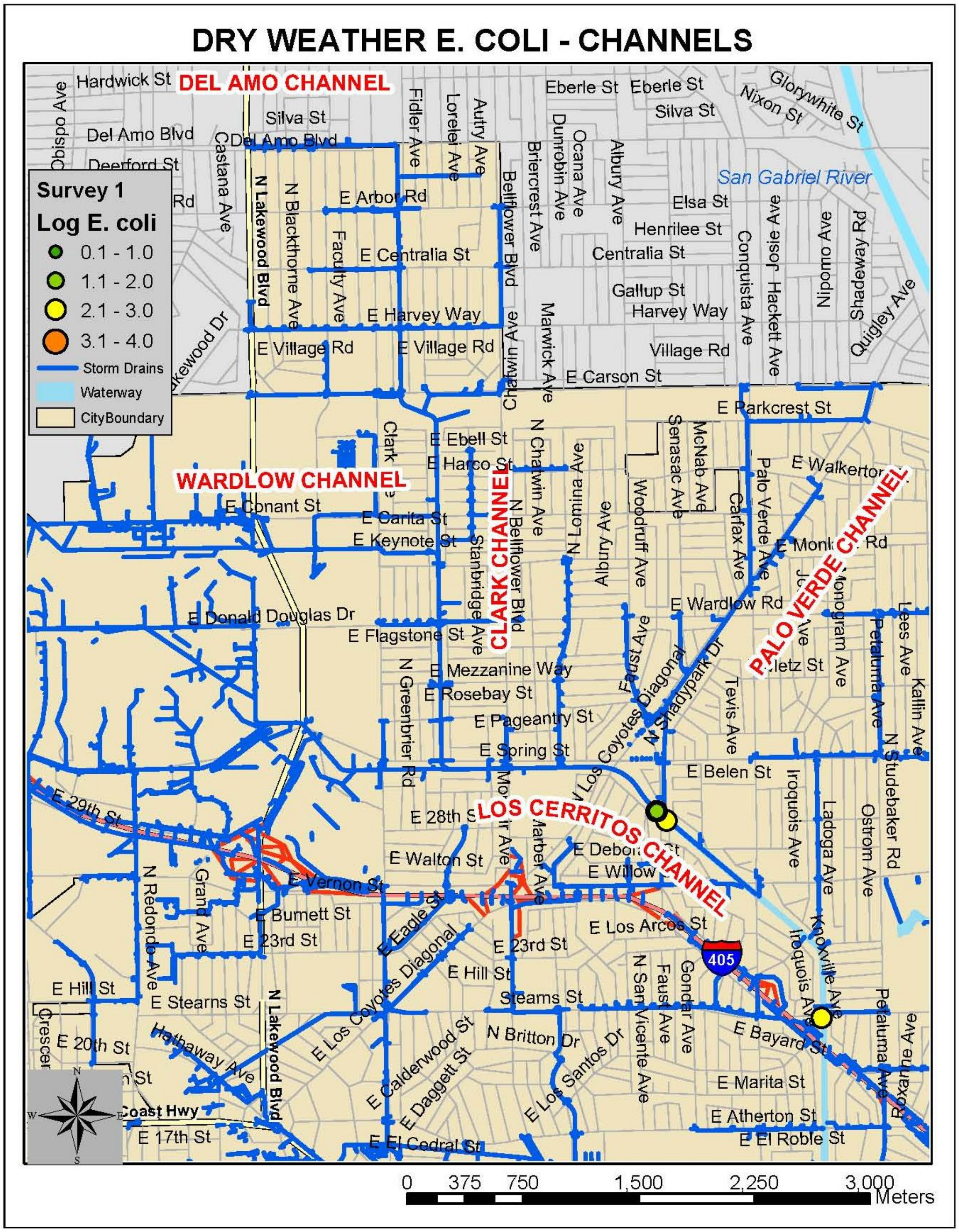

Figure A-16. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 1.

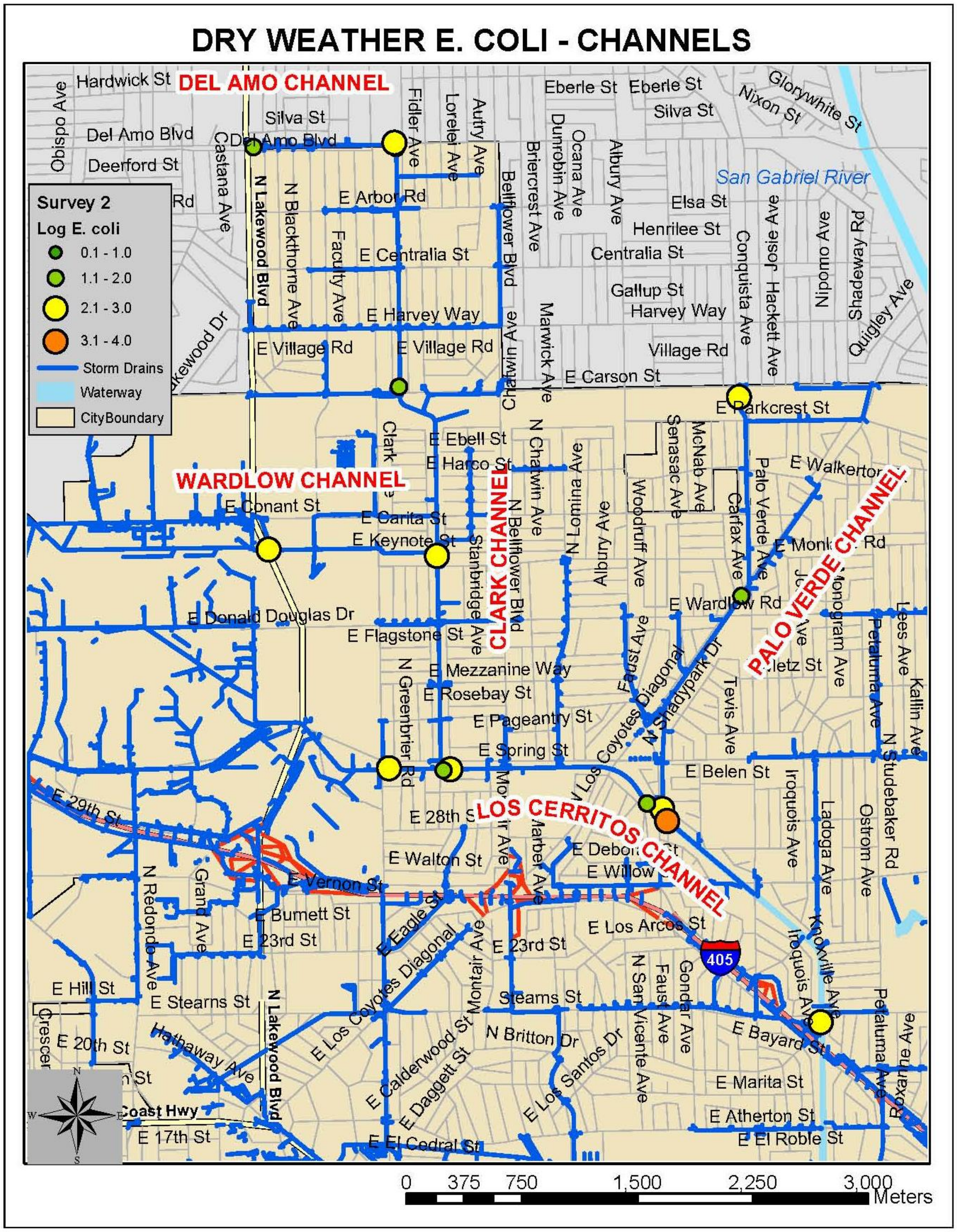

Figure A-17. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 2.

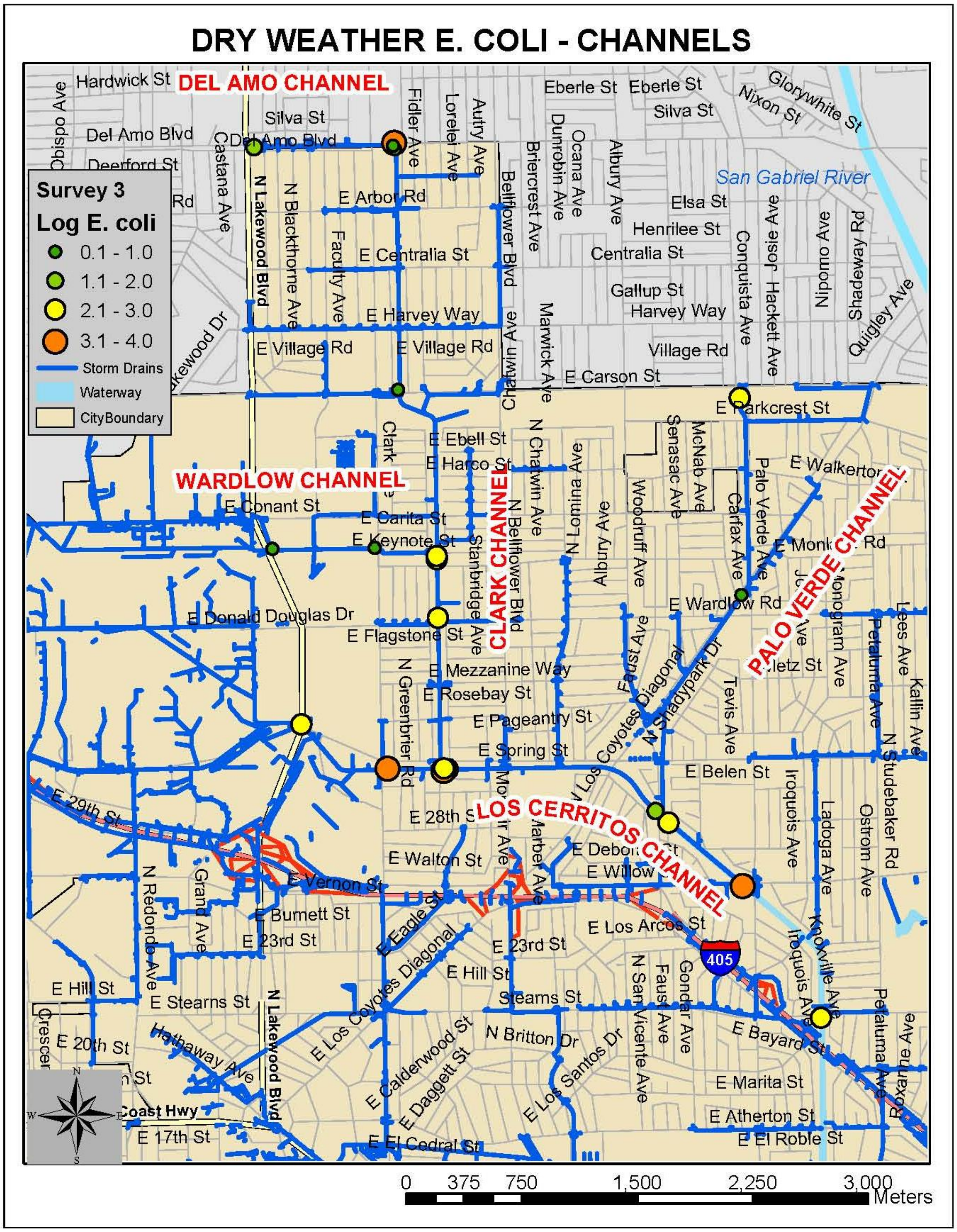

Figure A-18. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 3.

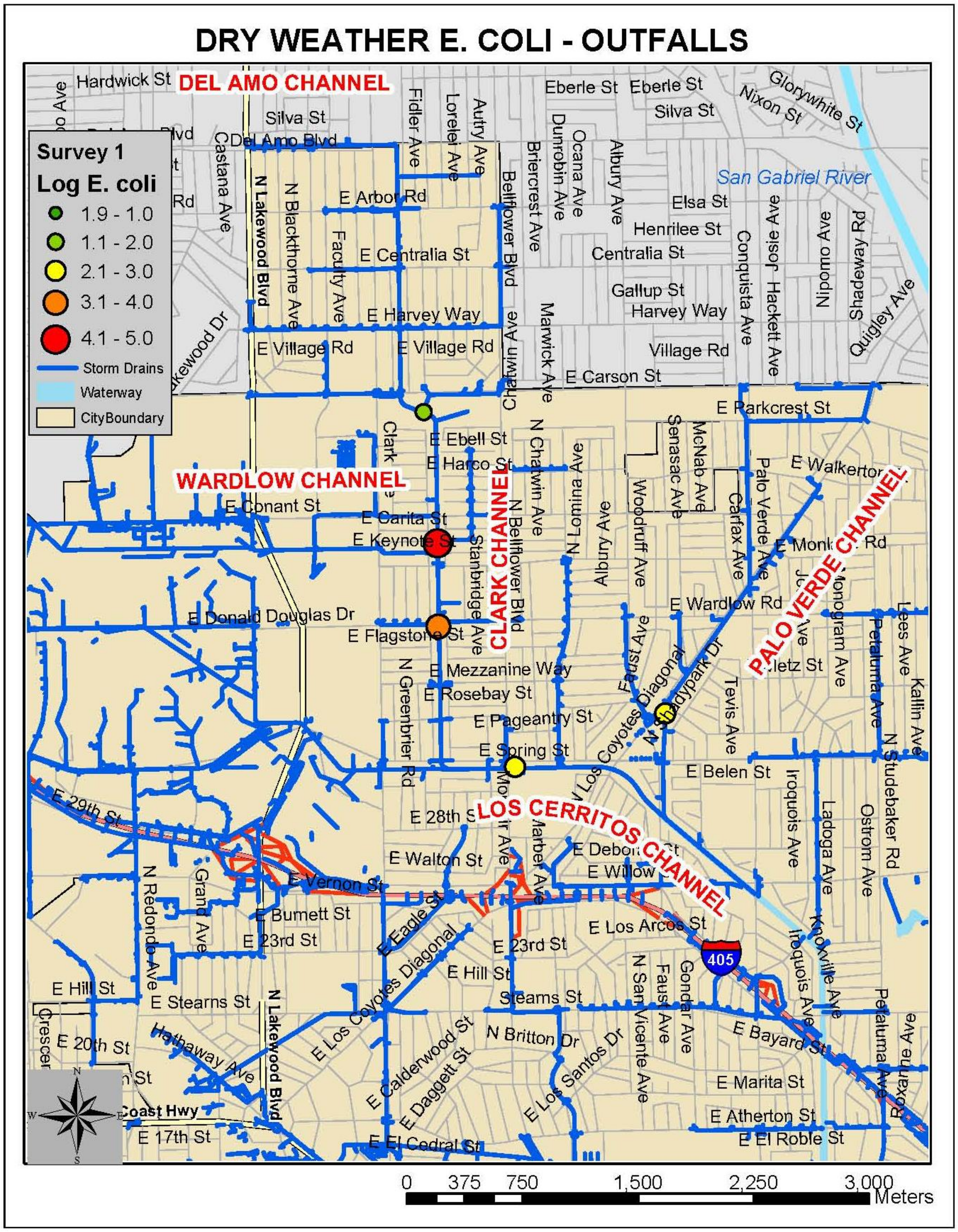

Figure A-19. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.

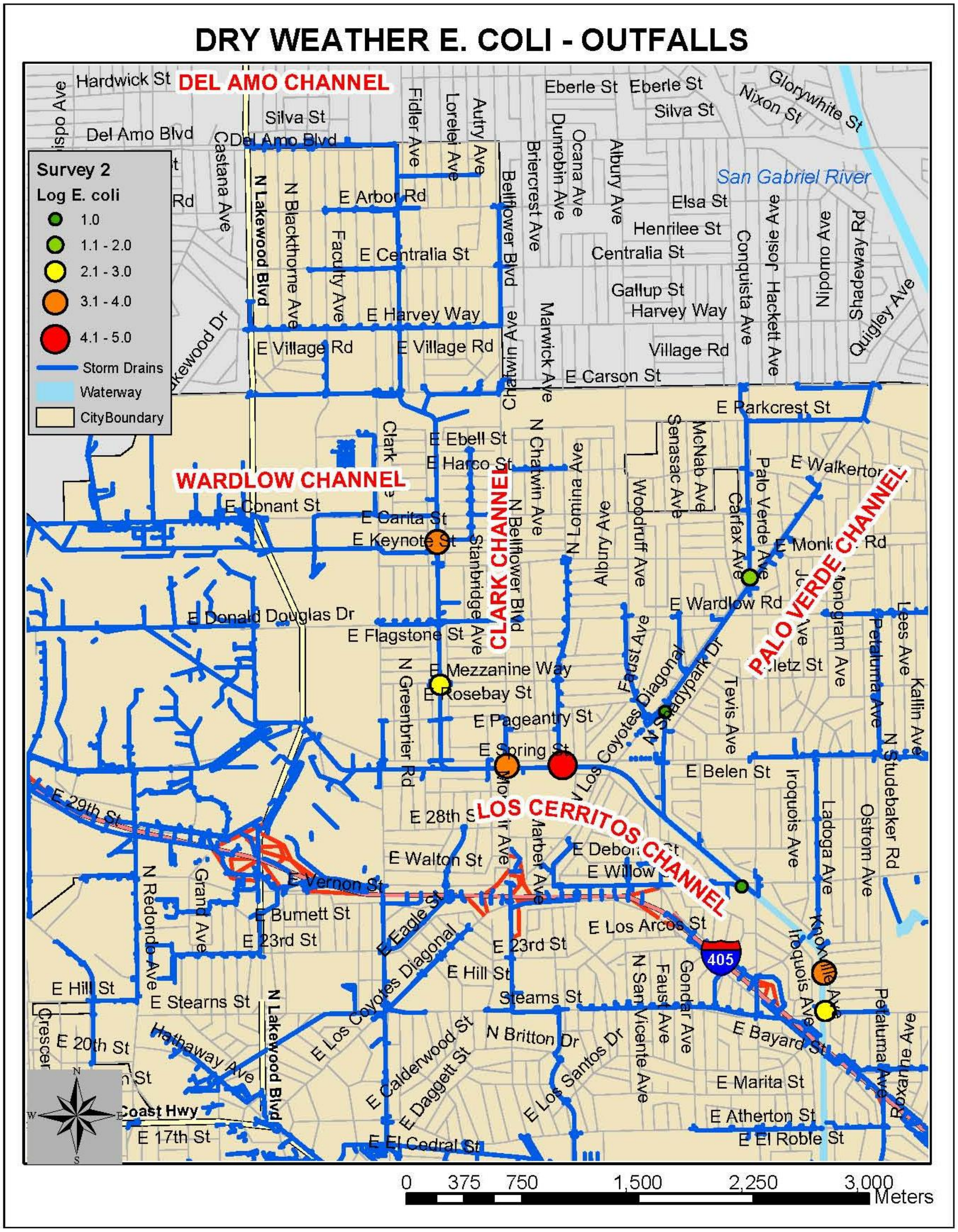

Figure A-20. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.

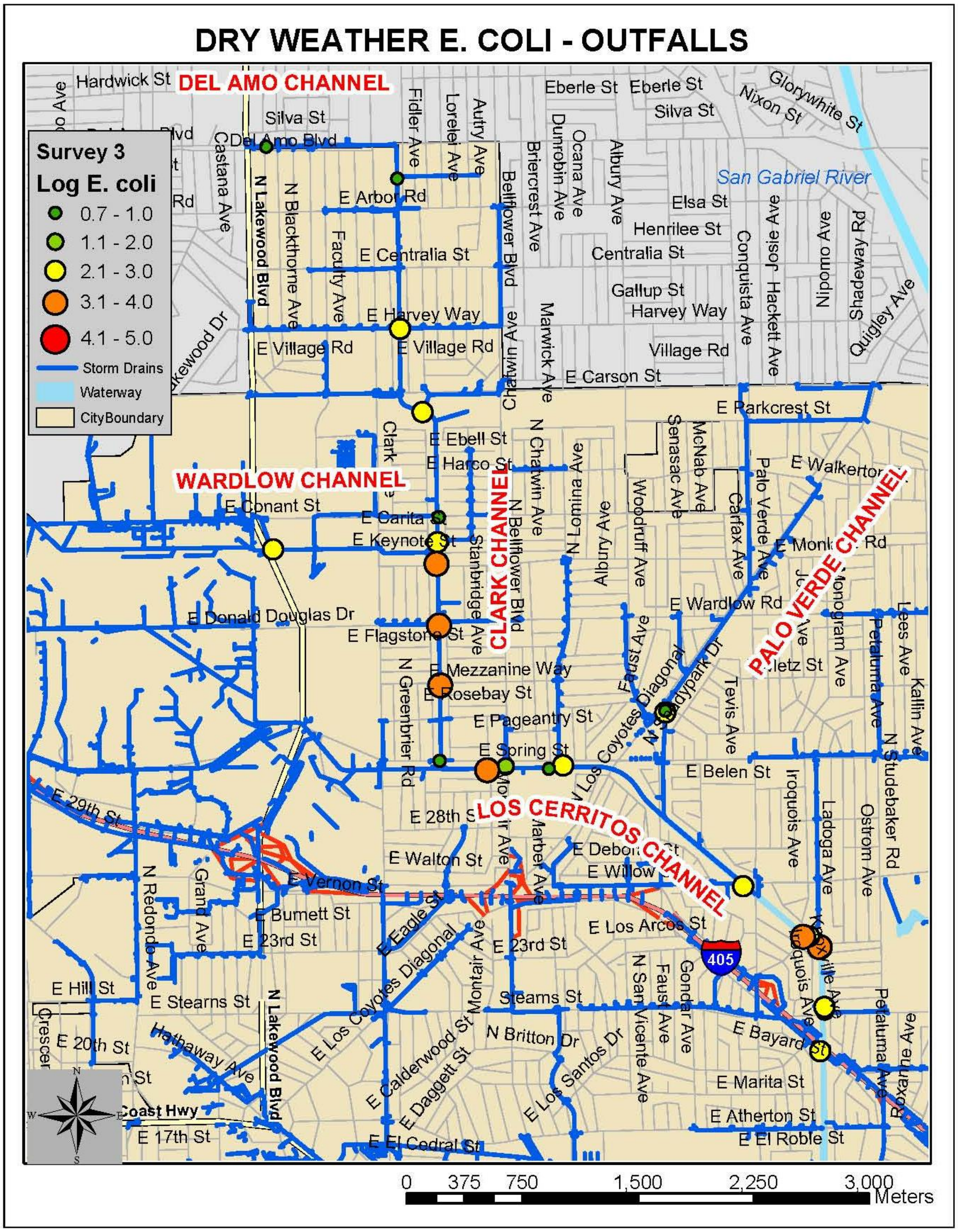

Figure A-21. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.

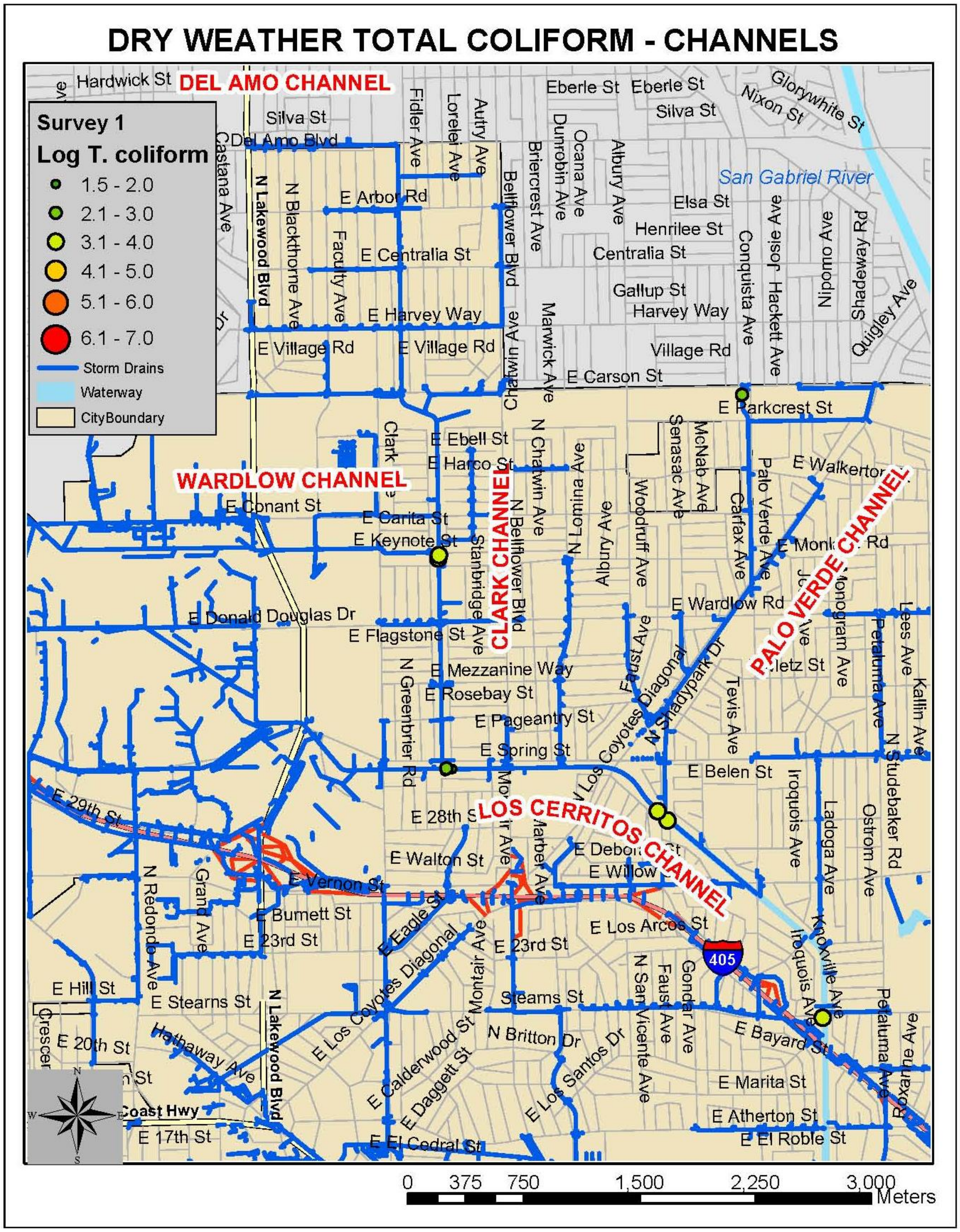

Figure A-22. Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 1.

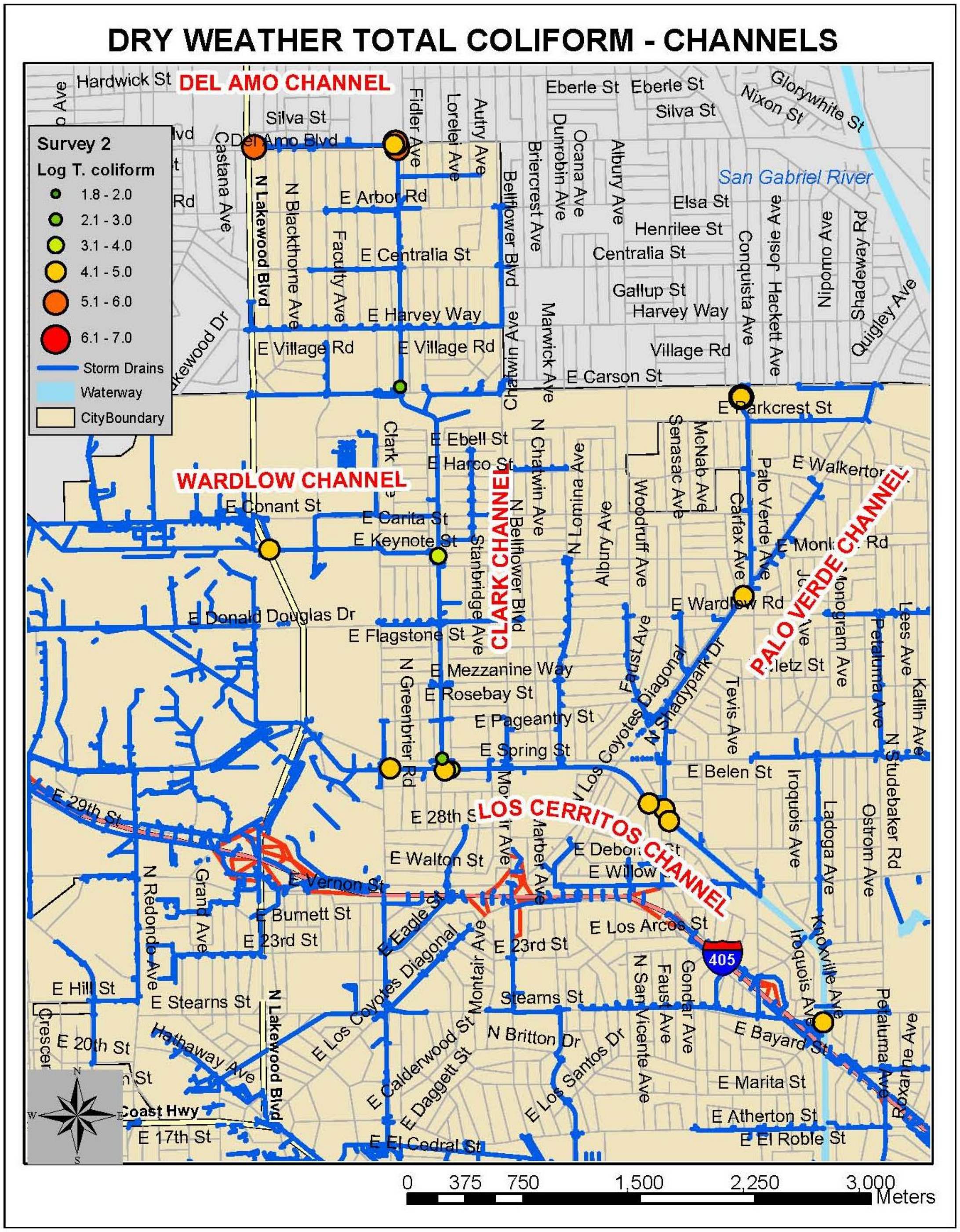

Figure A-23. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 2.**

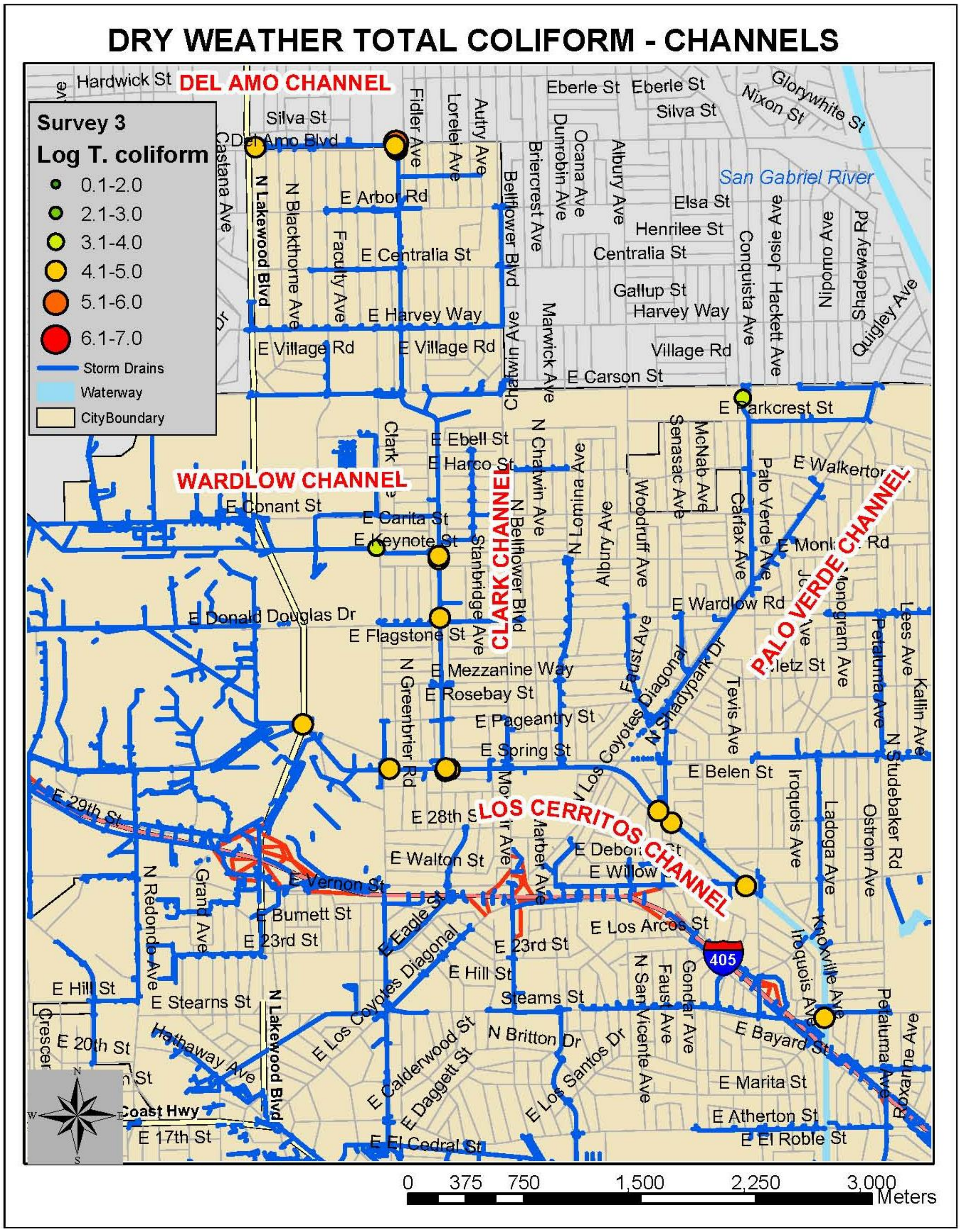

Figure A-24. Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 3.

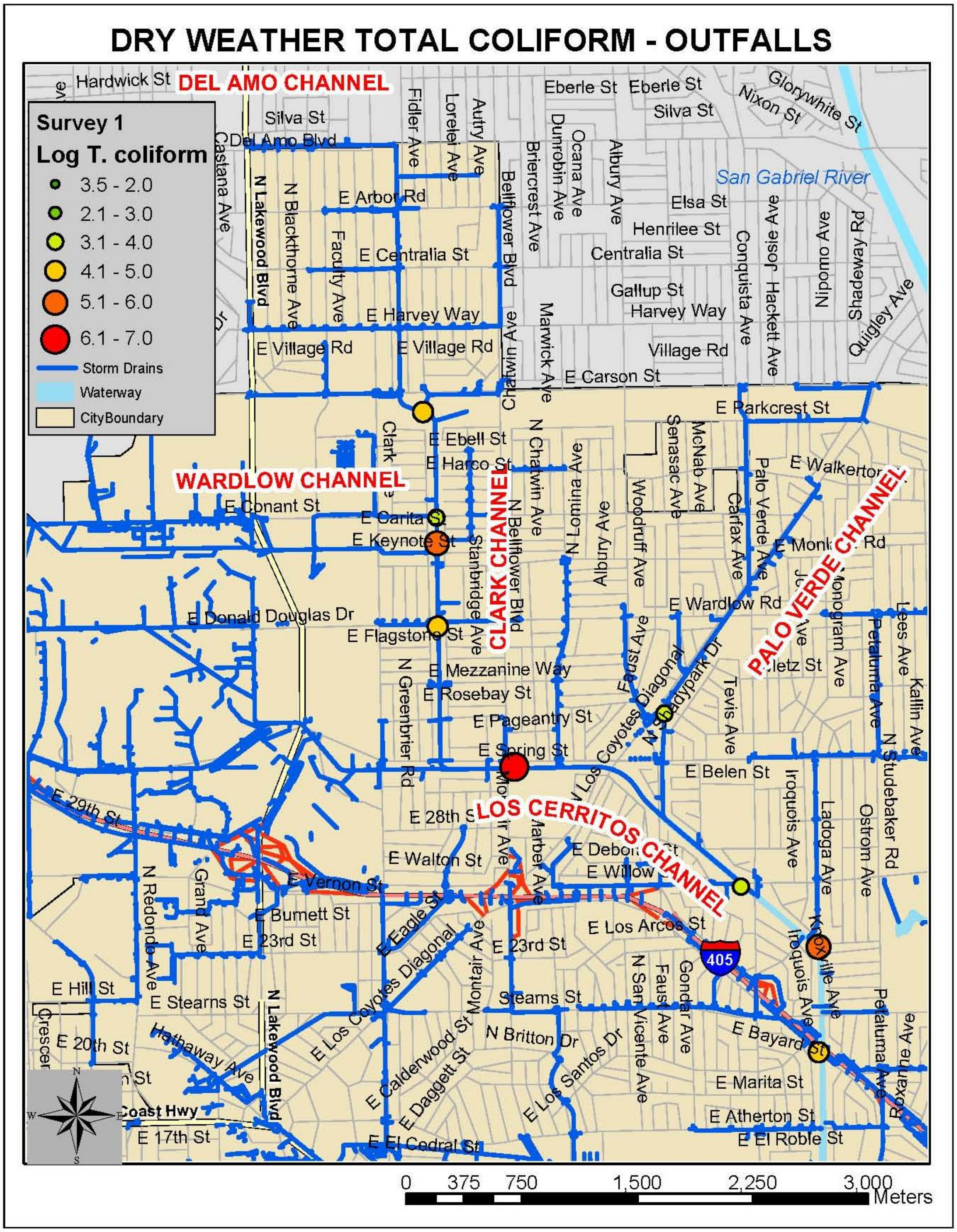

Figure A-25. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.**

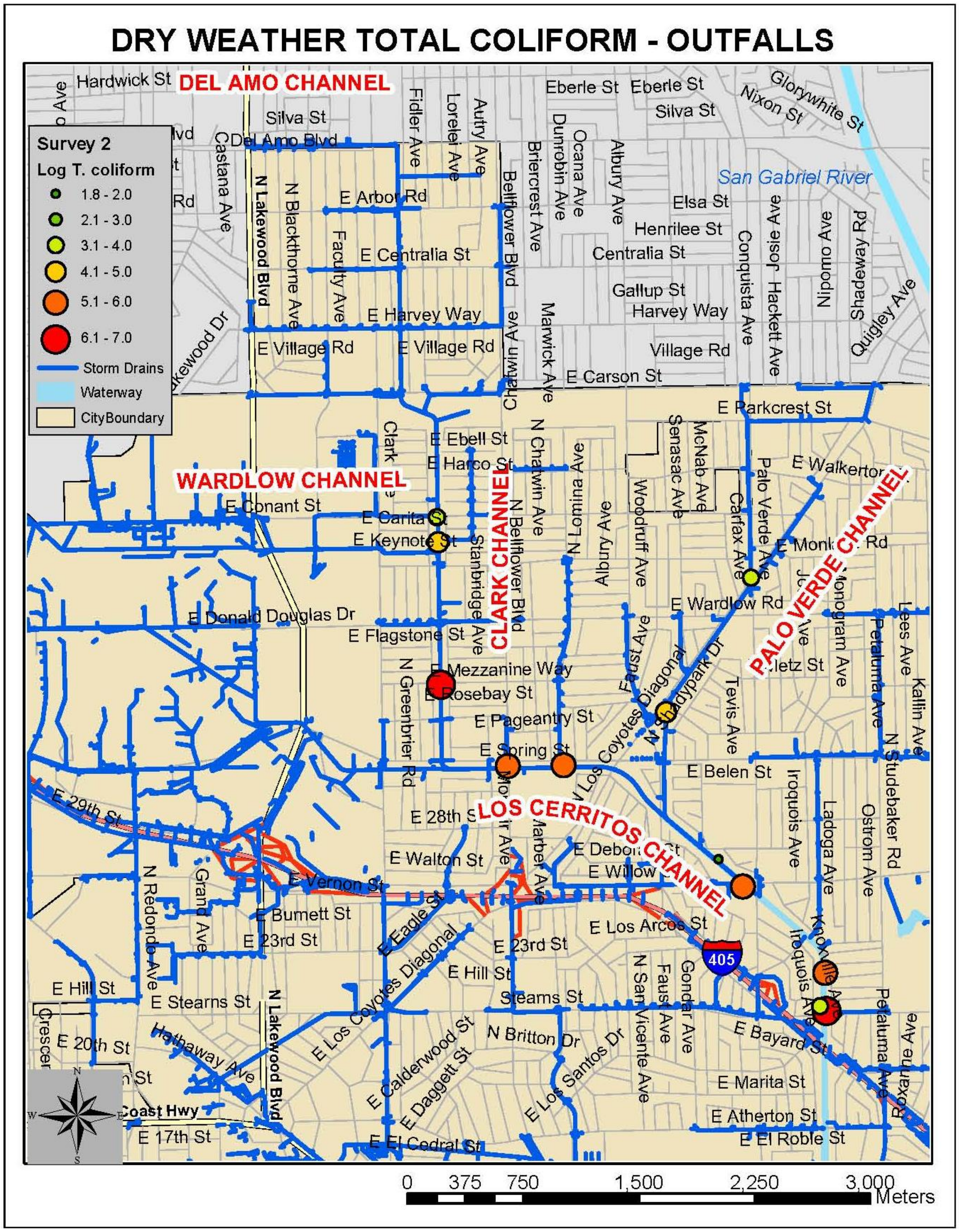

Figure A-26. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.**

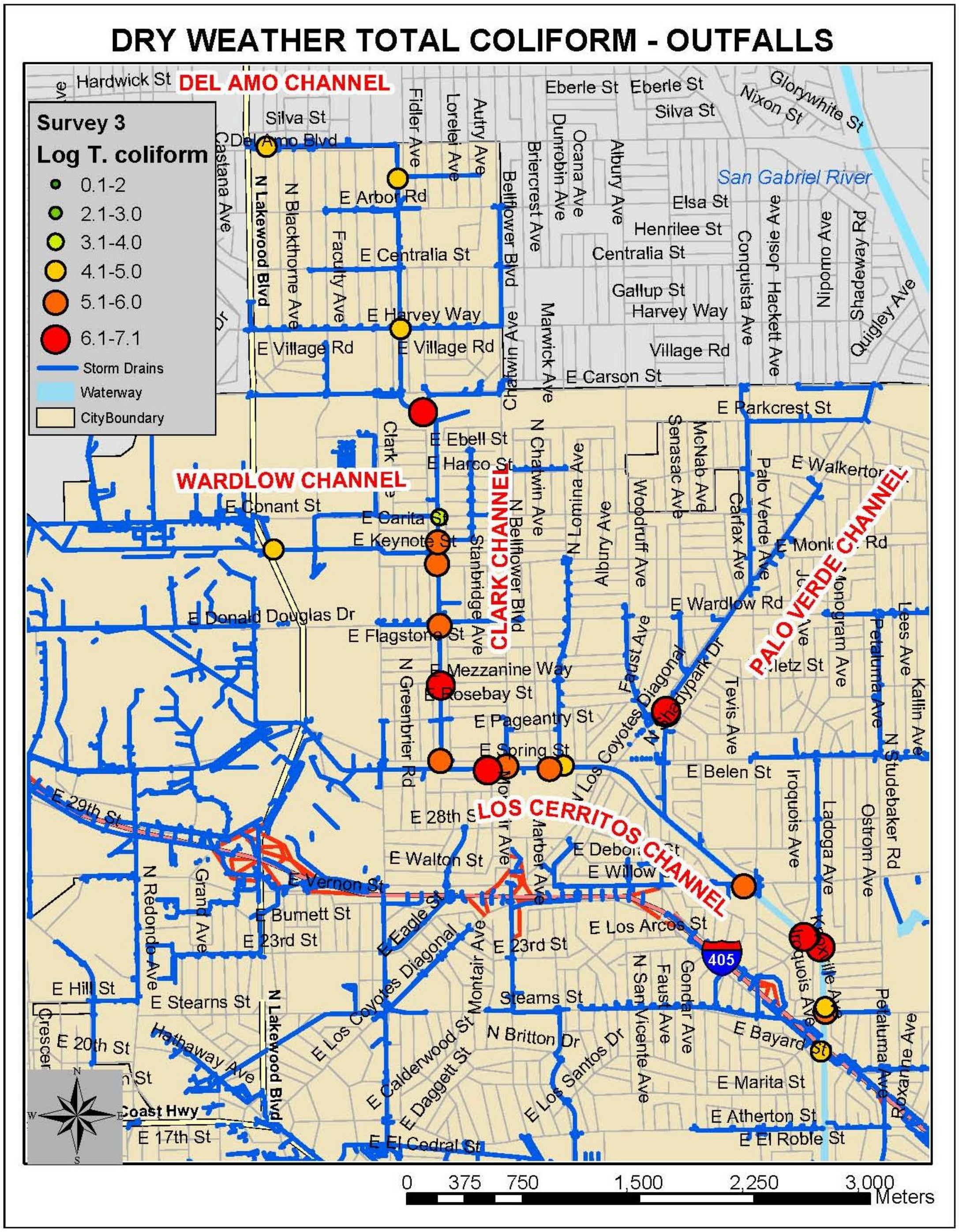

Figure A-27. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.**

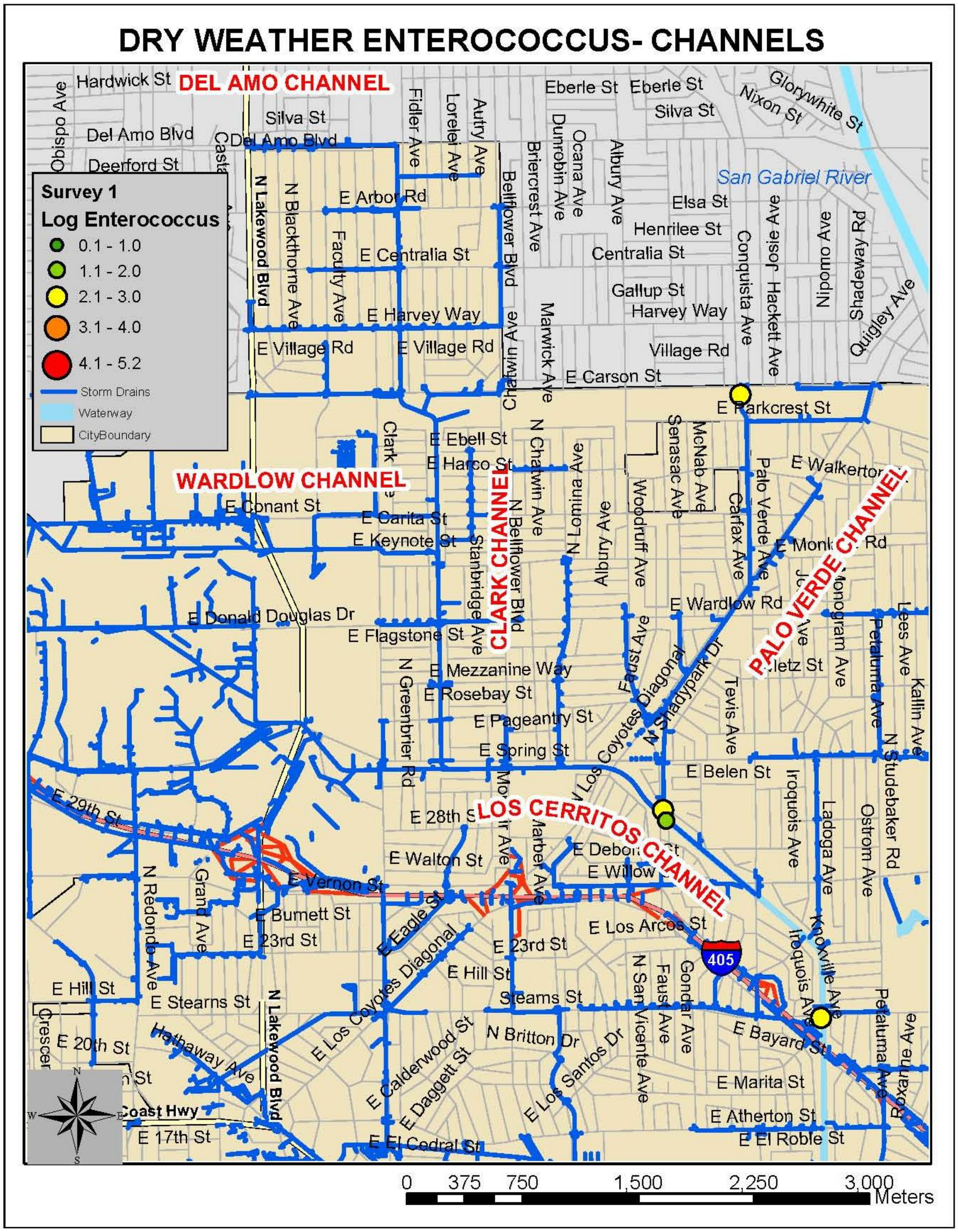

Figure A-28. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 1.**

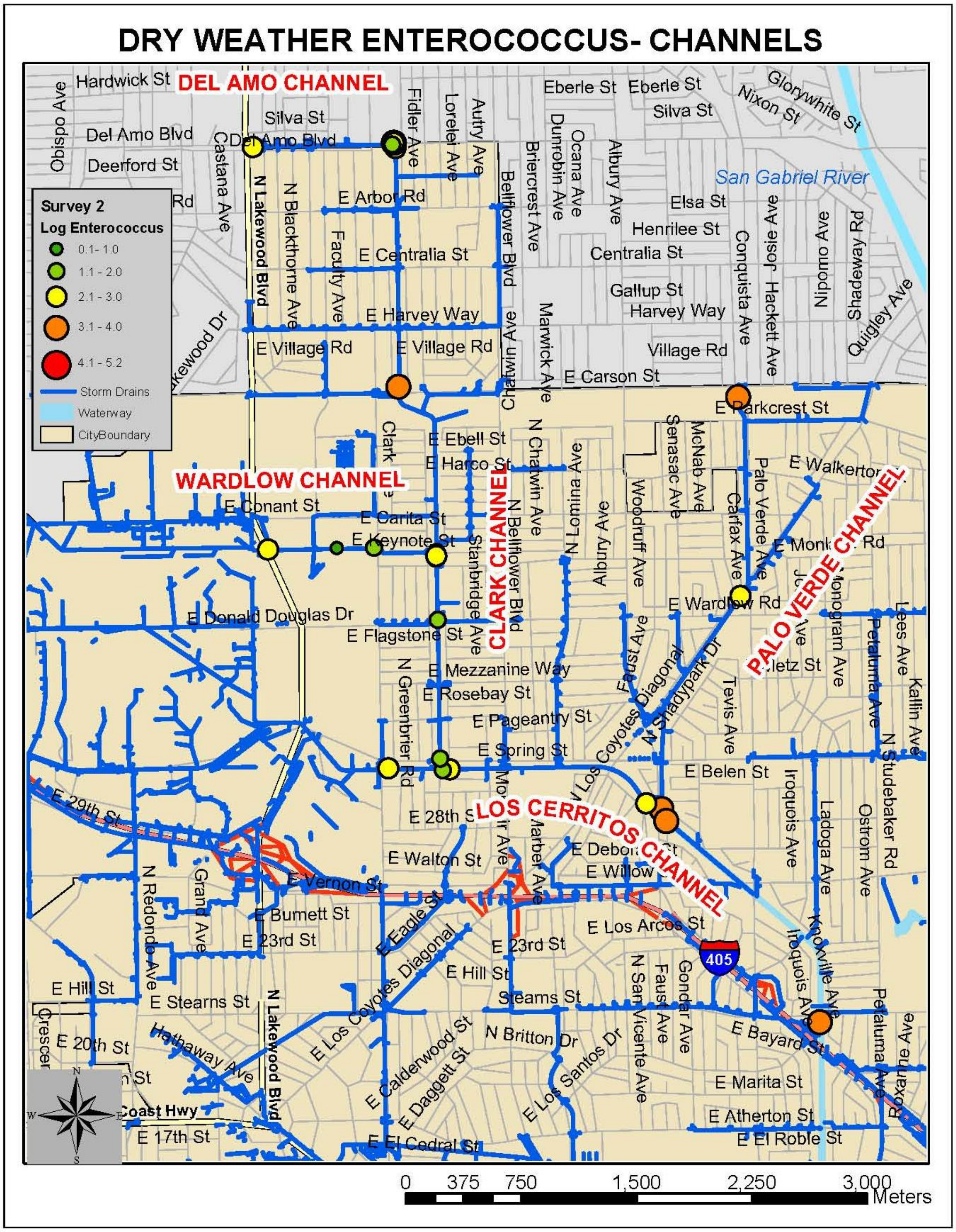

Figure A-29. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 2.

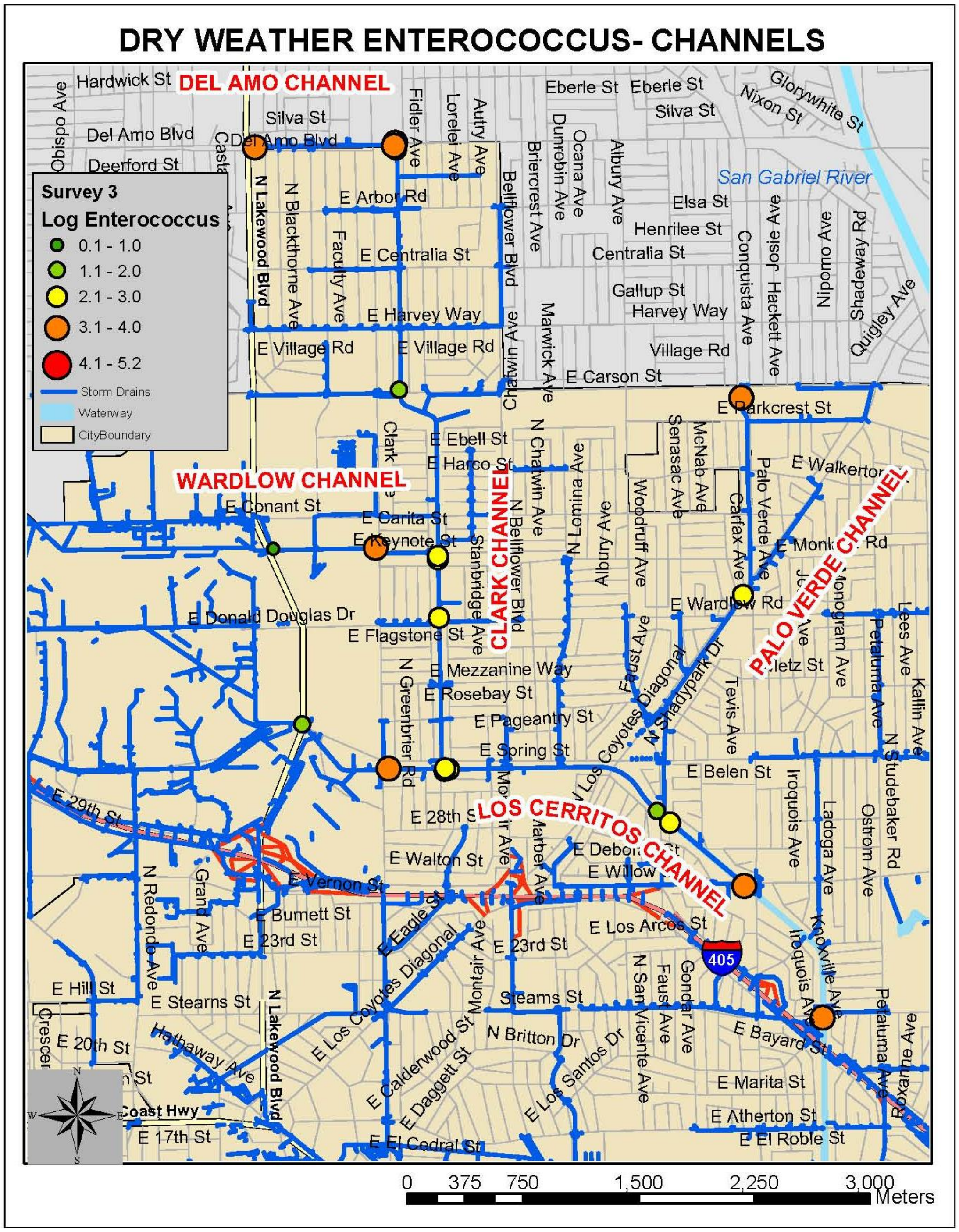

Figure A-30. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 3.**

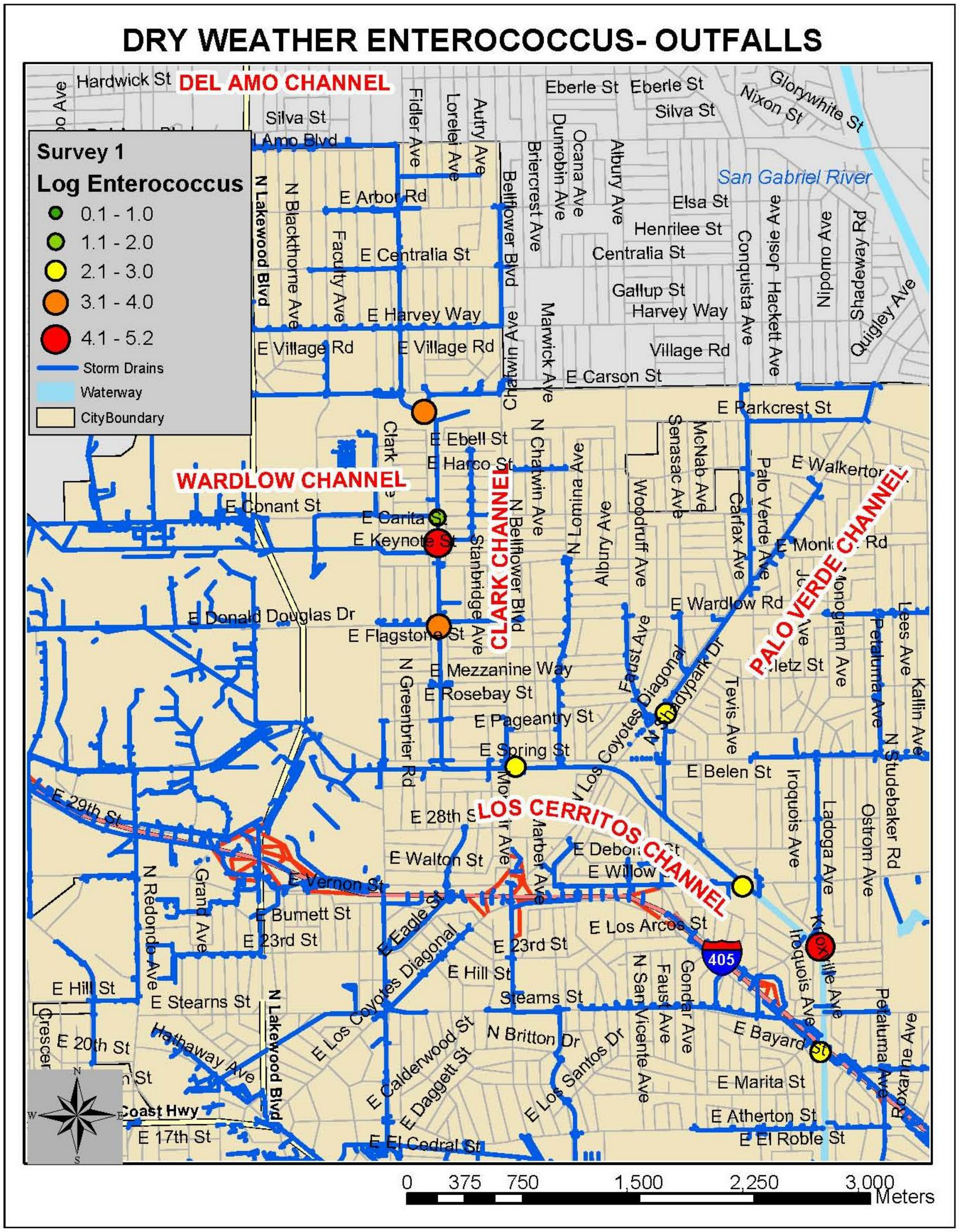

Figure A-31. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.**

Figure A-32. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.

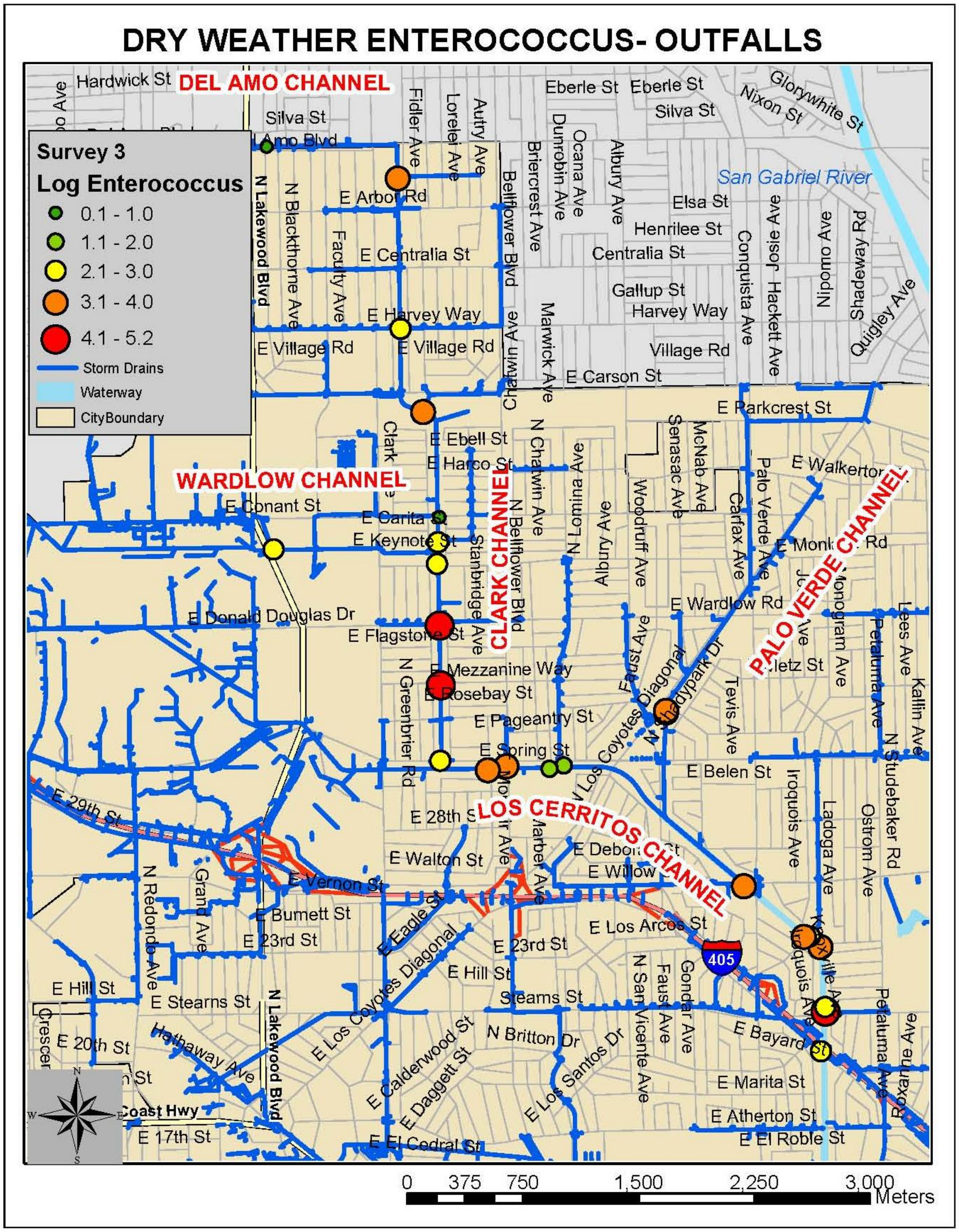

Figure A-33. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.**

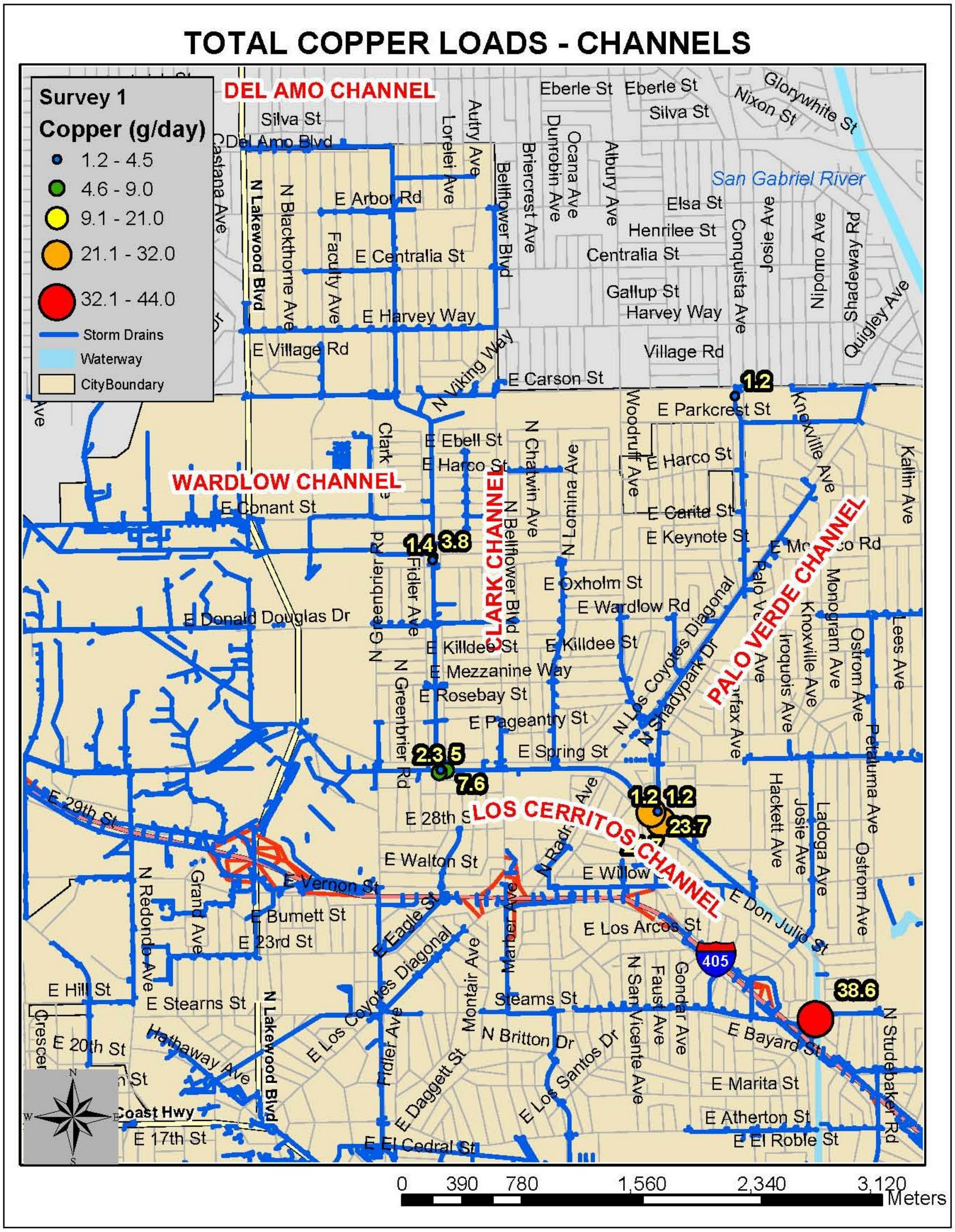

Figure A-34. Total Copper Loads Measured in Main Channels during Survey 1.

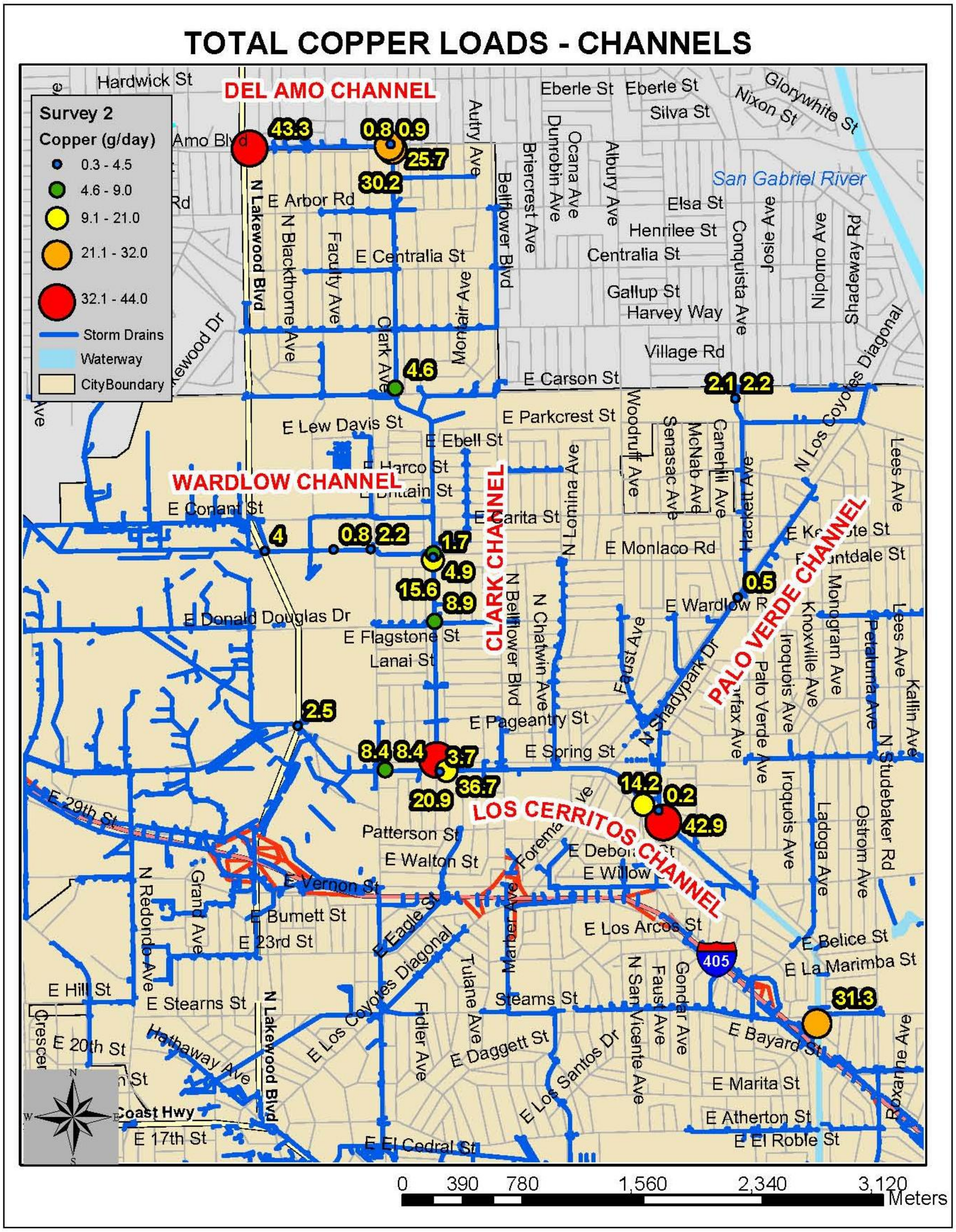

Figure A-35. Total Copper Loads Measured in Main Channels during Survey2.

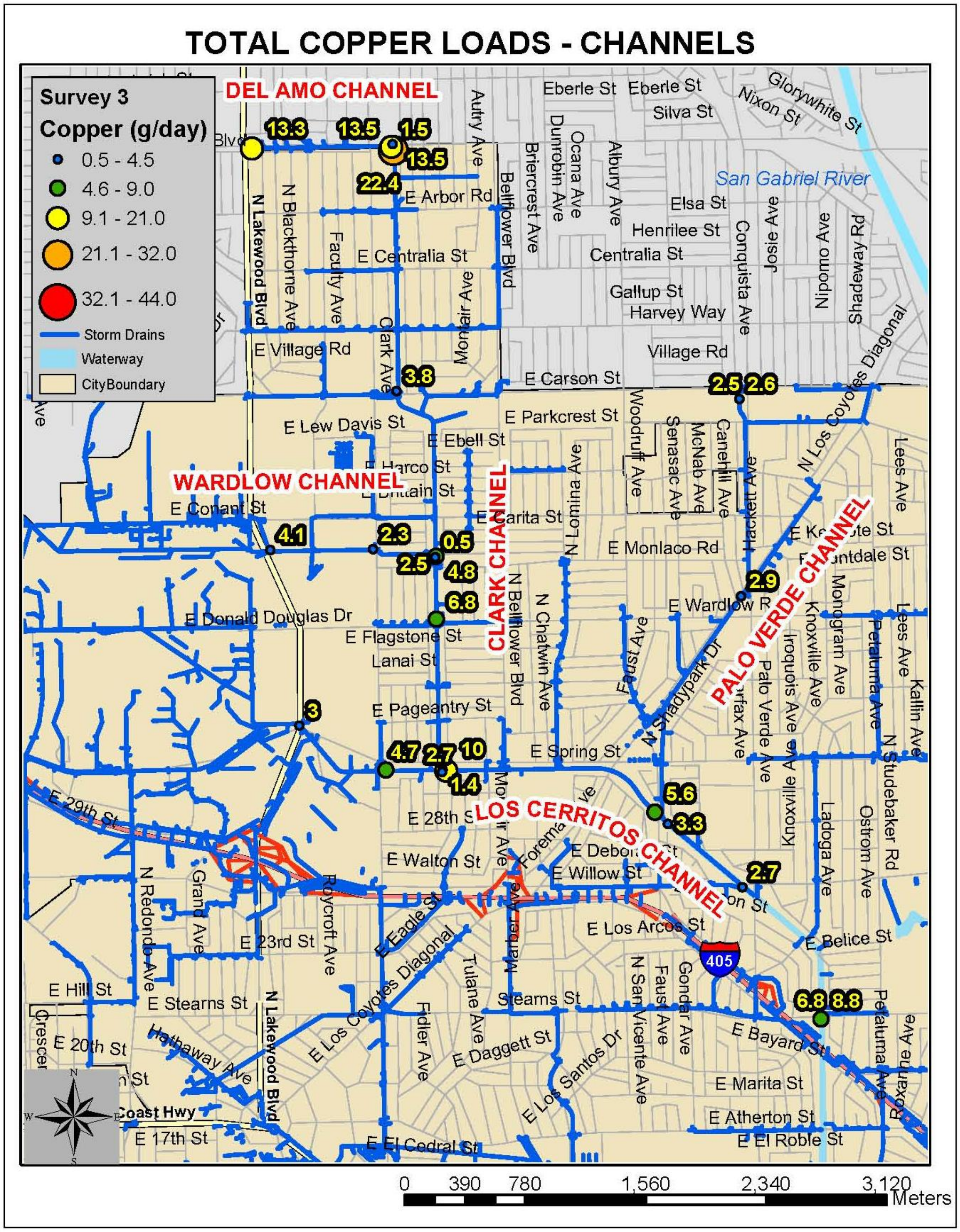

Figure A-36. **Total Copper Loads Measured in Main Channels during Survey3.**

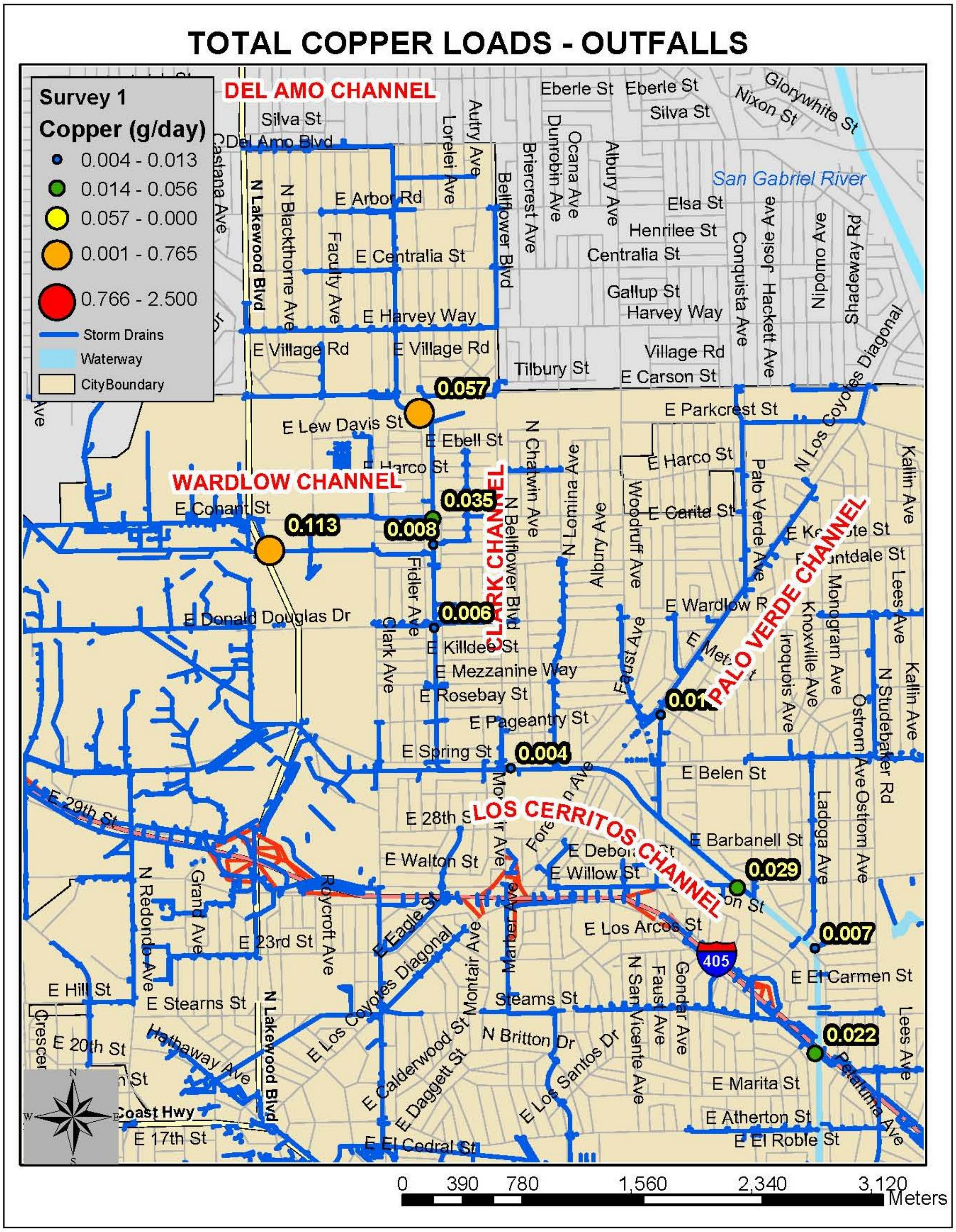

Figure A-37. **Total Copper Loads Measured in Flowing Outfalls during Survey 1.**

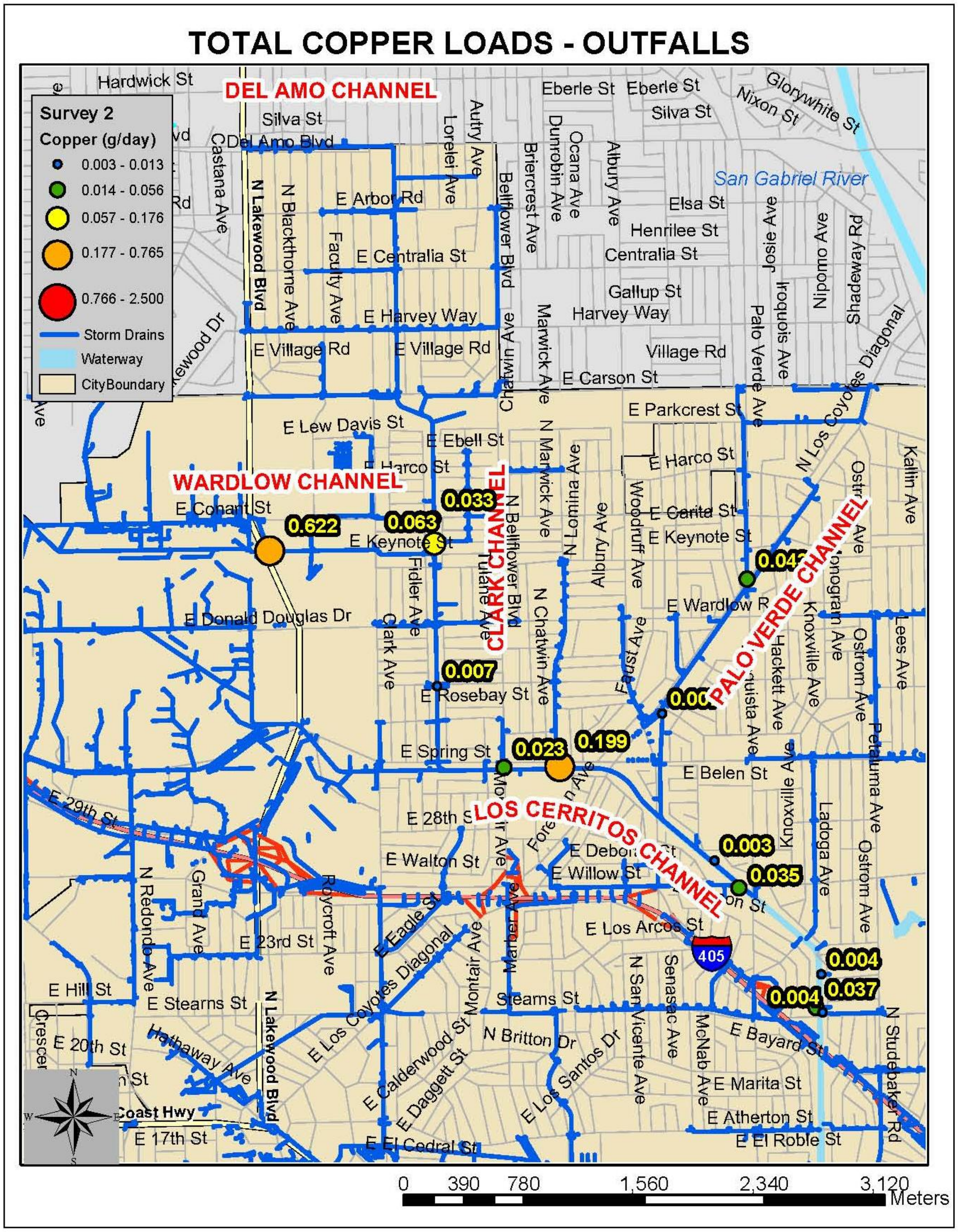

Figure A-38. **Total Copper Loads Measured in Flowing Outfalls during Survey 2.**

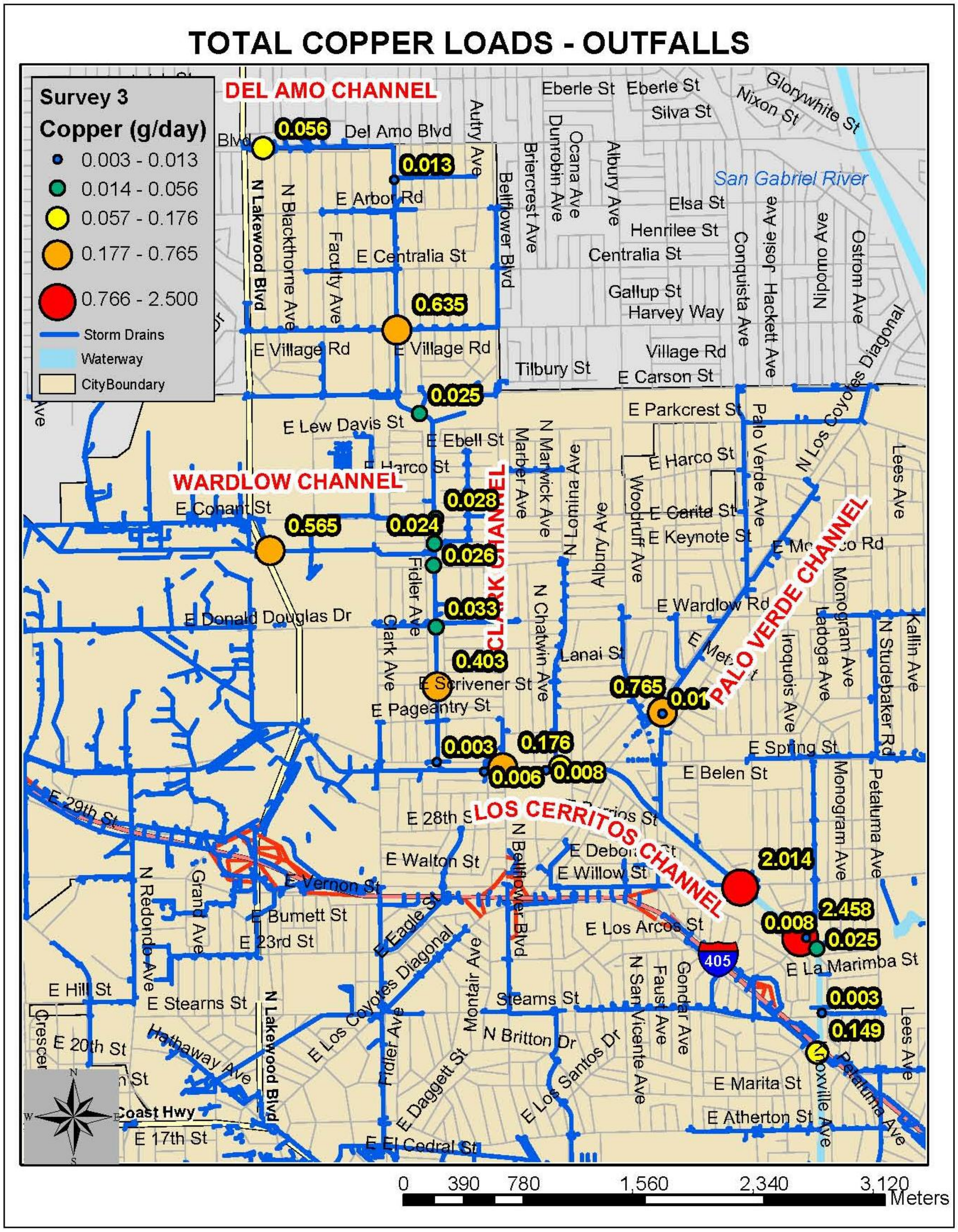

Figure A-39. Total Copper Loads Measured in Flowing Outfalls during Survey 3.

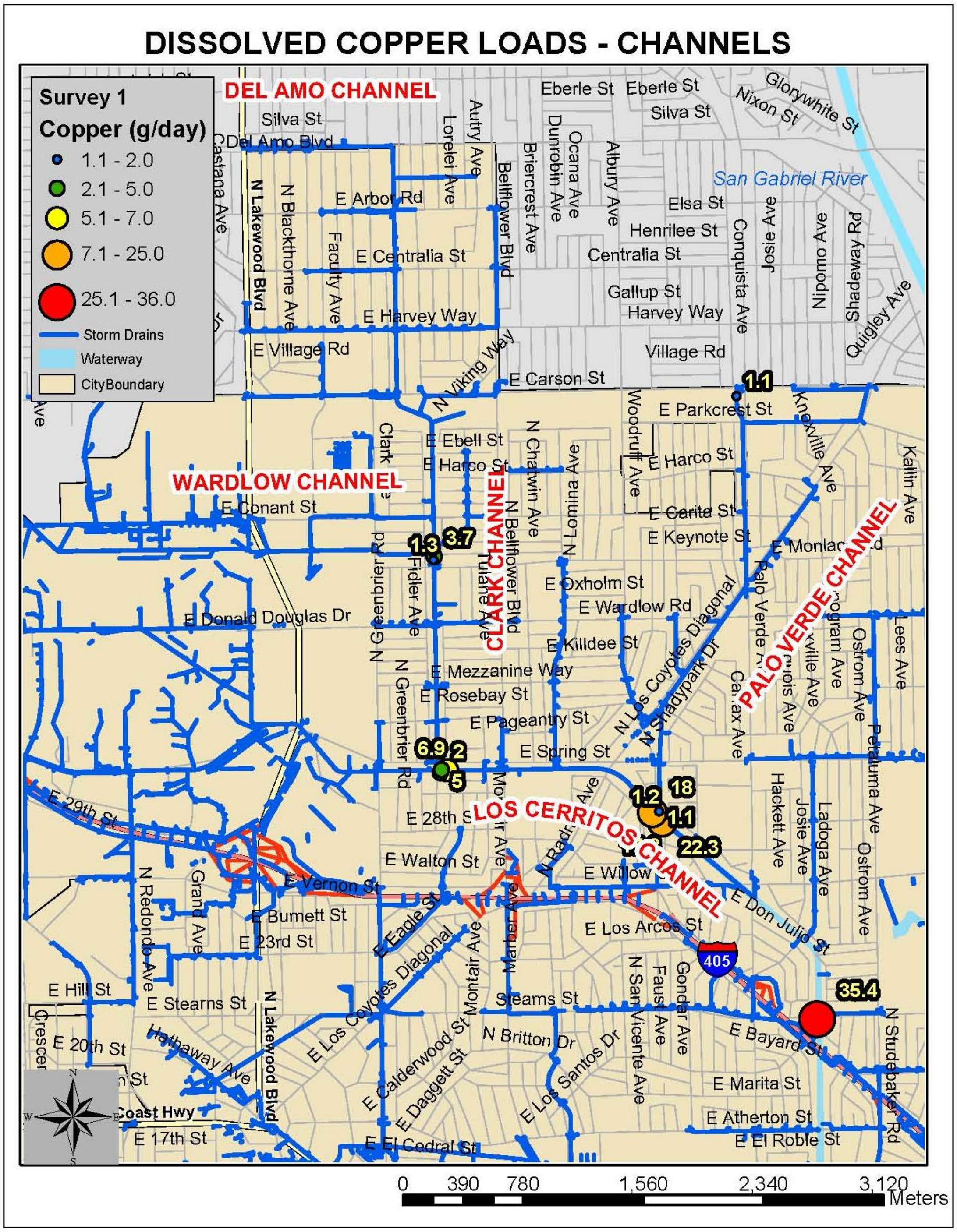

Figure A-40. **Dissolved Copper Loads Measured in Main Channels during Survey 1.**

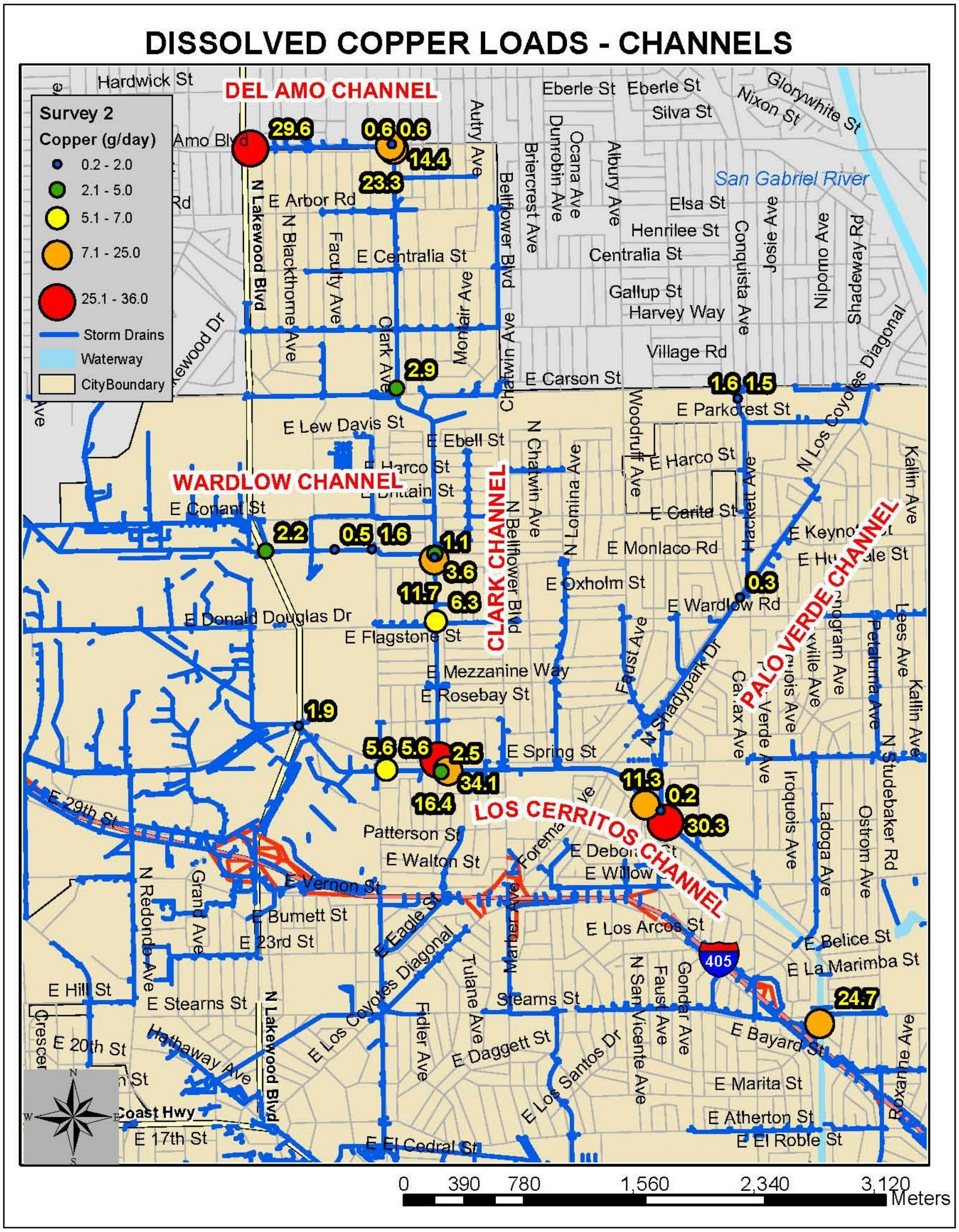

Figure A-41. Dissolved Copper Loads Measured in Main Channels during Survey 2.

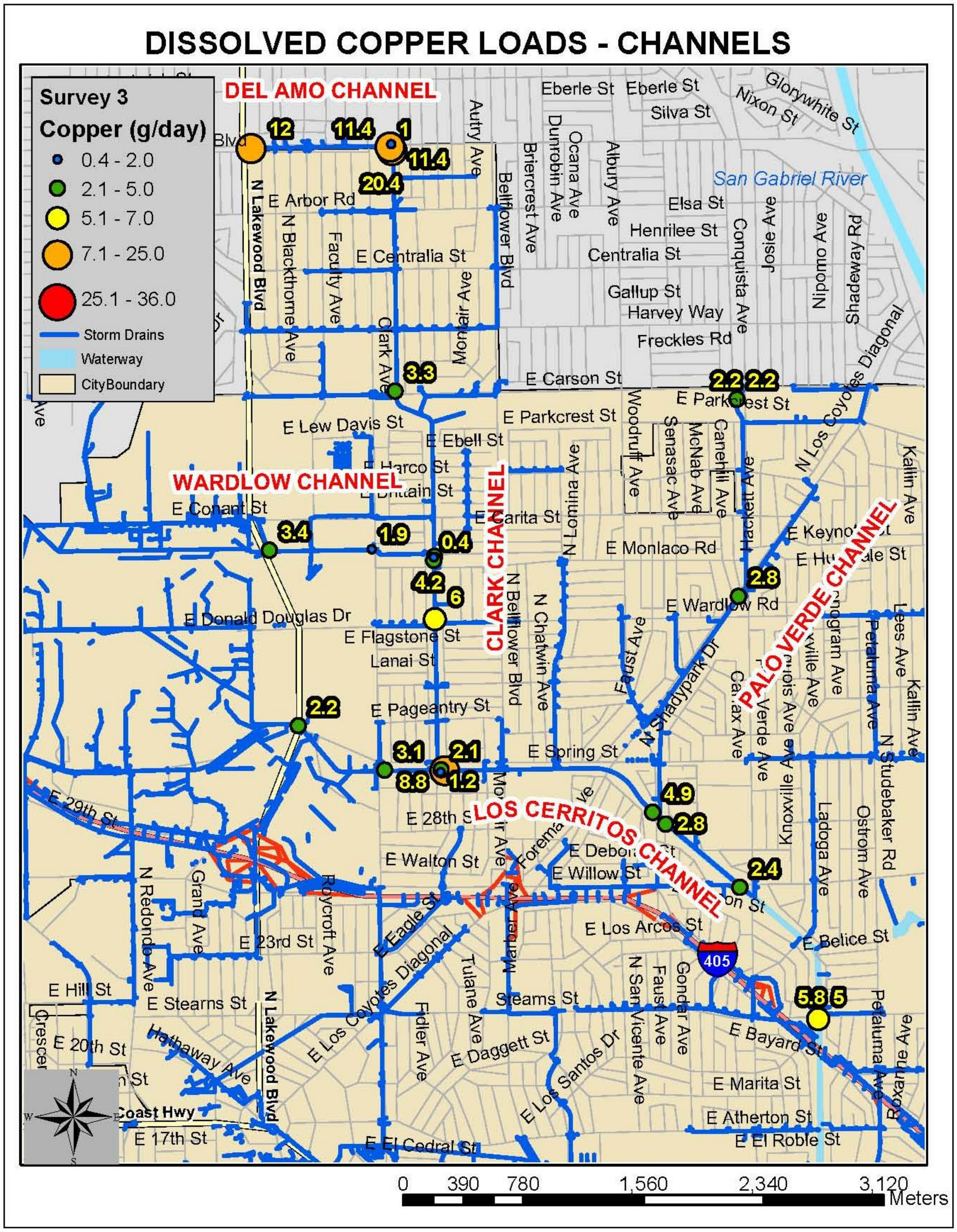

Figure A-42. **Dissolved Copper Loads Measured in Main Channels during Survey 3.**

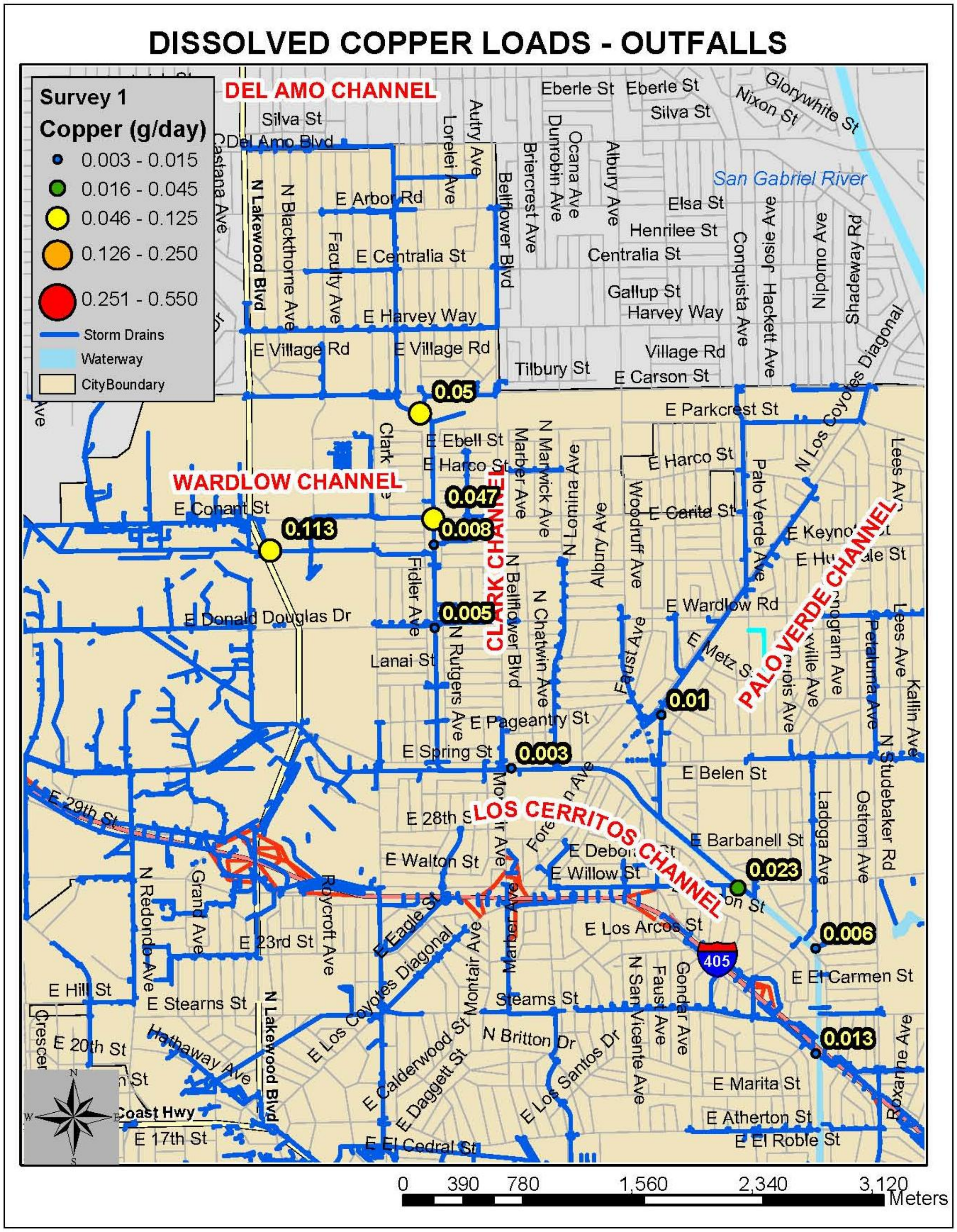

Figure A-43. **Dissolved Copper Loads Measured in Flowing Outfalls during Survey 1.**

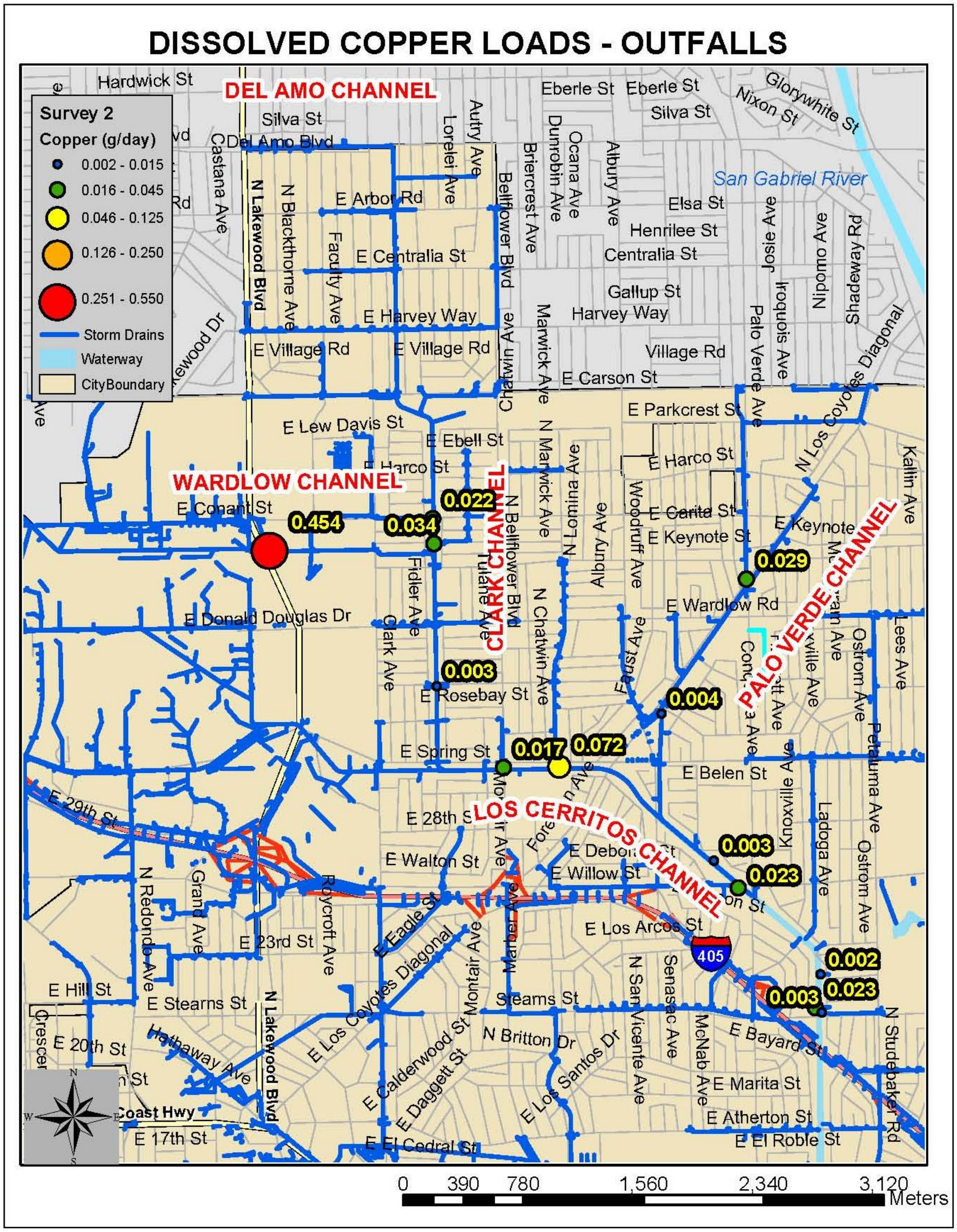

Figure A-44. Dissolved Copper Loads Measured in Flowing Outfalls during Survey 2.

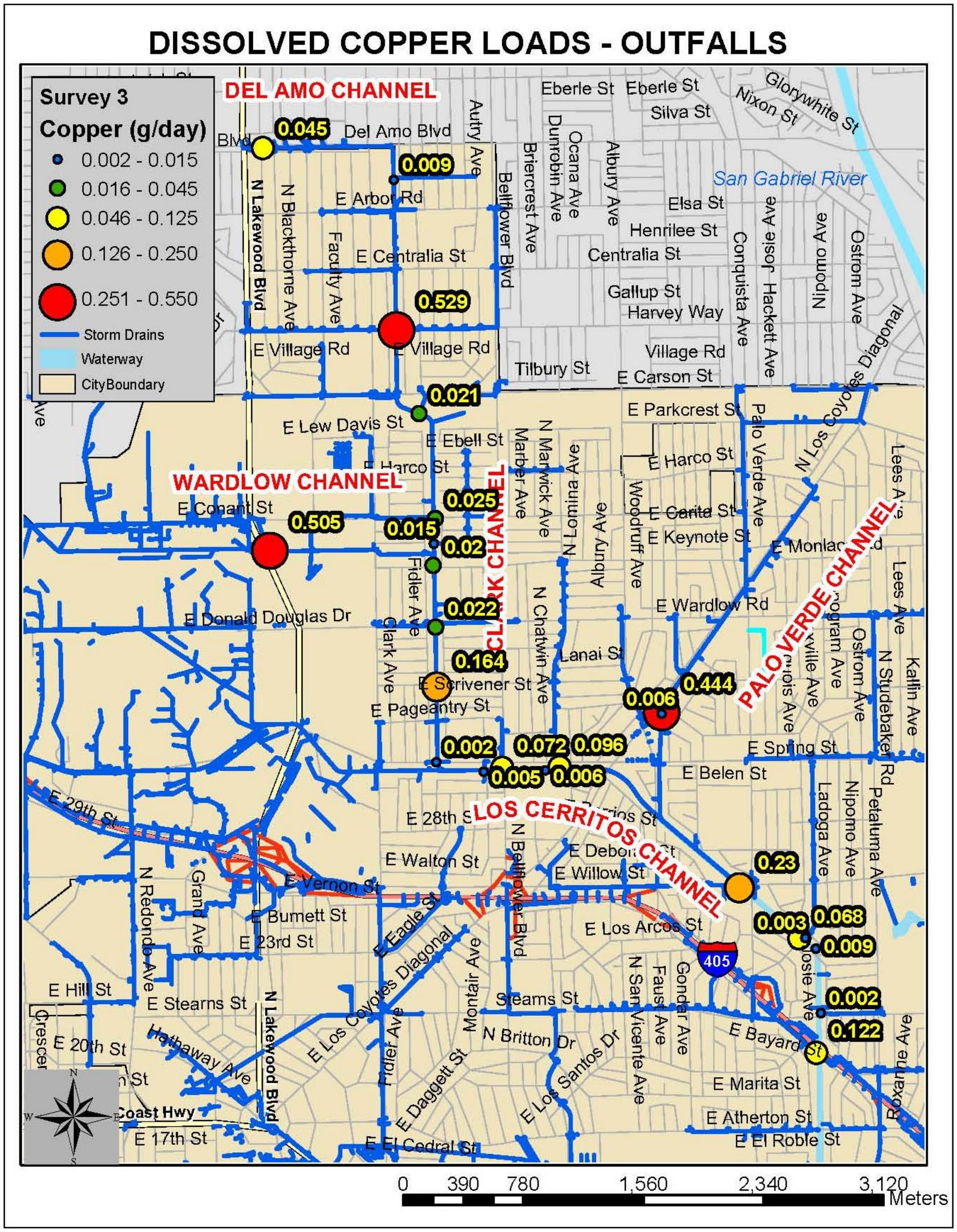

Figure A-45. Dissolved Copper Loads Measured in Flowing Outfalls during Survey 3.

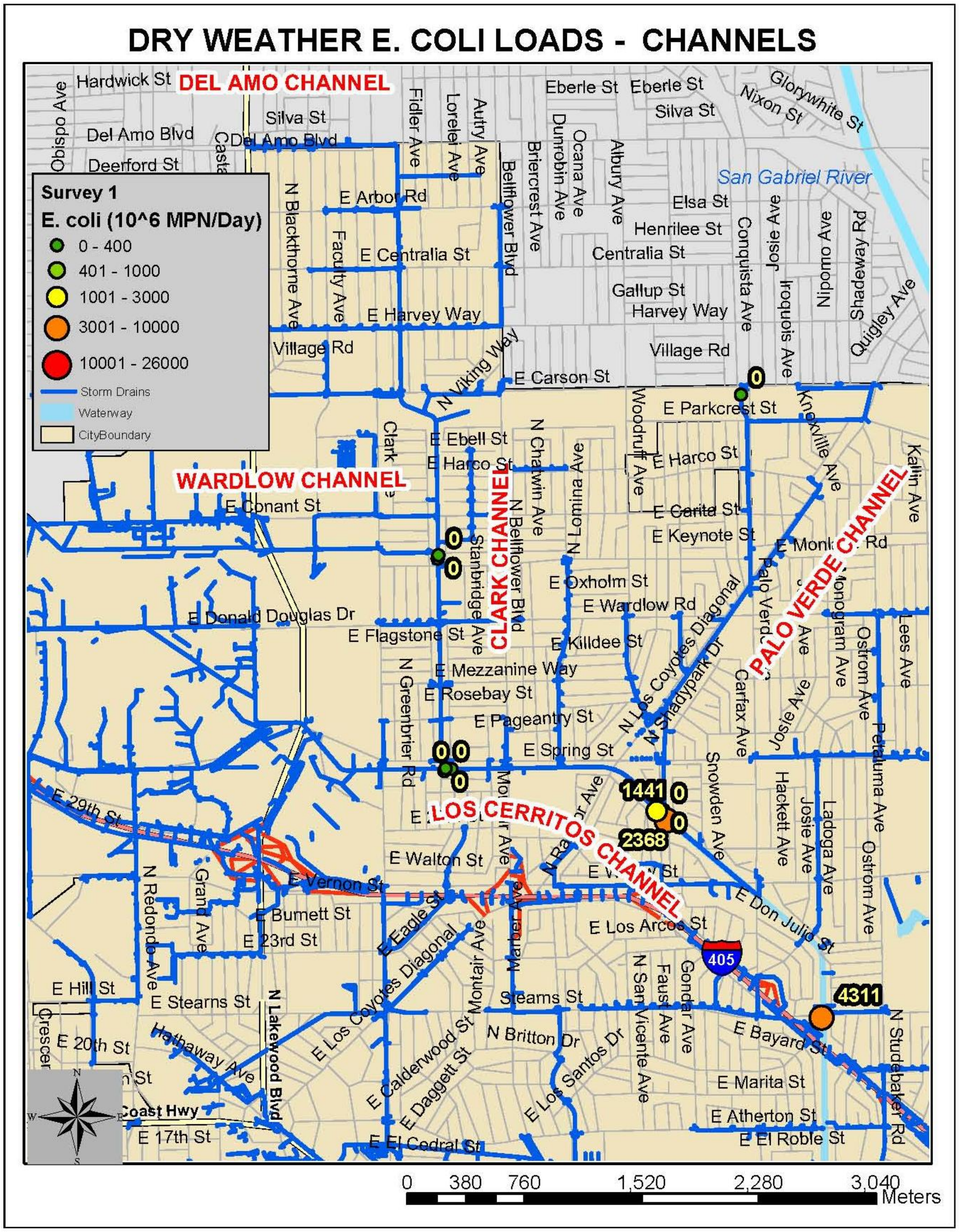

Figure A-46. ***E. coli* Loads Measured in Main Channels during Survey 1.**

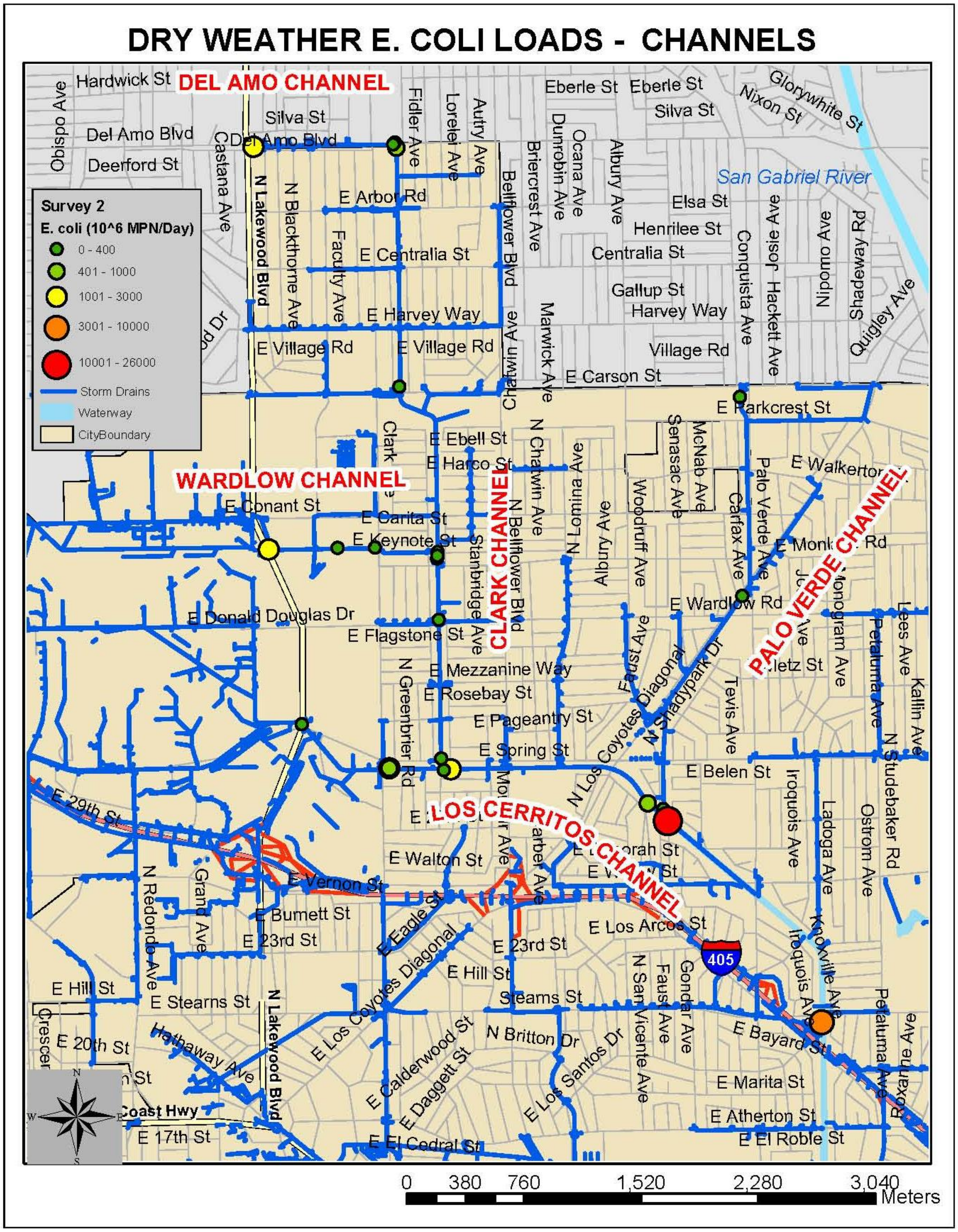

Figure A-47. *E. coli* **Loads Measured in Main Channels during Survey 2.**

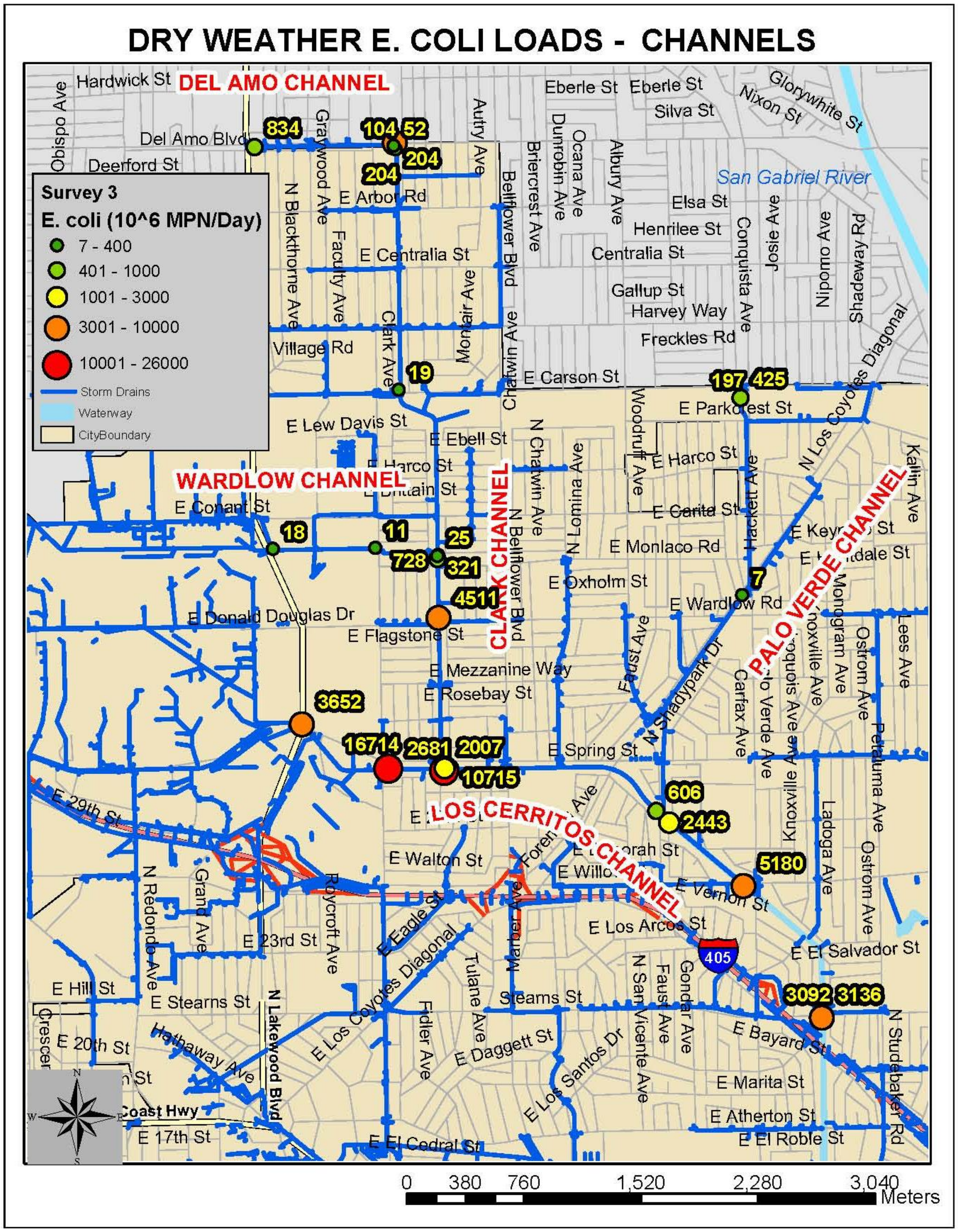

Figure A-48. ***E. coli*** **Loads Measured in Main Channels during Survey 3.**

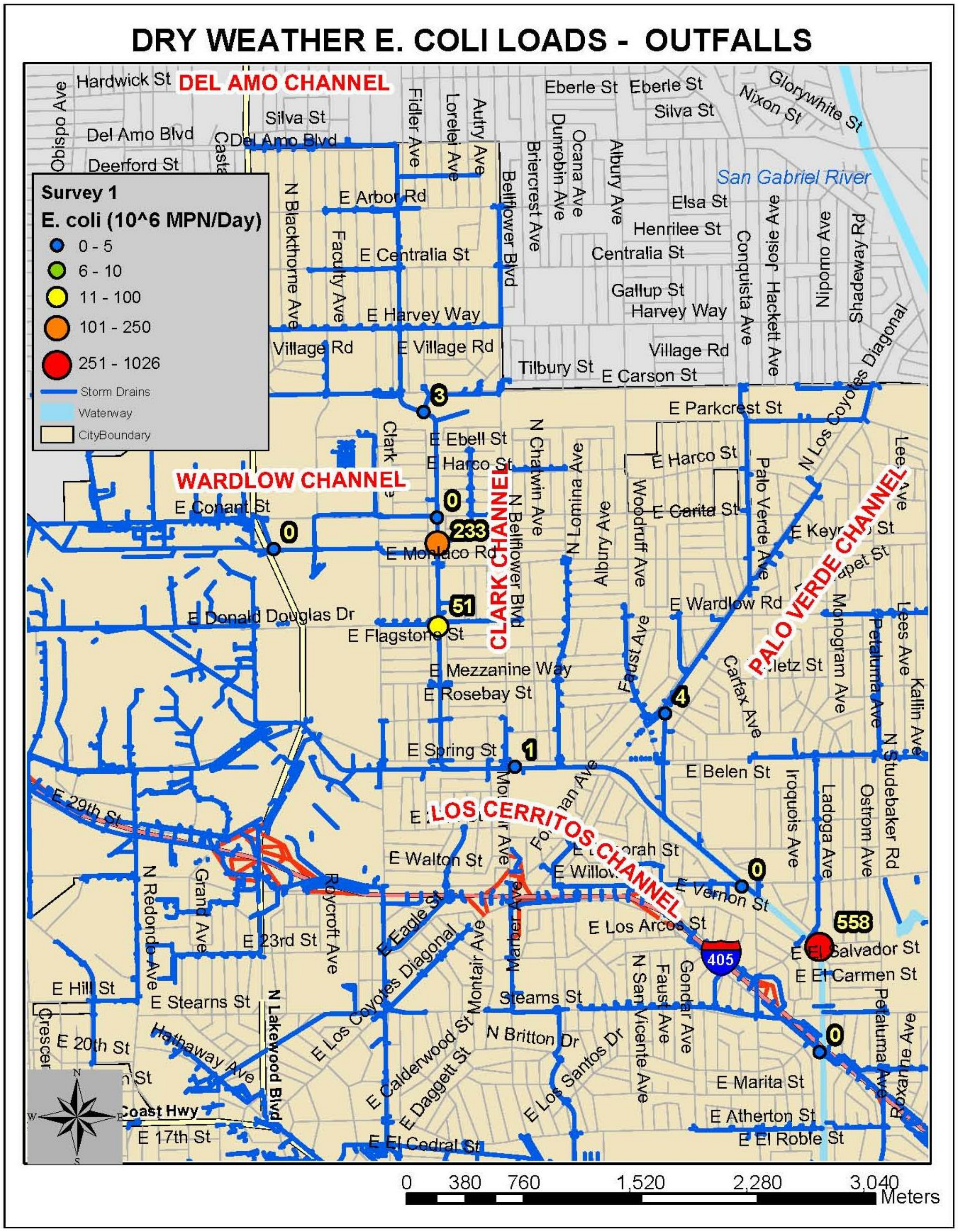

Figure A-49. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 1.**

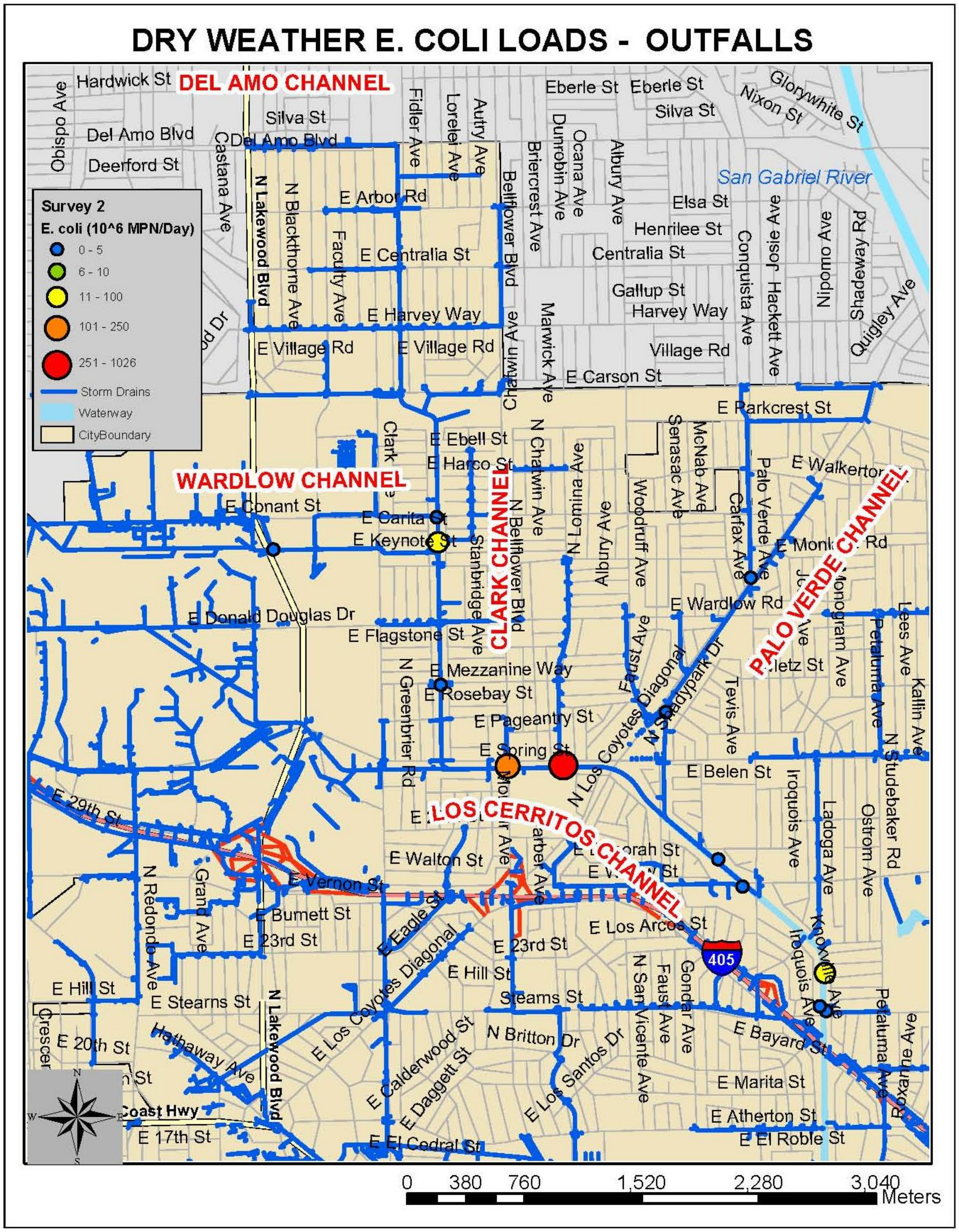

Figure A-50. *E. coli* **Loads Measured in Flowing Outfalls during Survey 2.**

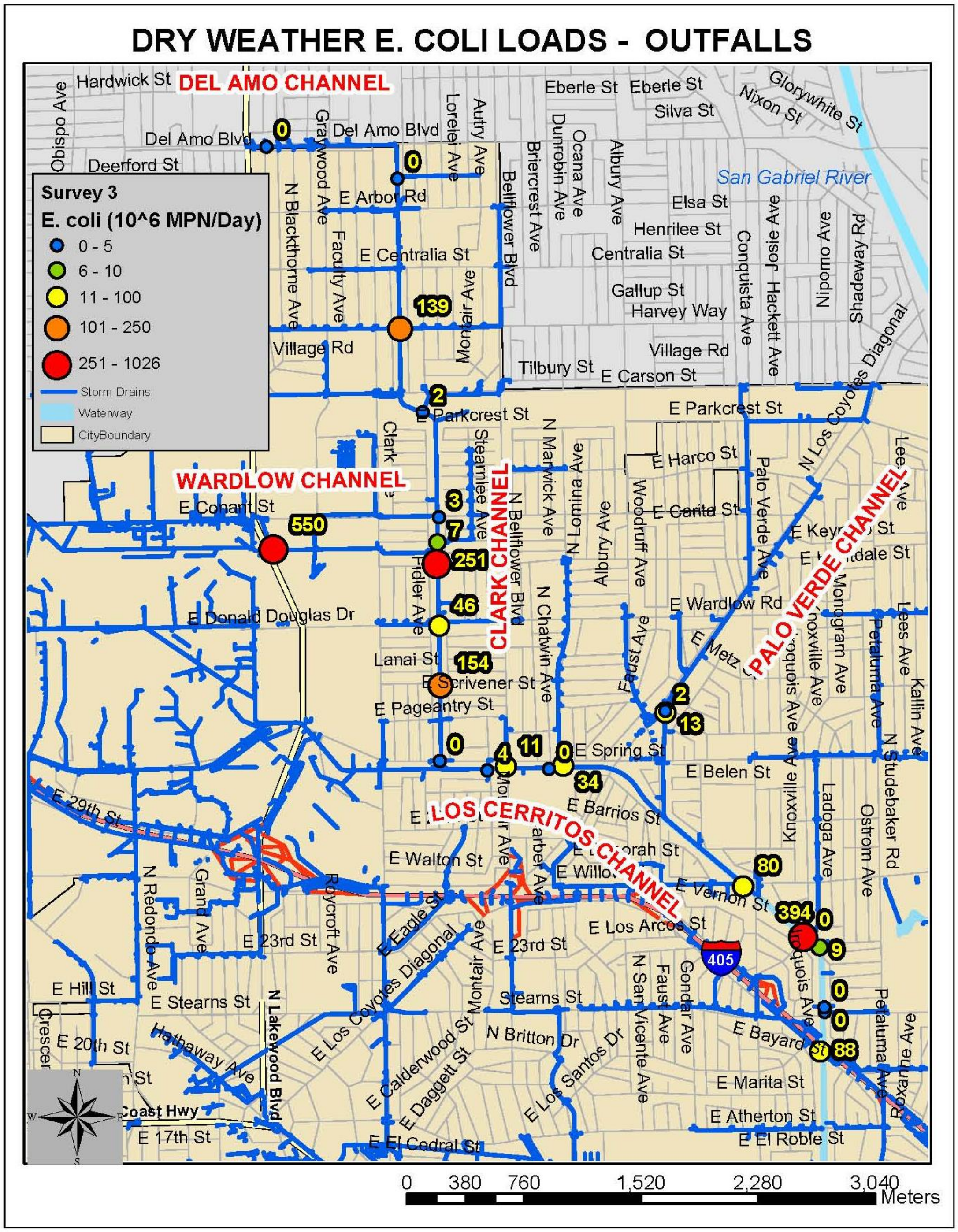

Figure A-51. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 3.**

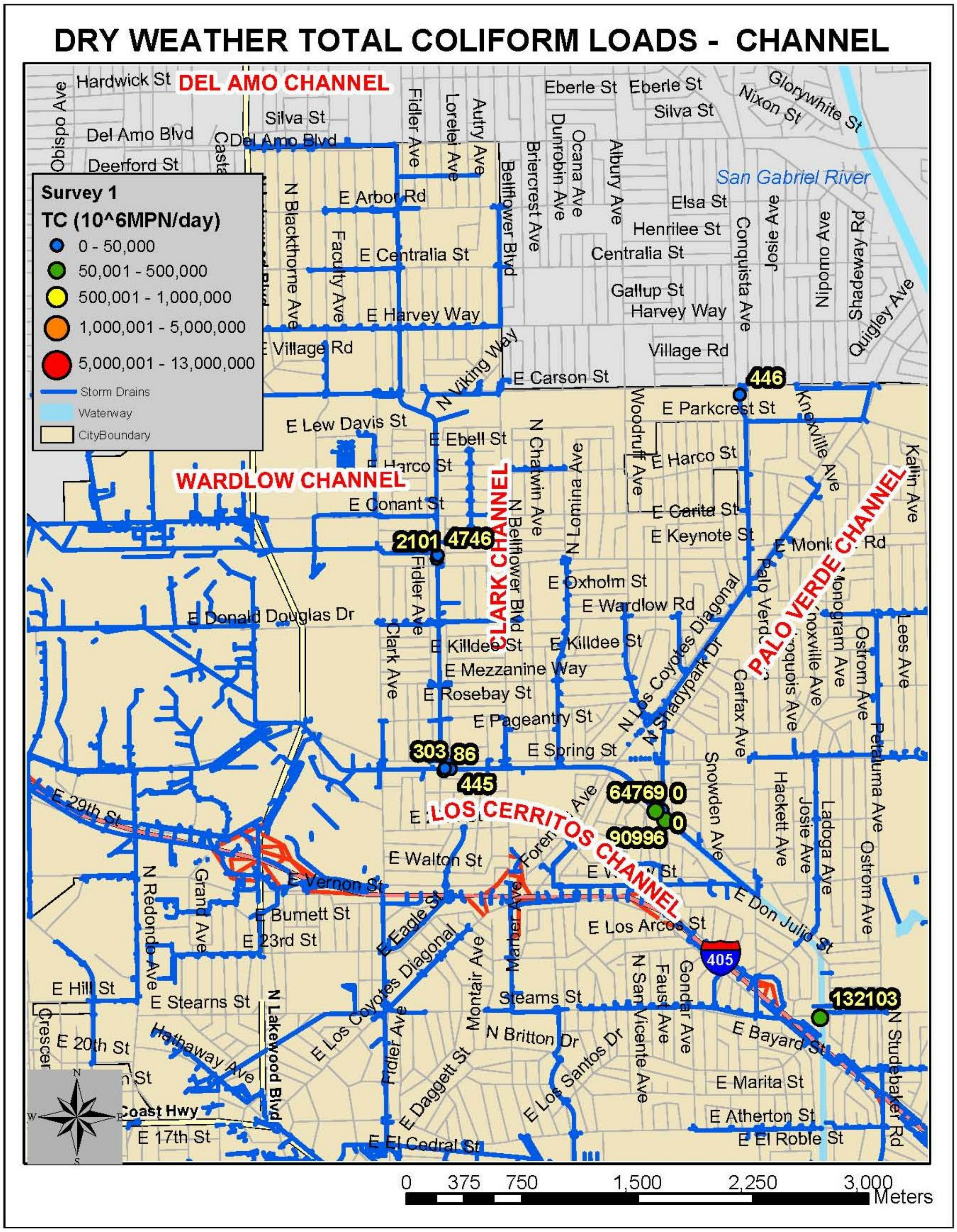

Figure A-52. **Total Coliform Loads Measured in Main Channels during Survey 1.**

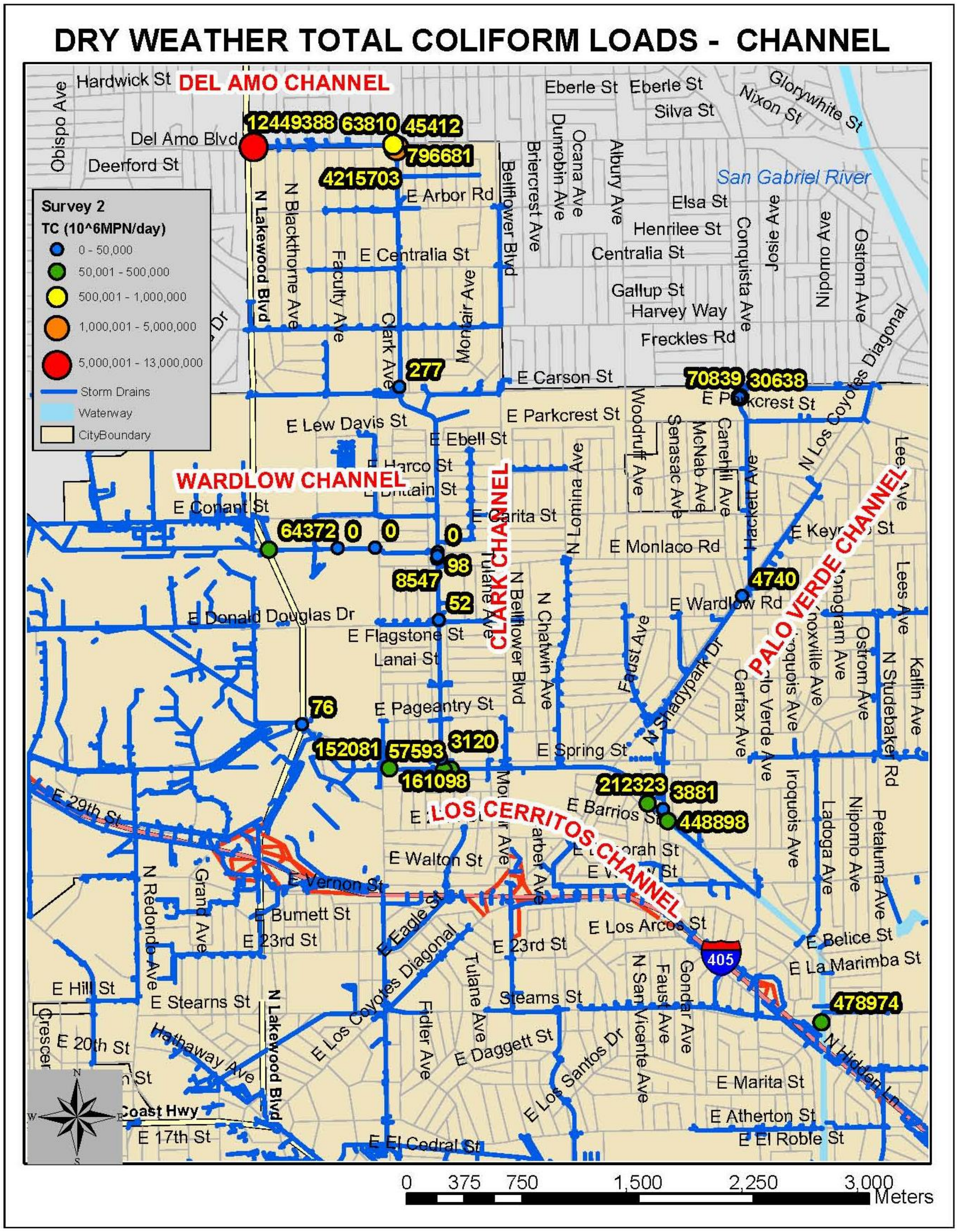

Figure A-53. Total Coliform Loads Measured in Main Channels during Survey 2.

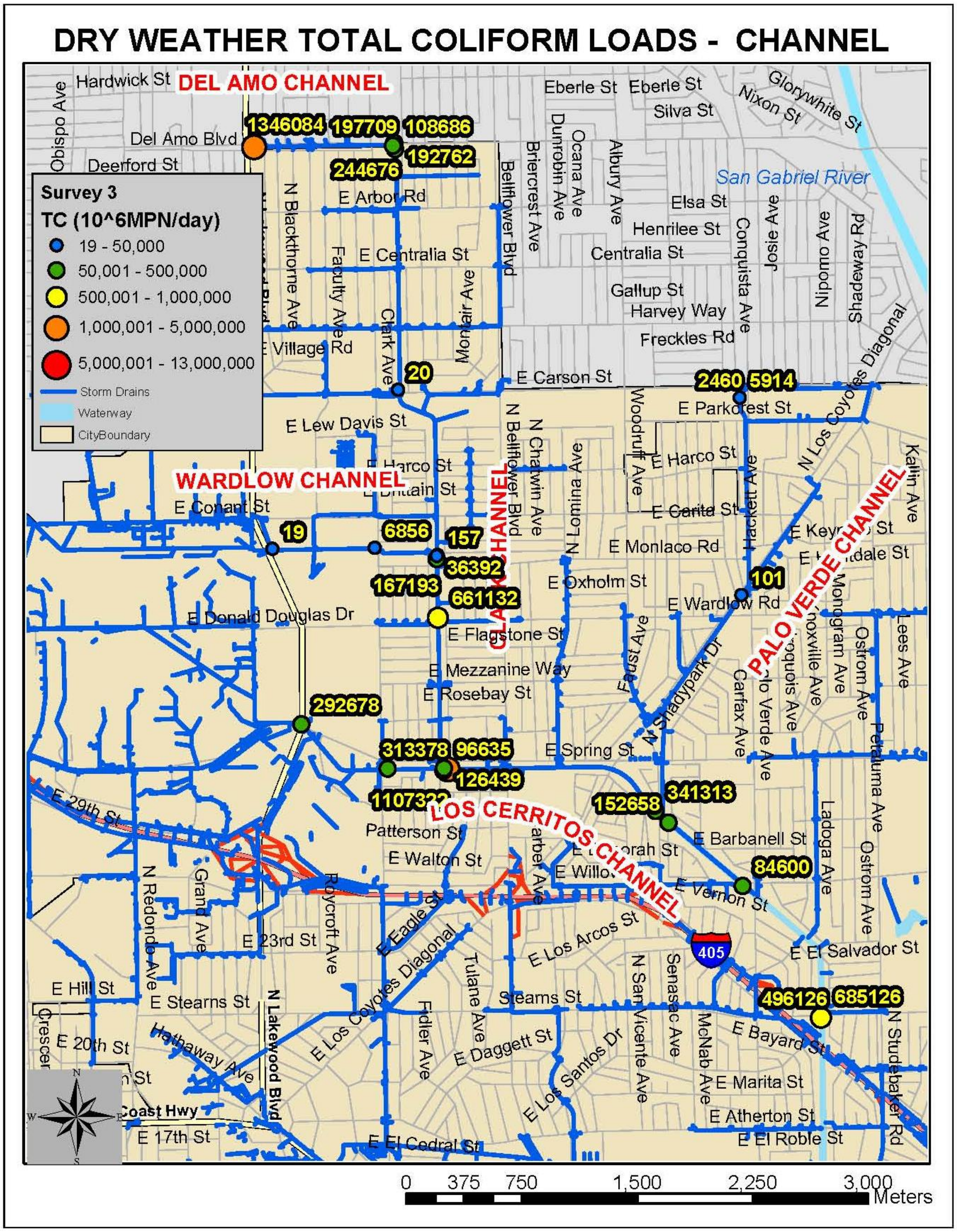

Figure A-54. **Total Coliform Loads Measured in Main Channels during Survey 3.**

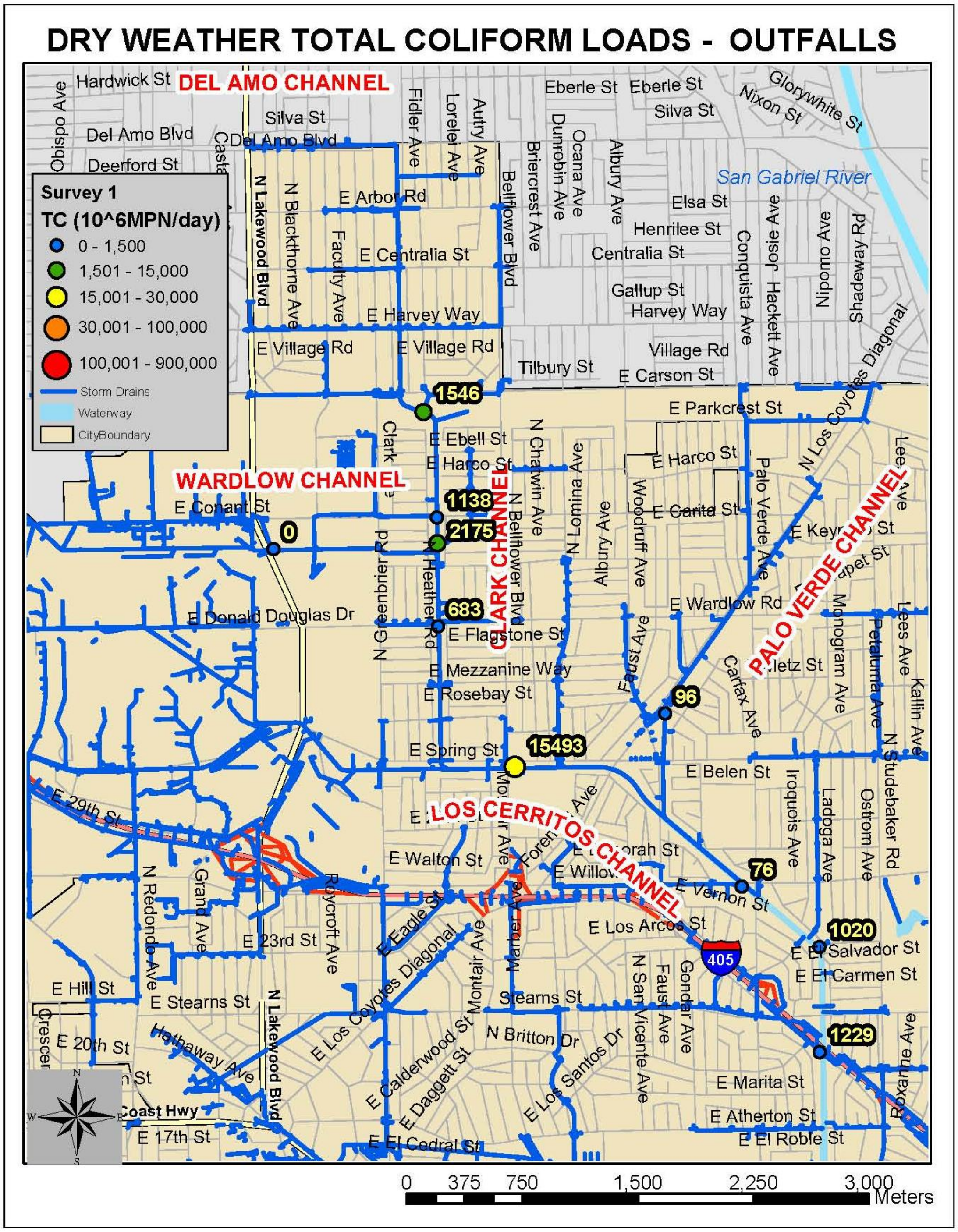

Figure A-55. Total Coliform Loads Measured in Flowing Outfalls during Survey 1.

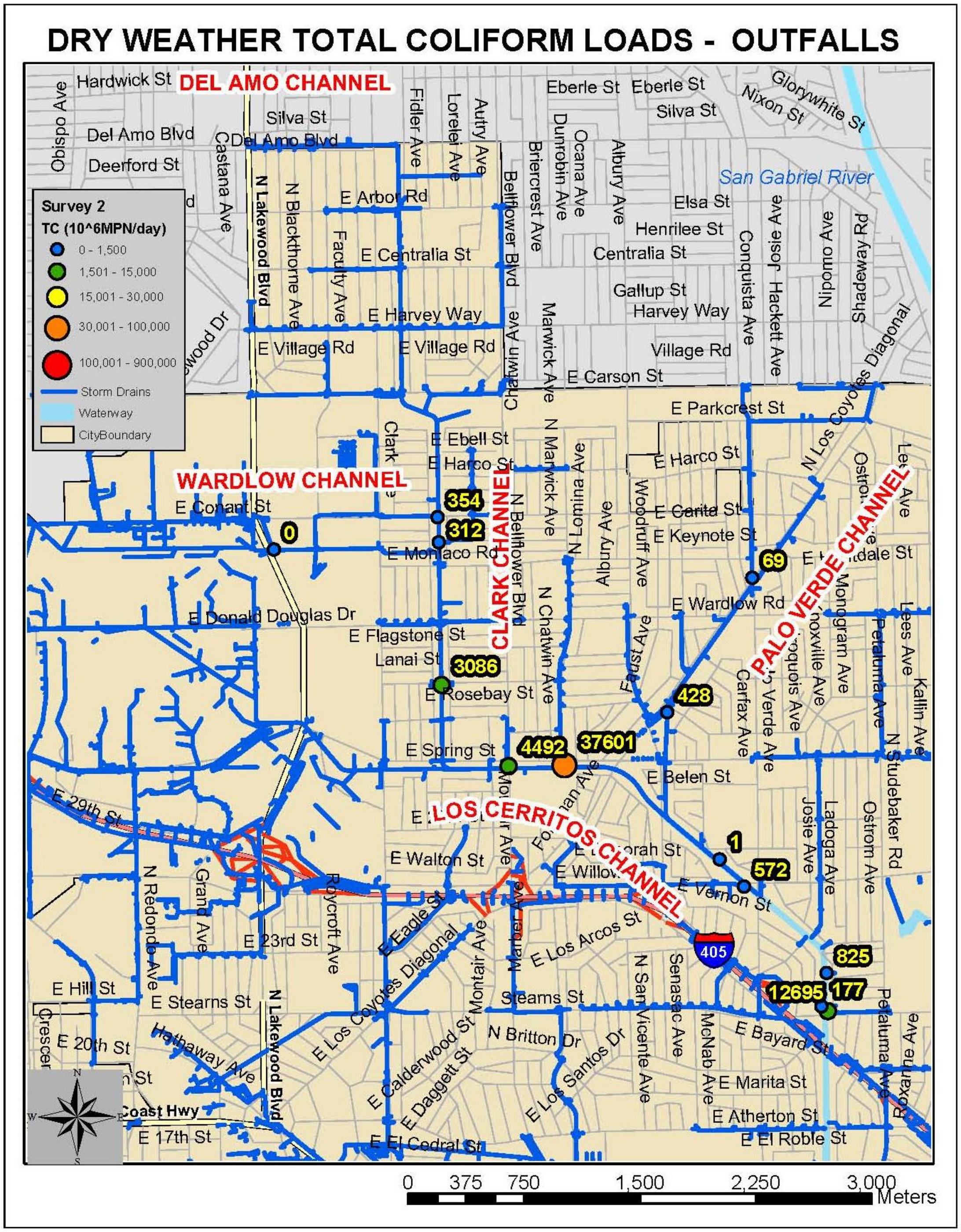

Figure A-56. Total Coliform Loads Measured in Flowing Outfalls during Survey 2.

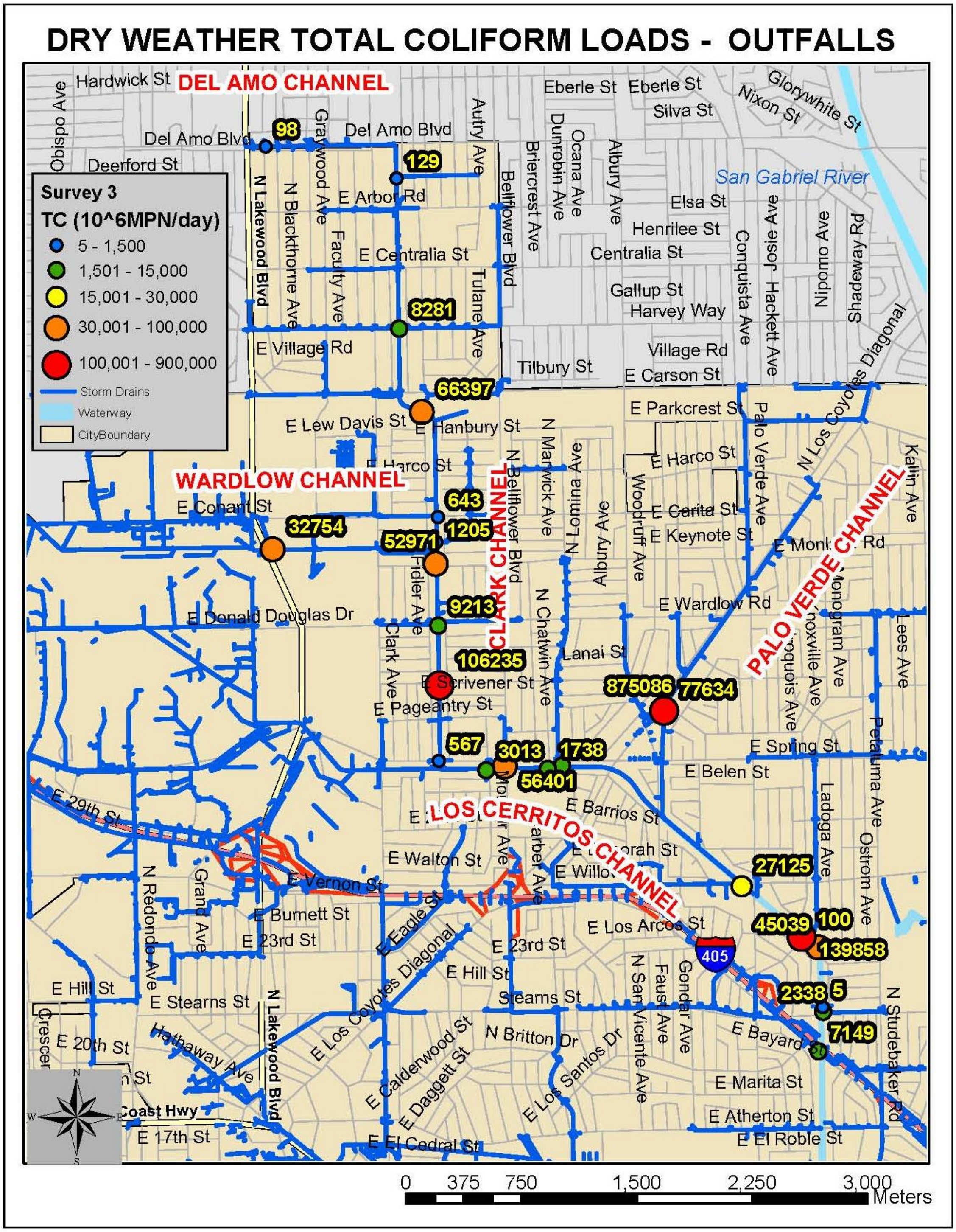

Figure A-57. Total Coliform Loads Measured in Flowing Outfalls during Survey 3.

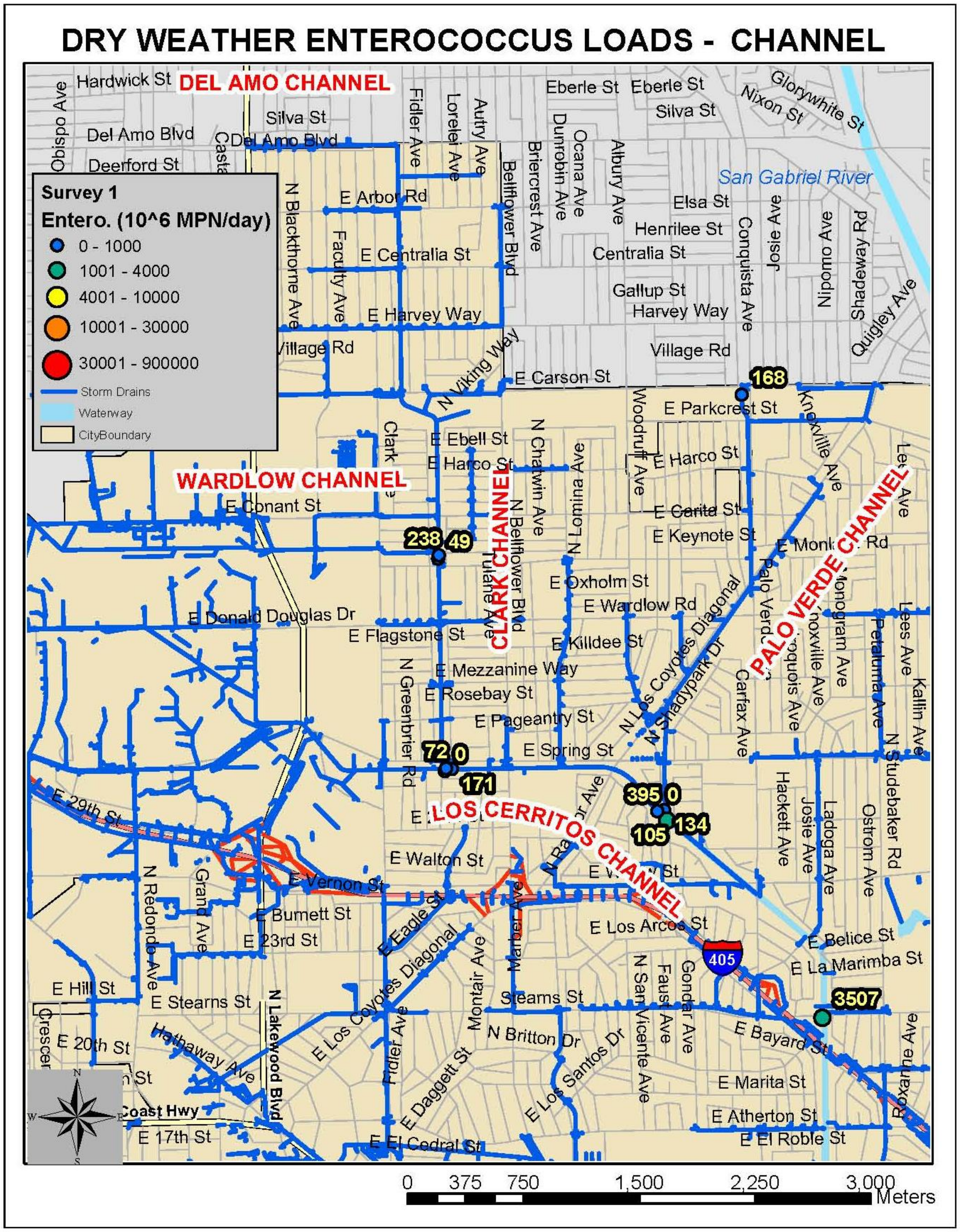

Figure A-58. **Enterococcus Loads Measured in Main Channels during Survey 1.**

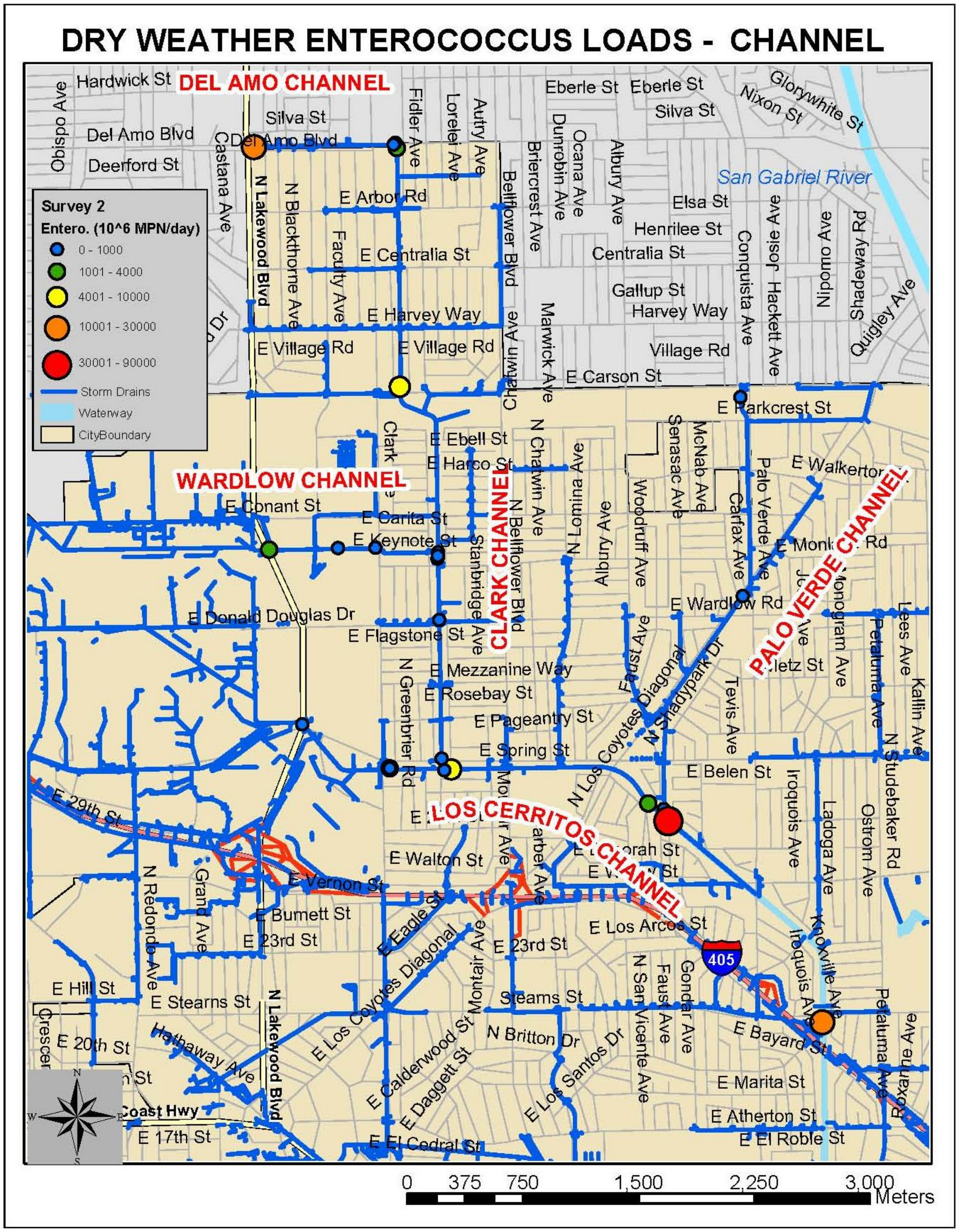

Figure A-59. **Enterococcus Loads Measured in Main Channels during Survey 2.**

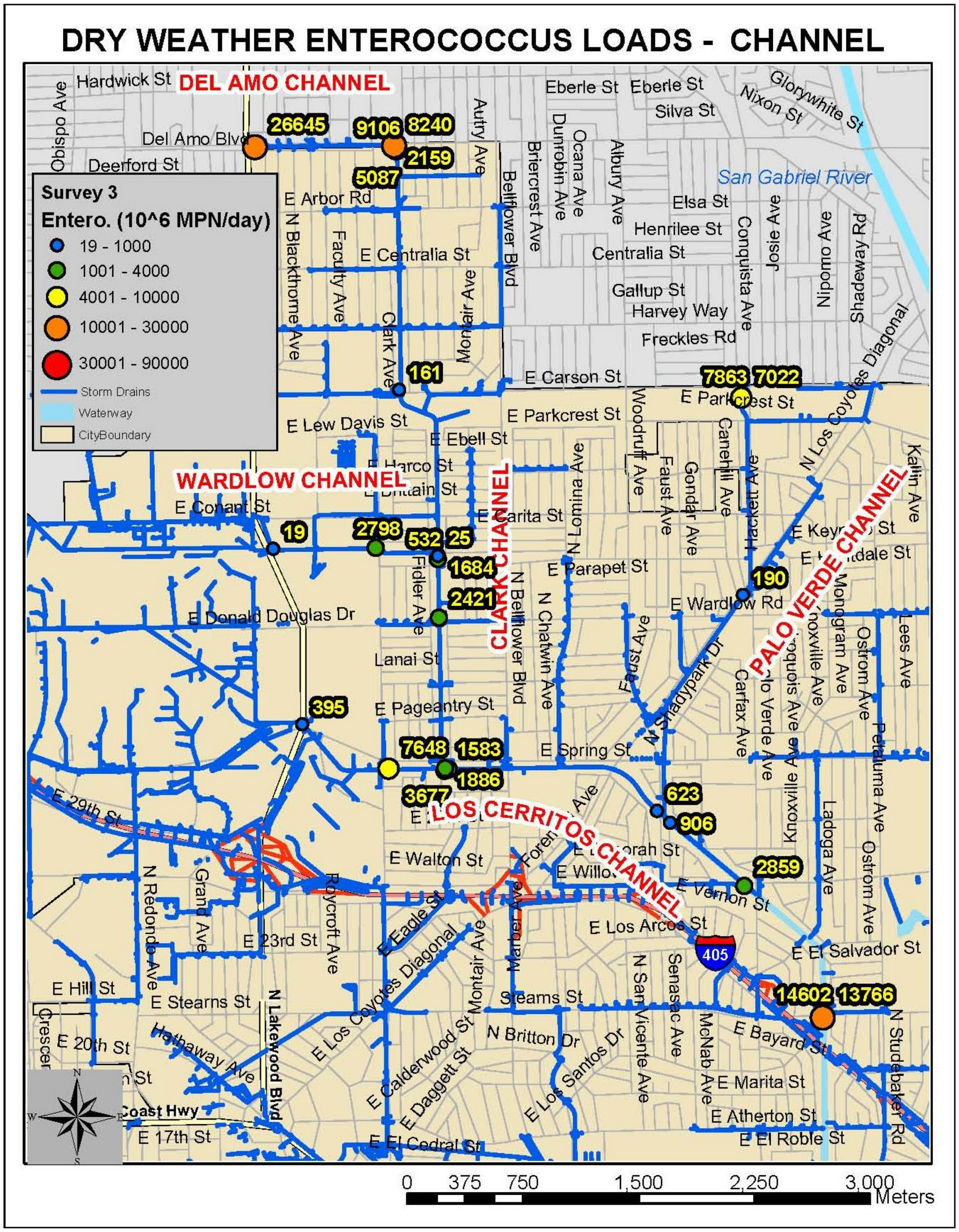

Figure A-60. Enterococcus Loads Measured in Main Channels during Survey 3.

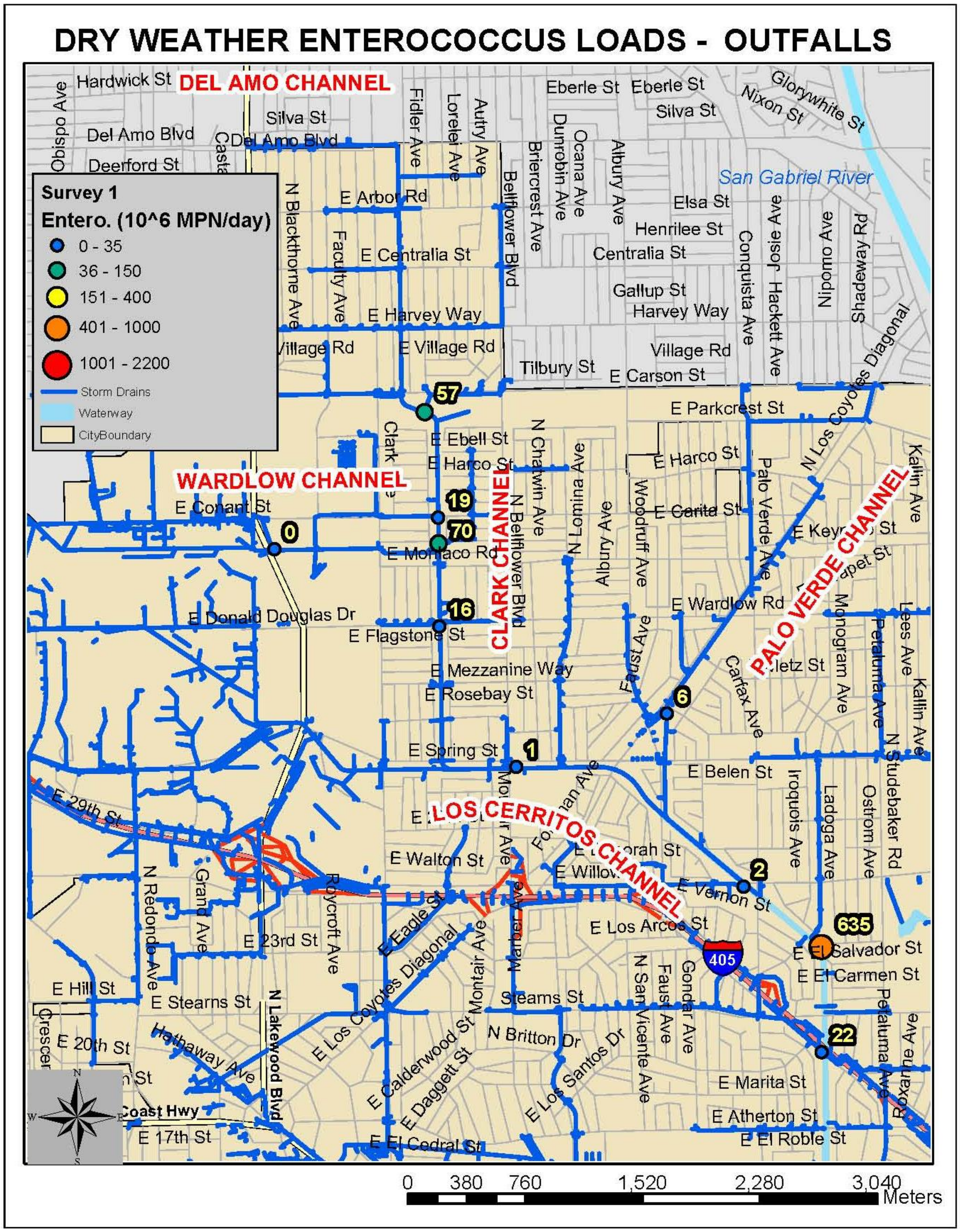

Figure A-61. **Enterococcus Loads Measured in Flowing Outfalls during Survey 1.**

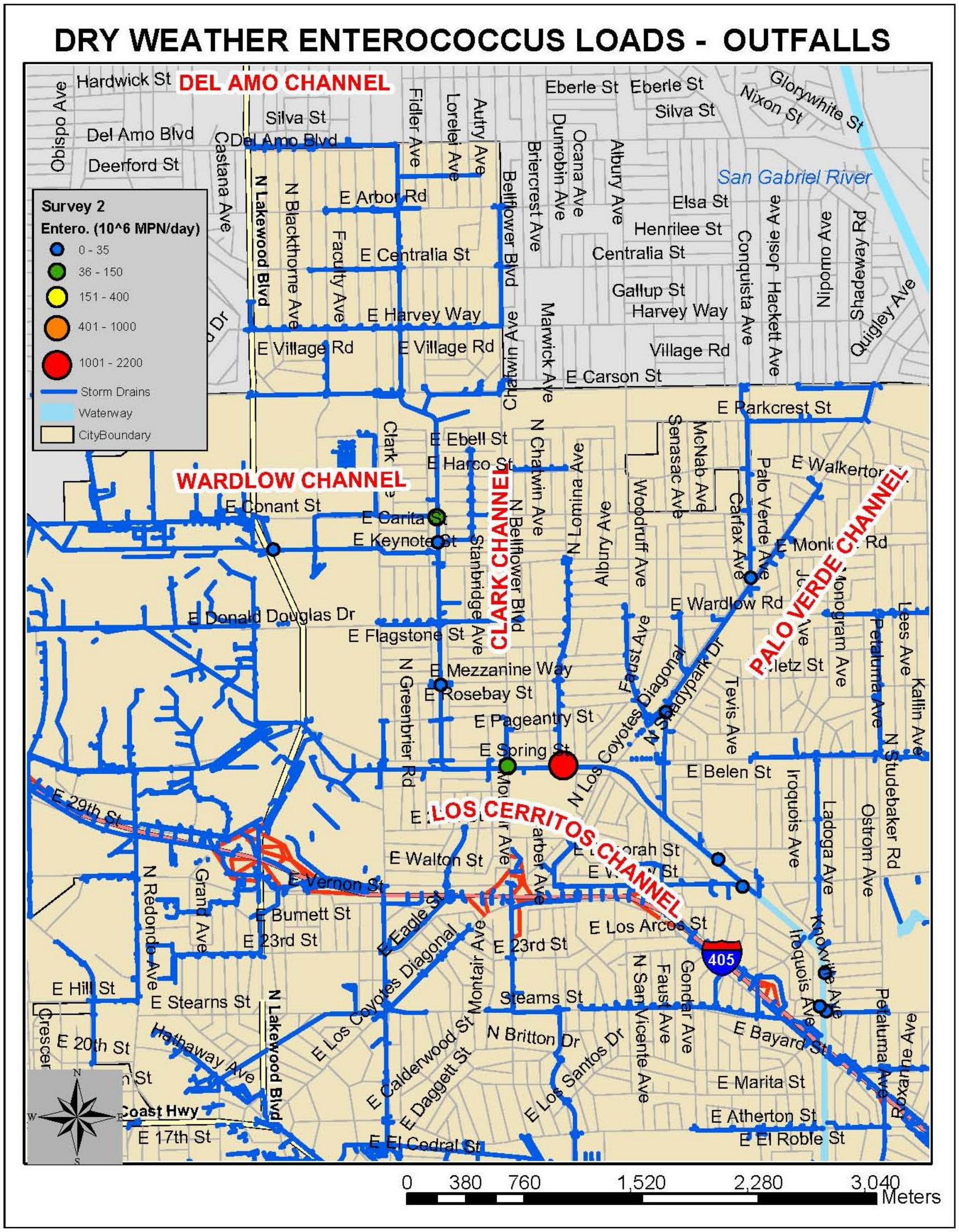

Figure A-62. **Enterococcus Loads Measured in Flowing Outfalls during Survey 2.**

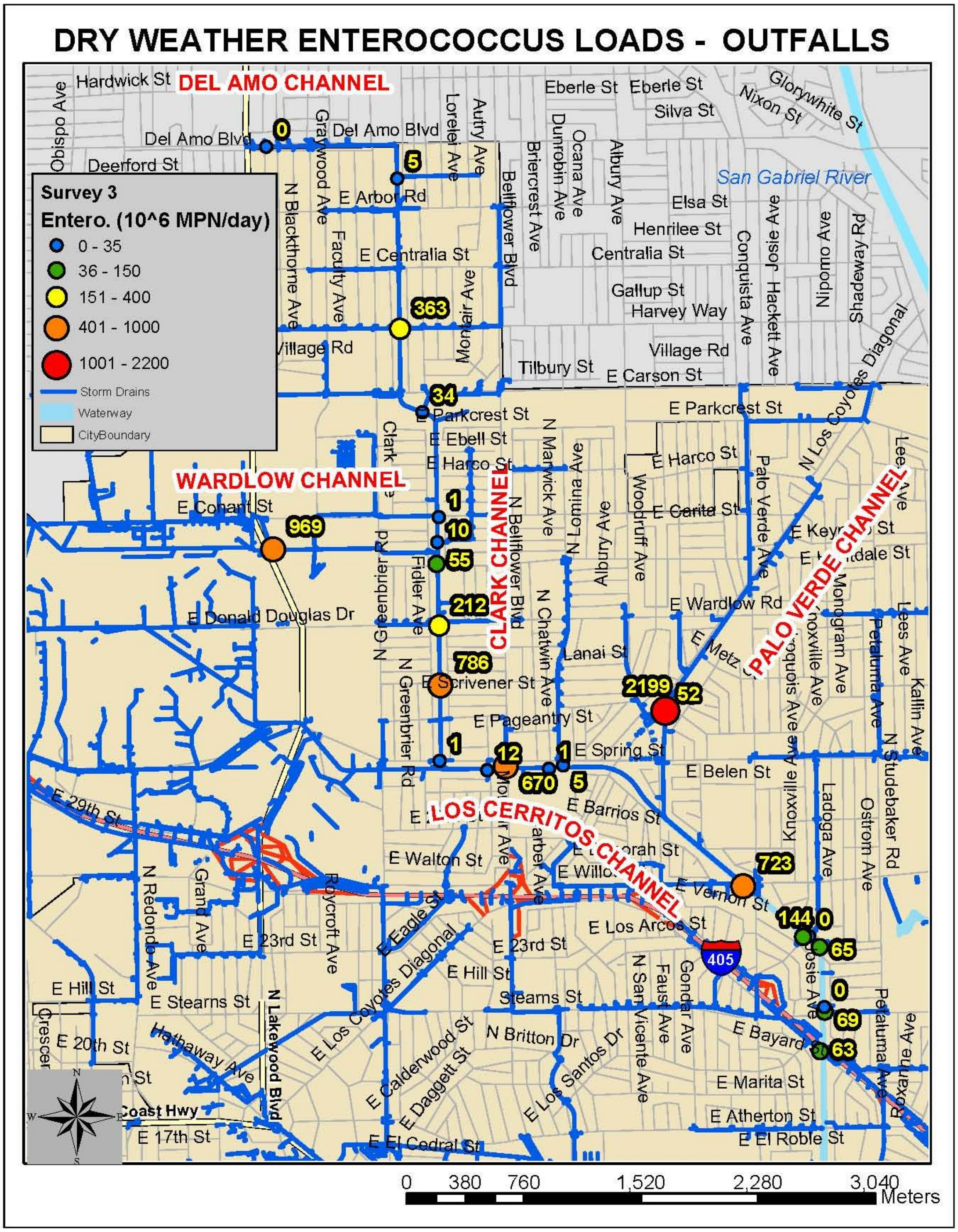

Figure A-63. **Enterococcus Loads Measured in Flowing Outfalls during Survey 3.**

Attachment 3. **Kinnetic Laboratories, Inc. 2011. City of Long Beach Storm Water Monitoring Report. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.**

Reference: Kinnetic Laboratories, Inc. 2011. City of Long Beach Stromwater Monitoring Report 2010/2011. NPDES Permit No. CAS004003. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

APPENDIX D

CYCLING OF pH VALUES IN LOS CERRITOS CHANNEL

CITY OF LONG BEACH, CA

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EXECUTIVE SUMMARY

The Basin Plan (CRWQCB, 1994) specifies water quality objectives for pH of 6.5 to 8.5 for inland water, and bays and estuaries. Measurements of pH in Los Cerritos Channel have been routinely taken as part of the City's dry weather water quality monitoring studies required under its NPDES stormwater permit. These values have frequently been measured at levels greater than pH 9.0 (Kinnetic Laboratories 2005, 2009). Initially, pH was measured only at the NPDES mass emission monitoring site in the Los Cerritos Channel. The sampling site is located just below Stearns Street near the end of the freshwater portion of the drainage. The elevation of the channel bottom at this site is such that tidal effects are limited to periods of spring tides. In accordance with permit requirements, subsequent upstream source surveys were conducted in order to determine the source of elevated pH levels in the watershed. The following is a summary of the results of those initial surveys:

- Dry weather exceedances of the pH 8.5 objective was common in the upper Los Cerritos Channel and the upper branches, the Palo Verde Channel, the Clark Channel, Del Amo Channel, and the Wardlow Channel with pH values up to 10.5 or more.
- Dry weather discharges from outfalls entering the open channel from enclosed pipes and box culverts were characterized by uniformly lower pH values of approximately 8.0 and always below pH 9.0.
- These initial upstream investigations showed that pH tended to increase later in the survey day suggesting that they were likely influenced by photosynthetic activity and temperature increases in these shallow Channel flows.

From early data, the initial hypothesis was that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity during the day. Respiration of algae and bacteria in the biofilm was suggested to be the cause for the decreases in pH overnight. This present report details results of the deployment of a continuous recording instrument that was emplaced in the Los Cerritos Channel at the Stearns Street monitoring station in order to provide documentation of the expected daily and seasonal excursions of both pH and temperature. Except for brief periods when the instrument was pulled for data retrieval and calibration checks, this instrument recorded pH and temperature of the flowing water at intervals of 10 minutes between September 10, 2010 and May 1, 2011.

Results of these continuous recordings are reported below and can be summarized as follows:

- Both pH and temperature records show repetitive, pronounced 24-hour sinusoidal oscillations that support the earlier conclusion that they are controlled by biological and physical processes common to all sites with similar conditions.
- These 24-hour signals are muted and depressed by major storm flows in the Channel, but also immediately

Figure D-1. Typical Dry Weather Flow Showing Algal Growth.

continue during the intervening winter dry periods even in the absence of major filamentous algal mats.

- Hourly averaged pH values in the Channel were pH 7.98 for rain days, pH 9.00 for dry days, and pH 8.93 as an average of all data, but with maximum values during the days of pH 10.49 to 10.91. Minimum values were from pH 6.43 to 7.04 for the various wet/dry categories.
- With the pH average or median just below 9.0 for all days other than during storm events, the upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year (inclusive of summer dry and winter dry periods).

BACKGROUND

Over the past ten to eleven years, a substantial number of pH and other conventional water quality measurements have been recorded from the main channels and enclosed outfalls that discharge to the open portion of the Los Cerritos Channel watershed. The following sections provide a summary of these studies and provide a brief history of work completed in this watershed.

Early Dry Weather Measurements in the Los Cerritos Channel

Several dry weather surveys in the Los Cerritos Channel conducted early in the program found high pH values at monitoring sites located in the open concrete channels. In 2002, the Regional Board added a requirement to conduct upstream investigations if pH values of 8.5 or greater were encountered during the surveys.

August, 2004. On August 31, 2004 (Kinnetic Laboratories, 2005) elevated pH values were measured in a time-composite dry weather sample taken at the Los Cerritos Channel station which is located below Stearns Street near the end of the Channel but above tide elevation. Upon measurement of the composite bottle pH, an immediate upstream investigation was initiated.

The field crew initially walked approximately 1000 feet upstream in the Los Cerritos Channel to look for possible sources. Measurements of pH tended to increase from 10.02 at the monitoring site to 10.42 to 10.52 at all upstream sites. No sources of water with elevated pH were identified. The crew then went upstream to Spring Street near the junction of the Los Cerritos and Palo Verde Channels. Similar, high pH measurements (10.14 to 10.43) were found in waters above the confluence of these channels, at the mouth of the Palo Verde Channel, and downstream of the confluence. Further investigations were conducted upstream of this site in the vicinity of the Clark Channel. The pH measurements in this region of the Los Cerritos Channel were lower (9.30 to 9.82) but still elevated. Further investigation was halted due to the late hour and approaching darkness.

September, 2004. Since the source of high pH water was not found to be the result of a nearby source discharge, a follow-up watershed investigation was conducted on September 3, 2004 (Kinnetic Laboratories, 2005). Twelve sites (Table D-1) were visited throughout the watershed starting from the Los Cerritos Channel monitoring site and incorporating the two major tributaries to the Los Cerritos Channel (Figure D-2). Field estimates of flow were taken using conventional dry weather flow procedures. The average width and depth of the flow were measured for a 10 foot section of the channel. Velocity over the 10-foot section was measured based upon measuring the time required for particles to drift through the segment. Dissolved oxygen was measured with a YSI Model 58 meter. Temperature, salinity and pH were measured with a YSI Model 63 meter. Water samples for measurement of alkalinity were taken for measurement in the laboratory.

The results of this survey are shown in Table D-2. The survey showed evidence of high pH water throughout the open conveyances of the Los Cerritos Channel and both major tributaries, the Palo Verde and Clark Channels. Measured pH values typically ranged from 9.45 to 10.90. An initial pH check conducted in the morning (0845) at site CC1-A resulted in a pH of 8.93, just under the trigger of 9.0 that was set to initiate upstream investigations. Three hours later (1146), pH had risen to 9.50 and the upstream investigation was started. Flows generally decreased at upstream sites with the exception of flows measured at CC2-A located in the Los Cerritos Channel just downstream of the mouth of the Palo Verde Channel. Total alkalinity ranged from 90 to 173 mg/L. Alkalinity provides an indication of the buffering capacity of the water. Alkalinity values of 100 to 200 would be expected to have a stabilizing effect.

Water temperature and dissolved oxygen were extremely high at all sites. Temperatures ranged from 23.8 to 31.5 °C. Temperatures also tended to increase over the course of the day reaching the higher portion of the range around 1500. Dissolved oxygen levels ranged from just over 11 mg/L to greater than 20 mg/L at several sites indicating that dissolved oxygen was well into supersaturated conditions. Based upon these results the initial hypothesis was that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity.

Los Cerritos Watershed Surveys, 2009. Extensive surveys were made in the Los Cerritos Channel Watershed (Figure D-4) on March 3, April 9, and May 11, 2009 as part of a copper source study (Kinnetic Laboratories, 2009). Multiple sites were sampled within the Los Cerritos, Palo Verde, Clark, Wardlow, and Del Amo Channels as well as 10 to 24 outfalls that were observed to have measurable discharges into these Channels. Detailed tables of results were included in the original annual report (Kinnetic Laboratories, 2009) but descriptive statistics of the accompanying results are also given in Tables D-3, D-4, and D-5 below.

Results of these three surveys (Tables D-3 through D-5) show the following:

- Median pH of Channel waters ranged from pH 9.1 to 9.9 with maximum values of pH 10.7 to 11.0 and minimum values of pH 7.4 to 7.7.
- Median pH of outfall discharges was pH 8.0 to 8.2 with maximum values of pH 8.5 to 8.8 and minimum values of pH 7.4 to 7.9.
- The results of these more extensive watershed surveys provided further verification that the pH of the Channel waters routinely range above the pH 8.5 Basin Plan objective, but do not fall below the pH 6.5 lower limit.

Interestingly, the results also show that the elevated pH values in the open channels were not due to discharges of water from the enclosed outfalls along the channel since the measured pH of these discharge waters were almost all within the range of acceptable values established in the Basin Plan.

Thus these results provided further evidence of elevated and oscillating pH values within the Channels that correspond with expected effects of daily photosynthetic activity, respiration, temperature, and buffering capacity provided by alkalinity.

Purpose and Scope of Present pH Studies in Cerritos Channel

The purpose of this present study was to provide better documentation of the daily fluctuations in pH over the range of conditions that occur over the course of a year. These data were also intended to provide improved information for calculation of chronic ammonia-N criteria that require use of 30-average pH values.

Table D-1. Sampling Locations in the Los Cerritos Channel Watershed.

Site Name	Site Description	Latitude[1]	Longitude
CC1-A	Los Cerritos Channel Below Stearns St. bridge	33.79544	118.10352
CC1-B	Los Cerritos Channel at first outfall upstream of Stearns	33.79601	118.10356
CC2-A	Los Cerritos Channel below confluence with Palo Verde Channel	33.80695	118.11408
PV-MOUTH	Palo Verde Channel above confluence with Los Cerritos Channel	33.81070	118.11408
PV-A	Palo Verde Channel west of Palo Verde Ave. and Los Coyotes Diagonal	33.81987	118.10862
PV-B	Palo Verde Channel south of Carson St.	33.83192	118.10832
CC3-A	Los Cerritos Channel below confluence w/ Clark Channel	33.81020	118.12907
CLARK-A	Clark Channel below Monlaco Rd.	33.82201	118.12982
CLARK-OUTFALL	39-inch outfall (106+25) into Clark Channel under the Conant St. bridge	33.82509	118.12982
CLARK-B	Clark Channel south of Del Amo Blvd. Below the confluence of the Clark and Del Amo Channels	33.84647	118.13210
DA-A	Del Amo Channel east of Lakewood Ave.	33.84690	118.14201
CC4-A	Los Cerritos Channel west of Lakewood Ave., north of Spring St.	33.81301	118.13953

1. All positions based upon NAD 1983 datum

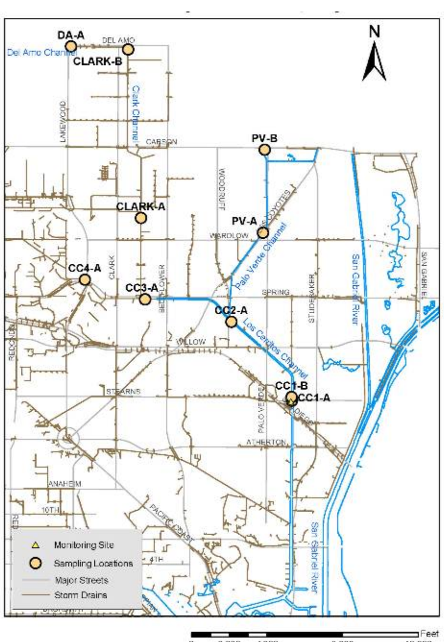


Figure D- 2. Watershed Investigation Sites 2004.

Figure D-3. Typical Dry Season Growth, Del Amo Channel.

Table D-2.   Summary of the Results of the 2004 Upstream Investigation in the Los Cerritos Channel Watershed.

Site Name	Arrival Time	Temp	pH	DO	Salinity	Flow	Alkalinity (mg/L)			
		°C		mg/L	(ppt)	(cfs)	Bicarbonate	Carbonate	Hydroxide	Total Alkalinity
CC1-A	8:45	23.8	8.93	15.25	0.5	2.06				
CC1-A	11:46	28.6	9.50	19.60	0.4	2.06	95.0	45.0	< 5.0	153
CC1-B	12:16	30.7	9.83	19.80	0.4	2.06	52.0	54.0	< 5.0	133
CC2-A	12:46	30.9	9.45	>20	0.4	4.29	49.0	57.0	< 5.0	135
PV-MOUTH	12:50					1.63				
PV-A	13:21	31.5	10.75	15.55	0.5	1.69	< 5.0	60.0	14.0	140
PV-B	14:00	26.5	10.30	11.13	0.4	1.40	< 5.0	84.0	< 5.0	143
CC3-A	15:35	30.4	10.55	15.20	0.4	1.65	< 5.0	69.0	< 5.0	120
CLARK-A	15:54	30.0	10.63	12.78	0.8	1.37	< 5.0	57.0	5.1	110
CLARK-OUTFALL	16:21	23.7	8.17							
CLARK-B	16:40	27.6	9.66	12.67	0.4	0.29	34.0	51.0	< 5.0	123
DA-A	17:00	27.3	10.60	12.50	0.4	0.25	< 5.0	51.0	< 5.0	90
CC4-A	17:45	27.7	10.90	>20	0.4	0.00	< 5.0	87.0	9.0	173

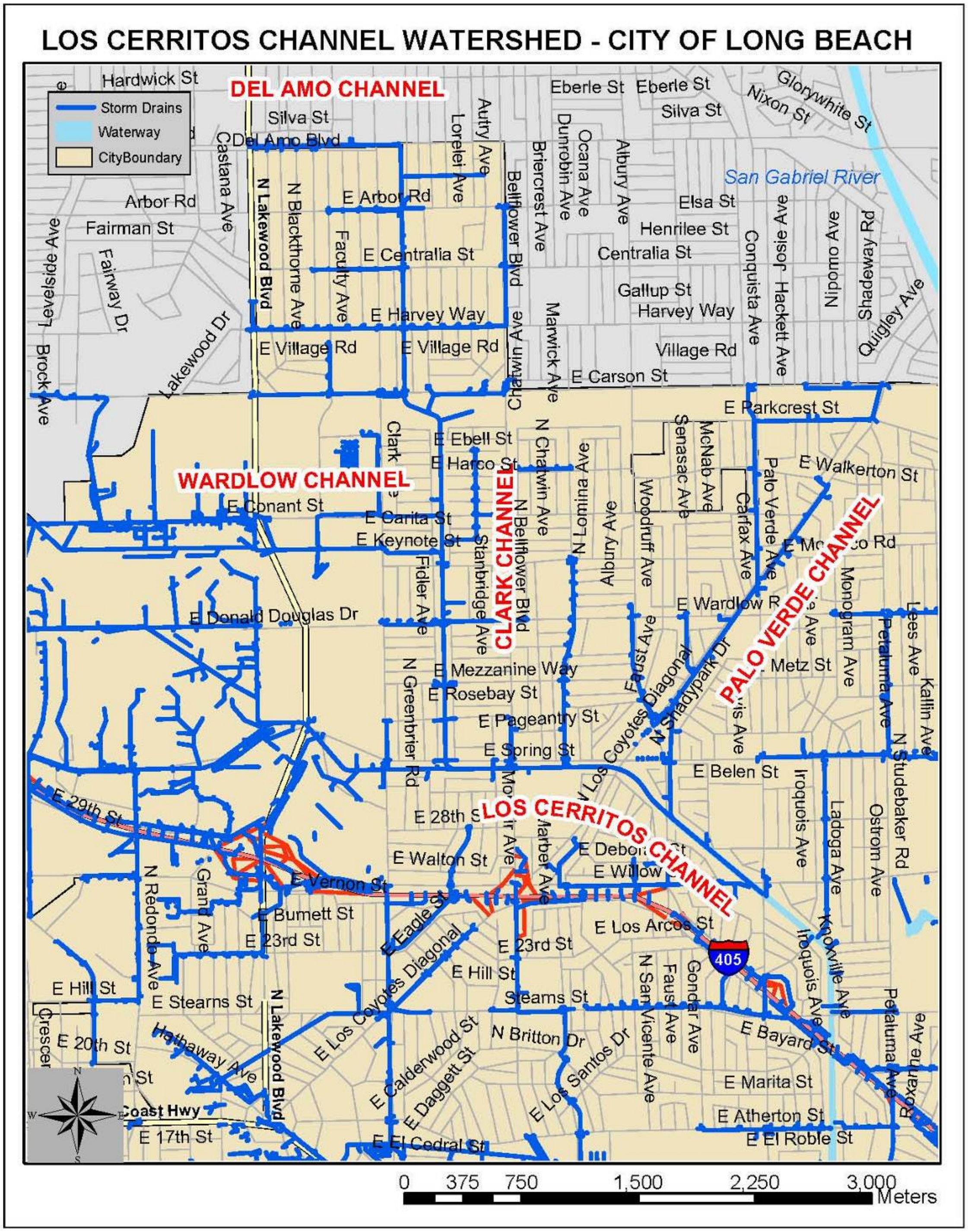


Figure D-4. City of Long Beach Los Cerritos Channel Watershed.

Table D-3. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 1 (March 3, 2009).

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.023	14.5	7.7	0.523	6.6	2	64	7	5	5	5	5
Maximum	1.315	28.2	10.8	4.92	16.1	273	1800	1500	750	908	754	17850
1st Quartile	0.072	17.2	9.3	0.589	9.6	6.1	113	10	9	5	31	72
Median	**0.135**	**19.3**	**9.9**	**0.969**	**12.6**	**17.5**	**140**	**10**	**10**	8	74	1592
3rd Quartile	0.692	25.5	10.5	1.103	14.9	33.9	180	12	11	131	105	3733
Mean	0.405	20.7	9.8	1.18	12	40.4	265	118	63	178	131	2879
Geometric mean	0.187	20.1	9.8	0.949	11.6	15.9	165	16	13	**30**	**64**	**530**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	10	10	10	10	10	10	10	10	10	10	10	10
Minimum	0.00014	14.8	7.9	0.56	6.9	0	94	1.2	1.4	5	5	5
Maximum	0.0331	19.2	8.5	2	9.6	41.2	570	20	19	111990	127400	4611000
1st Quartile	0.00028	16.6	8.1	0.657	7.6	1.3	115	4.3	3.3	5	132	4205
Median	**0.00084**	**17.4**	**8.2**	**0.727**	**8.1**	**3.8**	**135**	**10.5**	**6.5**	111	524	44815
3rd Quartile	0.00141	17.8	8.2	0.964	8.8	10.8	190	15.5	13.8	3123	1541	167138
Mean	0.00505	17.2	8.2	0.925	8.2	8.4	188	10.3	8.5	17126	14834	548413
Geometric mean	0.00102	17.2	8.2	0.849	8.1		161	7.1	6	**178**	**593**	**20969**

Table D- 4. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 2 (April 9, 2009).

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.006	13.9	7.7	0.48	6.7	5.7	76	8	4	5	5	5
Maximum	1.476	28.2	11.0	1.266	21.4	396	260	35	25	2239	14009	12449388
1st Quartile	0.040	16.5	9.3	0.740	9.3	10.3	125	14	11.5	13	91	125
Median	**0.152**	**19.6**	**9.6**	**0.859**	**14.3**	**19.5**	**140**	**18**	**13**	110	404	27550
3rd Quartile	0.415	24.1	10.4	1.069	16.4	88.2	160	22	14.5	278	1007	80650
Mean	0.309	20.3	9.7	0.885	13.7	60.3	148	18.6	13	1633	5806	722442
Geometric mean	0.122	19.9	9.6	0.856	13.0	24.8	142	17.4	12	**73**	**297**	**5564**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.00014	14.6	7.5	0.522	4.6	0.8	99	1.9	1.3	5	5	5
Maximum	0.0331	21.0	8.5	8.400	9.7	80.7	1000	120	81	11870	14136	2755000
1st Quartile	0.00019	16.3	7.9	0.730	6.6	3.6	132.5	4.5	2.8	6	48	4702
Median	**0.00045**	**17.2**	**8.0**	**0.950**	**7.2**	**6.6**	**170**	**11.9**	**6.1**	80	420	56175
3rd Quartile	0.00177	18.2	8.1	1.108	7.7	8.6	220	37.8	17.8	1406	2586	256283
Mean	0.00505	17.4	8.0	1.500	7.2	12.6	263	26.0	14.9	2014	2416	437502
Geometric mean	0.00079	17.4	8.0	1.070	7.1	6.2	200	12.5	7.1	**102**	**294**	**23999**

Table D-5. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 3 (May 11, 2009).

CHANNELS

Statistic	**Flow (cfs)**	**Temp. (°C)**	**pH**	**Cond (mS/cm)**	**DO (mg/L)**	**Turb. (NTU)**	**Hardness (mg/L)**	**Tot. Cu (ug/L)**	**Diss. Cu (ug/L)**	**E. coli (MPN/100ml)**	**Entero. (MPN/100ml)**	**Total Coliform (MPN/100ml)**
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.044	17.3	7.4	0.665	4.0	3.4	93	3.4	2.9	5	5	5
Maximum	0.856	32.4	10.7	1.66	17.4	61.8	440	21	20	4611	6131	228200
1st Quartile	0.097	18.5	8.6	0.809	8.8	6.1	155	6.8	5.5	13	91	126
Median	**0.194**	**22.9**	**9.1**	**1.029**	**12.3**	**11.3**	**190**	**10**	**7.6**	110	404	27550
3rd Quartile	0.396	28.7	10.1	1.369	13.6	20.0	295	12.5	10	278	1008	80650
Mean	0.286	24.0	9.2	1.100	11.1	16.9	215	10.5	8.7	765	1067	39233
Geometric mean	0.196	23.3	9.2	1.055	10.3	11.9	201	9.5	7.8	**98**	**387**	**9018**

OUTFALLS

Statistic	**Flow (cfs)**	**Temp. (°C)**	**pH**	**Cond (mS/cm)**	**DO (mg/L)**	**Turb. (NTU)**	**Hardness (mg/L)**	**Tot. Cu (ug/L)**	**Diss. Cu (ug/L)**	**E. coli (MPN/100ml)**	**Enterococcus (MPN/100ml)**	**Total Coliform (MPN/100ml)**
No. of observations	24	22	22	22	22	22	24	24	24	25	25	25
Minimum	0.000007	17.1	7.5	0.616	2.2	0.0	120	1.1	1.0	5	5	2481
Maximum	0.12500	23.9	8.8	1.94	9.2	112	650	540	88	8664	34100	6015000
1st Quartile	0.00023	18.8	7.9	0.795	5.8	5.1	167	6.3	5.2	63	317	34480
Median	**0.00088**	**19.2**	**8.0**	**0.969**	**6.6**	**8.5**	**180**	**17.5**	**11.5**	201	1000	275000
3rd Quartile	0.00574	20.9	8.3	1.096	7.8	23.0	200	35	15.8	836	5172	1046200
Mean	0.00825	19.9	8.1	1.000	6.5	21.8	214	55.8	16.1	1095	4122	1109732
Geometric mean	0.00110	19.8	8.0	0.961	6.3		199	16.6	9.0	**188**	**850**	**218568**

METHODS

In order to obtain continuous records of pH and temperature of water in the Los Cerritos Channel, a WTW pH logger (WQL-pH) fitted with a SensoLyt® WQL pH electrode was installed on a bridge abutment under the Stearns Street Bridge. The logger was set to record temperature and pH at intervals of 10 minutes throughout the deployment. The meter was installed in the middle of the channel below the bridge at a location that ensured the sensors would remain immersed throughout dry weather periods.

Figure D-5. Dry Weather Flow at the Los Cerritos Monitoring Station

The SensoLyt® WQL pH electode records pH in the range of 2 to 12 pH units with an accuracy of ≤ 0.005± 1 digit, and temperature in the range of -5.0°C to 105°C with an accuracy of ≤ 0.1K ± 1 digit. The meter was calibrated before emplacement and checked subsequently each 4 to 6 weeks during maintenance visits with pH standards and a laboratory thermometer and was found to be a stable and reliable instrument.

RESULTS

The continuous series of pH and temperature measurements were taken during the period of September 10, 2010 to May 1, 2011 to obtain both dry and wet season data to document daily, seasonal and event-driven variations in the cycling of pH and temperature. Data were plotted for the full record of deployment in Figure D-6 (upper two plots).

Two features of these data are immediately apparent. First, the strong 24-hour cycle in water temperature and pH is clear and persistent throughout the dry weather season and during dry weather periods throughout the winter. These 24-hour signals are muted in response to significant rain events but reestablish almost immediately after the runoff subsided from these rain events. Secondly, the overall average pH measured in Los Cerritos Channel at the Stearns Street monitoring station is just under pH 9.0 with a daily maximum of up to pH 10.9 thus exceeding Basin Plan objectives of pH 8.5 maximum. Though average solar radiation and average water temperatures drop during the winter, the pH values remain high, and the 24-hour cycle continues along with pH exceedances above pH 8.5.

A closer examination of the 24-hour cycle in temperature and pH is shown in expanded plots of two selected shorter time plots given in Figure D-7, the upper plot for a section of winter record, and the lower plot for a section of record in the spring. Both records show that there is a daily lag between the rise in water temperature and the pH response. A major storm event over a protracted number of days is obvious in the winter record by reduced cycling and pH values depressed to levels less than pH 8.0, but the cycling and pH exceedances resume within a few days. A significant but only one day duration rain occurring in the spring record had much less impact, but pH values actually increased in the following days.

In order to examine the daily cycling more closely, all days of record were averaged versus time of day with the results displayed in Figure D-8. The upper plot shows the results for all rain days, while the lower plot shows the results for all dry days. Both of these plots show temperature and pH hourly averages being lower during the night and increasing during the day. For the rain days, hourly averaged pH was 8.0 overall with maximum pH averaging 8.5. For most of the record comprising all dry days, the same pattern occurred of rising temperature and pH values during the daytime hours. For the dry days (lower plot) the overall average pH was 9.0, with the average maximums of pH 10 occurring late in the afternoon, and the average minimums of about pH 8.0 occurring about at sunrise.

Descriptive statistics for the pH time series data are given in Figure D-9 and numerically in Table D-6. Figure D-9 shows an overall rain day average pH of about 8.0 with a median of pH 7.7, though individual month statistical results are more scattered due to heavier influences of more rain days occurring in December. Nevertheless, maximum pH values for some of the rain days are up to pH 10.5. For the dry days, both the average and median values are about pH 9 with maximum values just below pH 11 and minimum values barely below pH 6.5.

DISCUSSION

The results of this investigation support the initial hypothesis that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity. Early evidence from discrete sampling in the upper channels suggested that pH increases during the day. These survey results also show that the elevated pH in the Los Cerritos Channel Watershed is not coming from high pH discharges in outfalls that drain into the upper Channels. The present results of the time series measurements of temperature and pH taken at the Stearns Street monitoring site in Los Cerritos Channel above tidal influence show the strong persistent 24-hour signal of temperature and pH values and confirm this hypothesis that the high pH values in the Channel are due to this natural process of algal growth. In addition, these latter time series data show that pH cycling and pH exceedances of the Basin Plan objectives also occur during winter dry weather conditions, starting immediately after muting effects of runoff from significant rain events.

Algae in the channels consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths of filimentaeous algae are observed in the open channels typically during summer, dry weather conditions. Evidence of high photosynthetic activity is typically evident in the form of the high concentrations of dissolved oxygen in the water as well as visual evidence of bubbles being generated as the water becomes oversaturated from oxygen. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions (H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel would cause CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways and in shallow lakes. Alkalinity provides buffering capacity such that high alkalinity water has less extreme diurnal changes in pH.

Daily cycling of pH and temperature and high peaks of pH values is a well documented phenomena in streams, ponds, or shallow lakes where shallow water and lack of sufficient vegetation for shading from sunlight allows sufficient photosynthetic activity to produce swings of 1.5 pH units or greater. Examples of high pH resulting from this natural photosynthetic activity can be found in streams and lakes as diverse as those in Hawaii (Tomlinson and DeCarlo, 2001), Oregon (DEQ, 2002), and Montana (Gammons et. al, 2007, Parker et.al. 2007). Phytoplankton diversity and cyanobacterial dominance have been studied in the shallow Santa Olalla Lake in southwestern Spain which is in an area dominated by a Mediterranean-type climate with dry hot summers and low-rainfall winters similar to Southern California (Lopez-Archilla et al., 2003). This lake has an average pH 9.52 with maxima > 10.5 and contained several species of green algae, diatoms, and euglenoids and several cyanobacteria.

Studies carried out in freshwater ponds in the southern United States with respect to management strategies to control pH have been carried out by Tucker and D'Abramo, 2008. They state that chemical interactions among carbon dioxide, hydrogen ions, and the anions that produce alkalinity buffer the pH of most natural waters in a range of about 6 to 8.5. In the absence of processes that add or remove carbon dioxide, the initial pH of water in contact with air depends on its alkalinity. Waters with low alkalinities have an initial pH at the low end of that range, while water of higher alkalinities have higher pH. Adding or removing carbon dioxide causes pH to rise or fall from that initial value. Adding carbon dioxide pushes the previously defined chemical reaction toward the side of forming carbonic acid and hydrogen ions and causing pH to decrease. Removing carbon dioxide pulls the reaction to the other side thereby removing hydrogen ions and causing pH to increase. The amount of variation from the initial pH depends on the amount of carbon dioxide added or removed and the alkalinity, which tends to buffer or reduce the effect of changes in carbon dioxide concentrations.

They state that difficulties in managing pH arise because the term high pH describes not only a chemical property, but also the outcome of many interacting chemical and biological processes. A solution to high pH problems must be to alter pond biology so that the net daily carbon dioxide uptake in near zero by reducing photosynthesis or increasing respiration both of which pose practical difficulties. For pond management, establishing a balance between the hardness and alkalinity helps, addition of alum or an organic substance that will decompose over time to release carbon dioxide into the water, or control of plant growth through shading or use of aquatic herbicides, the latter use in ponds usually to change one type of plant community to a more desirable type. All of these management methods appear to be very difficult if applied to shallow, slow moving water in miles of concrete channels.

CONCLUSIONS

Exceedances of pH above the Basin Plan objective of 8.5 occur in the upper channels of the Los Cerritos Watershed in both summer dry and winter dry periods. Early evidence from discrete sampling in the upper channels of the Los Cerritos Watershed suggested that pH increases during the day. These survey results also showed that the elevated pH in the Los Cerritos Channel Watershed is not coming from high pH discharges in outfalls that drain into the upper Channels. The present results of the time series measurements of temperature and pH taken at the Stearns Street monitoring site in Los Cerritos Channel above tidal influence show the strong persistent 24-hour signal of temperature and pH values and confirm the hypothesis that the high pH values in the Channel are due to this natural process of algal growth.

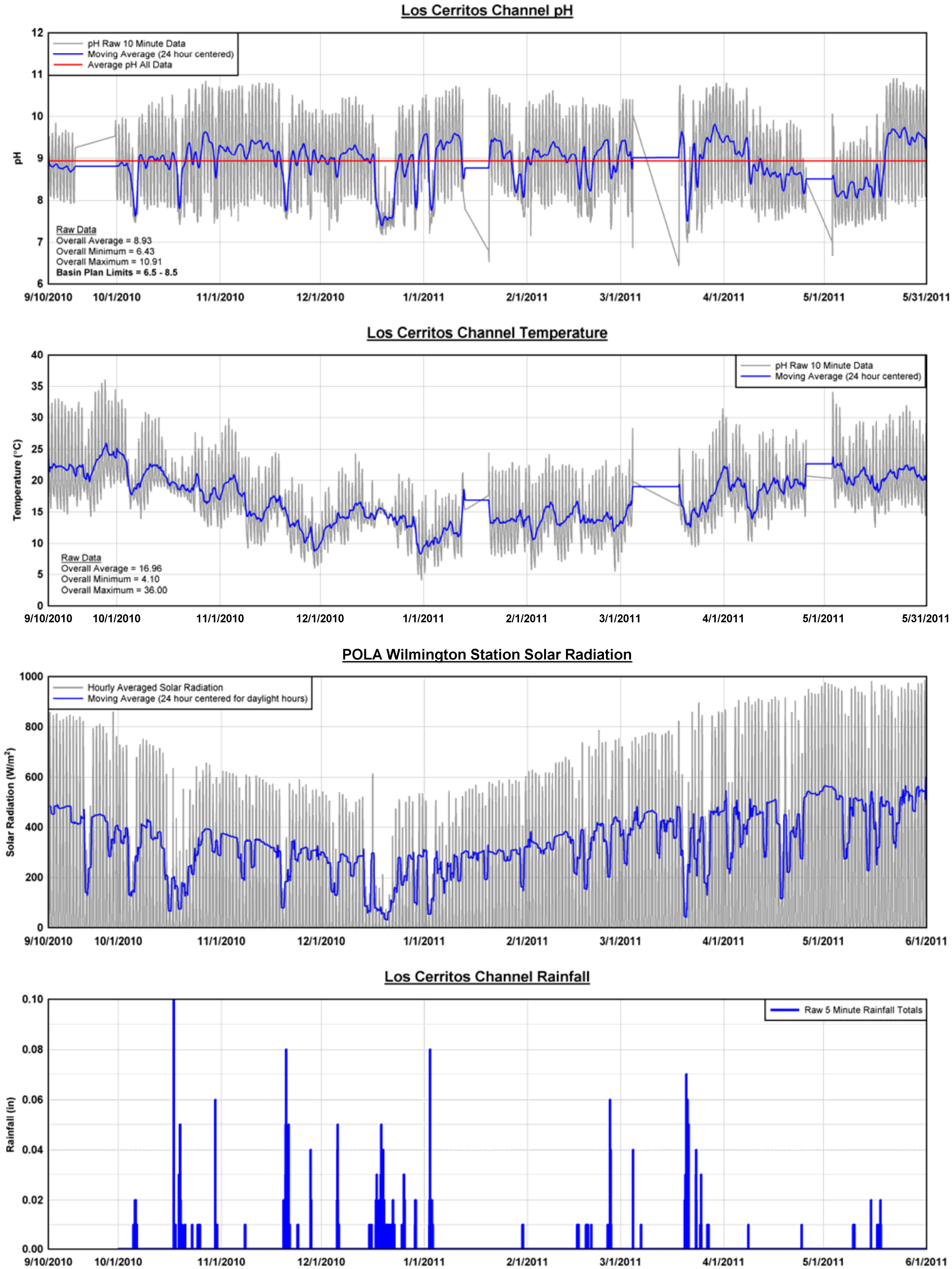
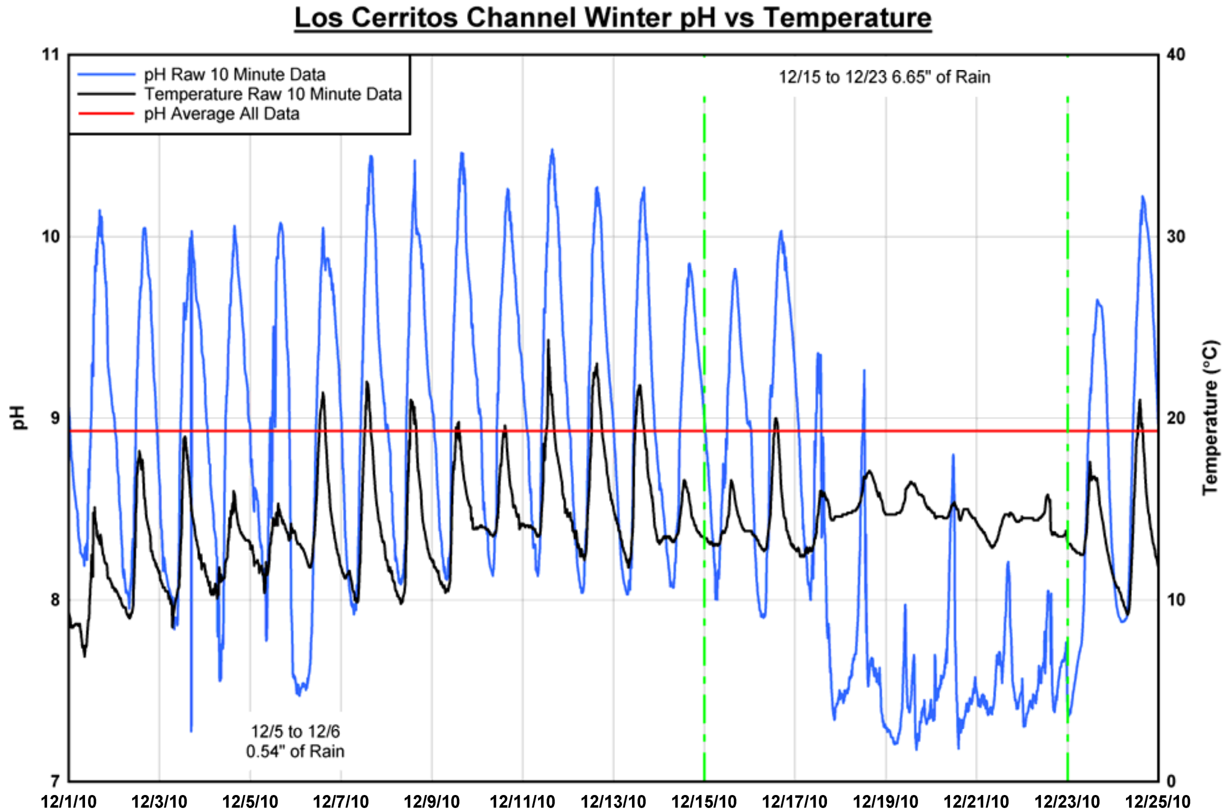


Figure D-6. **Time Series Records of pH, Temperature, Solar Radiation and Rainfall in Los Cerritos Channel at Stearns Street. September 10, 2010 to June 1, 2011.**



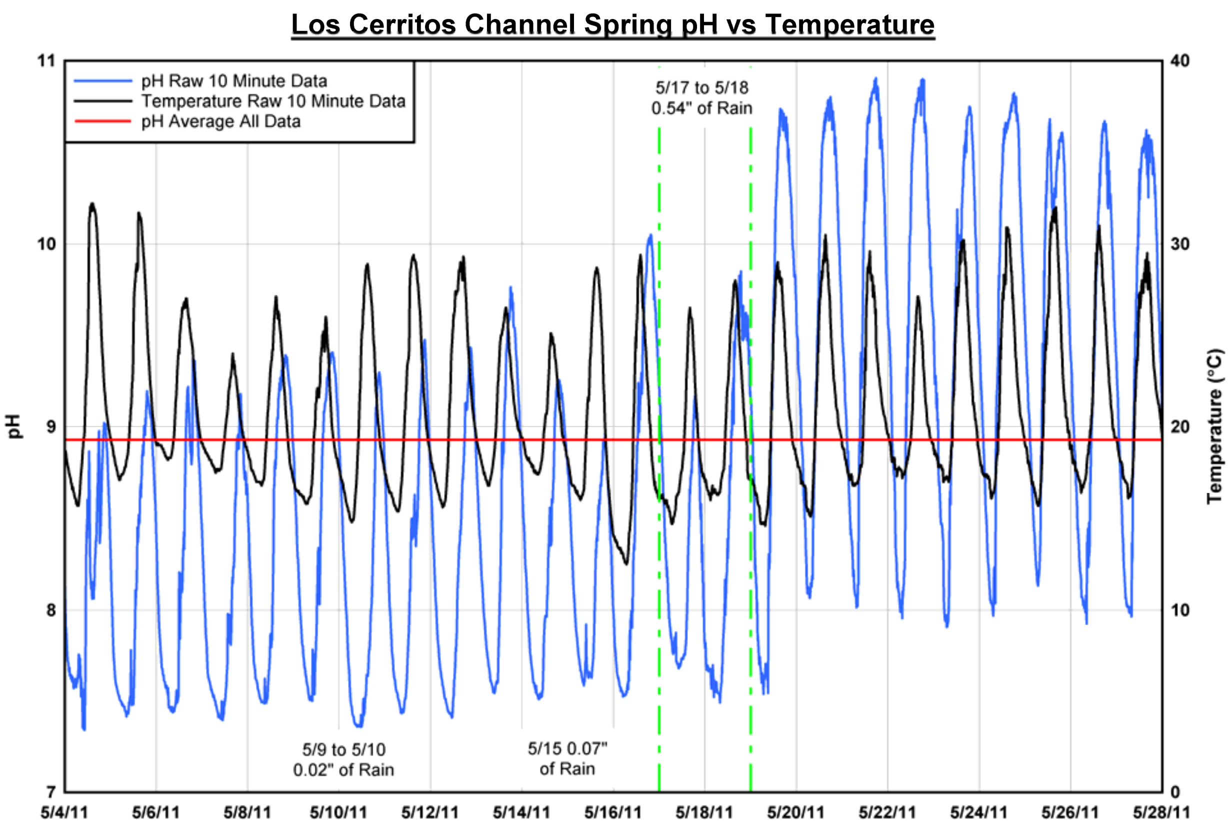
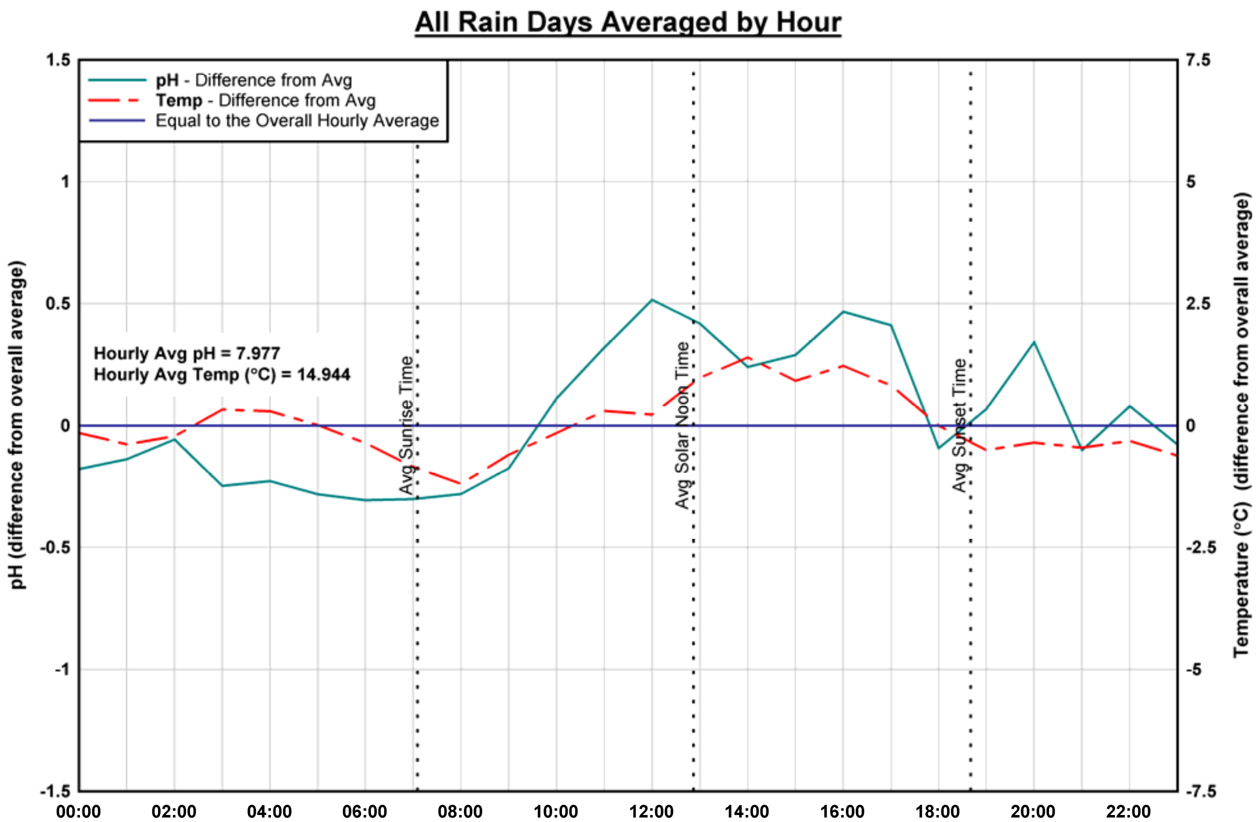


Figure D-7. Example Record of pH and Temperature 24-Hour Cycling in Los Cerritos Channel at Stearns Street. Winter (Above) and Spring (Below) Seasons.



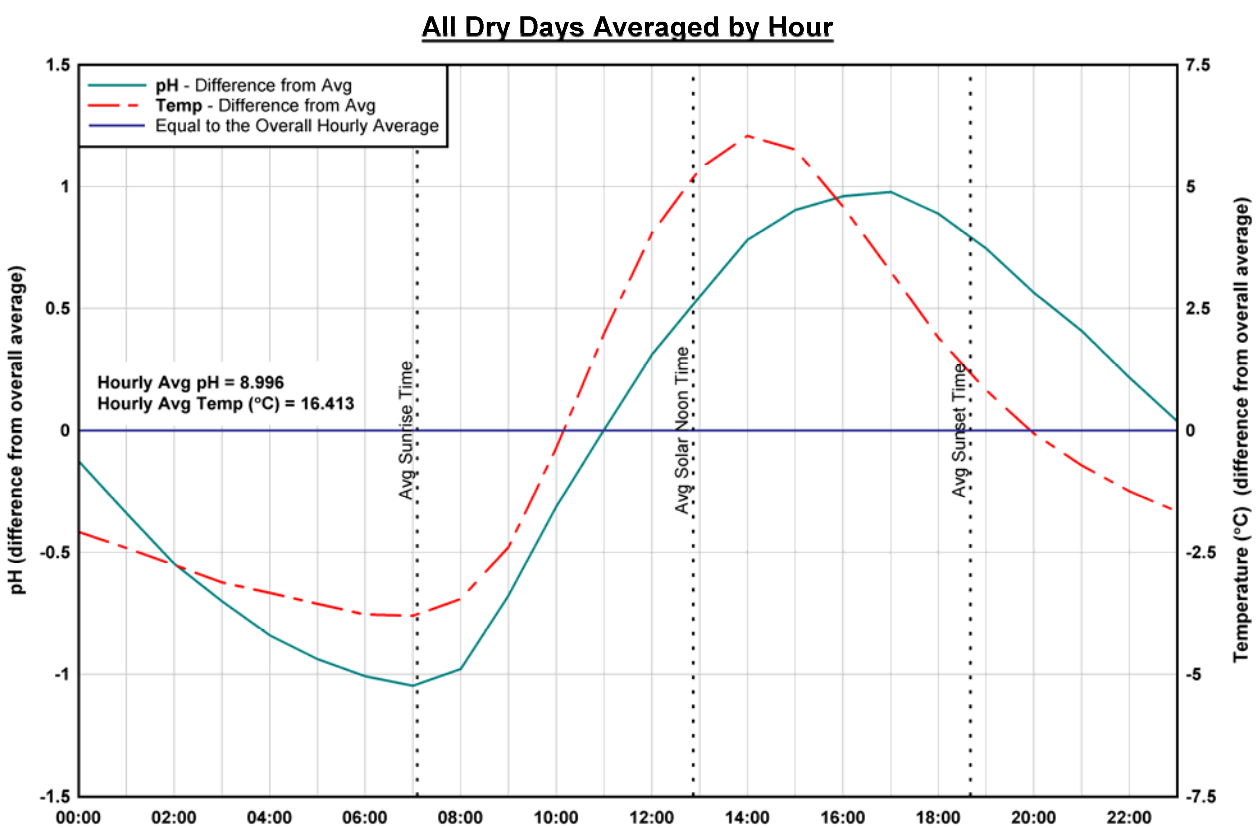
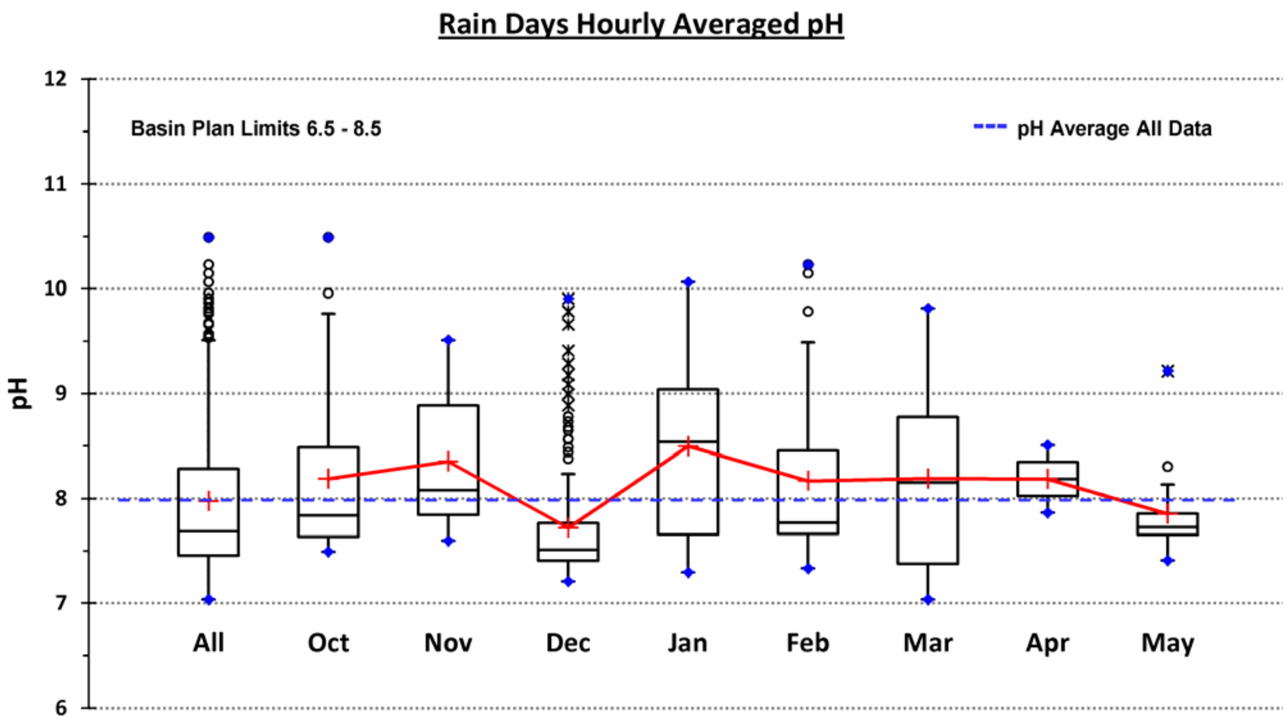


Figure D-8. Variations of pH and Temperature During Rain Days (Above) and Dry Days (Below) in Los Cerritos Channel at Stearns Street.



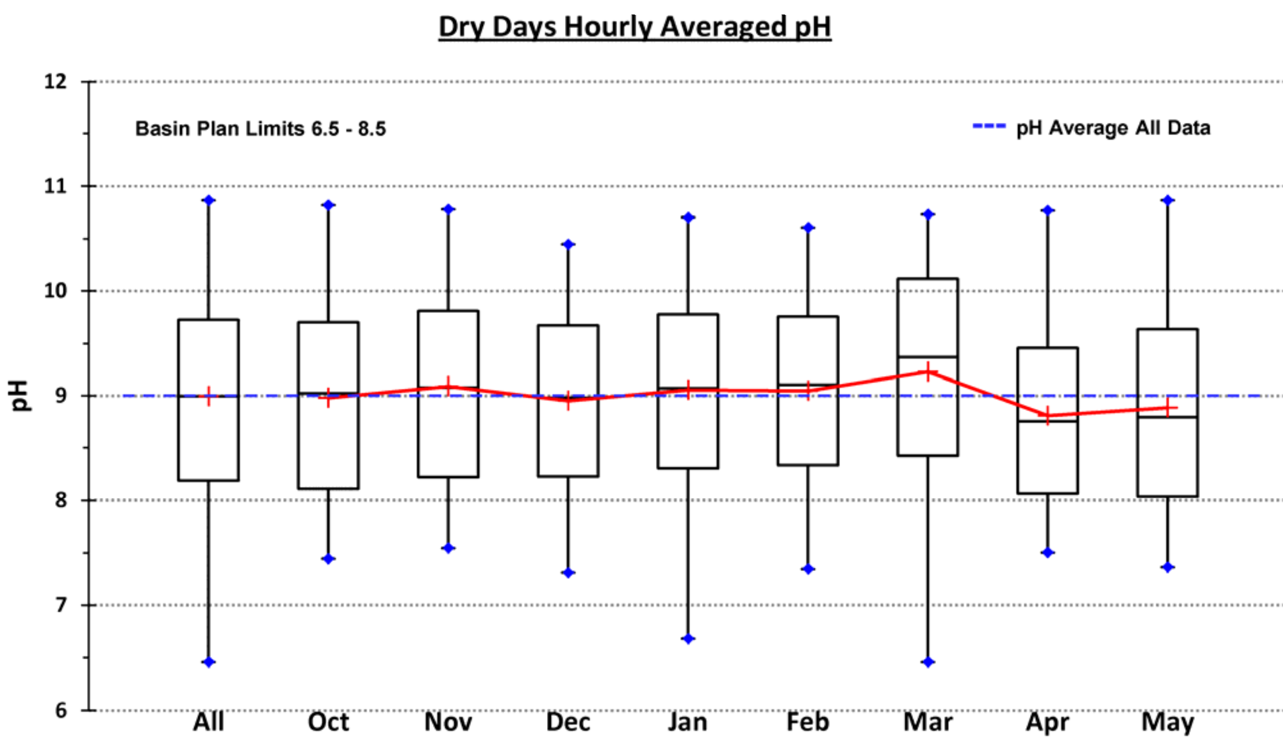


Figure D-9. Variability of pH in Los Cerritos Channel at Stearns Street for Rain Days (Above) and for Dry Days (Below).

Table D-6. Descriptive Statistics for pH at Los Cerritos Channel Monitoring Station.

pH on Rain Days (hourly averaged, Sept. not included)

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Oct	7.49	8.19	10.49	0.75	9.21	1.74
Nov	7.60	8.35	9.51	0.67	7.99	0.73
Dec	7.21	7.72	9.90	0.54	7.01	8.6
2011						
Jan	7.30	8.50	10.06	0.88	10.35	0.97
Feb	7.33	8.17	10.23	0.84	10.24	0.93
Mar	7.04	8.19	9.81	0.91	11.12	2.65
Apr	7.87	8.19	8.51	0.45	5.55	0.03
May	7.41	7.86	9.21	0.42	5.38	0.63
All	**7.04**	**7.98**	**10.49**	**0.73**	**9.09**	**16.28**

pH on Dry Days (hourly Averaged, Sept. not included)

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Oct	7.45	8.98	10.82	0.92	10.19	0
Nov	7.55	9.09	10.78	0.92	10.16	0
Dec	7.31	8.95	10.45	0.82	9.11	0
2011						
Jan	6.69	9.06	10.70	0.87	9.66	0
Feb	7.35	9.05	10.61	0.81	8.90	0
Mar	6.46	9.23	10.73	1.02	11.01	0
Apr	7.51	8.81	10.77	0.82	9.27	0
May	7.37	8.89	10.87	1.02	11.47	0
All	**6.46**	**9.00**	**10.87**	**0.90**	**10.05**	**0**

All Raw pH Data

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Sep	7.92	8.80	9.90	0.57	6.45	-
Oct	7.41	8.90	10.85	0.90	10.15	1.74
Nov	7.49	9.07	10.81	0.93	10.23	0.73
Dec	7.18	8.71	10.48	0.92	10.52	8.6
2011						
Jan	6.52	9.04	10.73	0.88	9.77	0.97
Feb	7.15	9.01	10.62	0.83	9.21	0.93
Mar	6.43	9.14	10.80	1.05	11.53	2.65
Apr	7.47	8.81	10.81	0.82	9.31	0.03
May	6.67	8.86	10.91	1.03	11.58	0.63
All	**6.43**	**8.93**	**10.91**	**0.92**	**10.28**	**16.28**

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Attachment 4. Summary of pH and Ammonia Data from City of Long Beach MS4 NPDES Storm Water Monitoring Site on the Los Cerritos Channel at Stearns Street along with Potential Toxicity Calculations

(Excel Spreadsheet, Electronic File Only)

ATTACHMENT D:

SUPPORT FOR ASSUMPTION OF SB 346 IMPLEMENTATION EFFECTIVENESS

1. Memo: Estimate of Urban Runoff Copper Reduction in Los Angeles County for the Brake Pad Reductions Mandated by SB 346

2. Brake Pad Copper Reduction Calculations Spreadsheet

3. Memo: Brake Pad Copper Reduction – Metrics for Tracking Progress

tdc environmental

MEMO

TO: Richard Watson, Richard Watson & Associates, Inc. **DATE:** Feb. 14, 2013

FROM: Kelly D. Moran, Ph.D. **PROJECT:** 86

SUBJECT: Estimate of Urban Runoff Copper Reduction in Los Angeles County from the Brake Pad Copper Reductions Mandated by SB 346

Summary

This memorandum provides an estimate of urban runoff copper reductions from the brake pad copper reductions mandated by SB 346. The estimate is designed for urban runoff management planning purposes in Los Angeles County.

The estimate relies on available information, which was largely developed through the lengthy collaboration among brake pad manufacturers, government agencies, and environmental groups in the Brake Pad Partnership (BPP). Since certain elements of the brake pad copper reduction schedule are unknown at this time due to the proprietary nature of product formulation and sales data, the estimates rely on a series of reasonable assumptions that were developed on the basis of available data. Three scenarios (see Table 1) were developed to span the reasonable range of industry product modification schedules.

Table 1. Copper Reduction Scenario Summary

Year*	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
2014	<0.5% copper brake pads start appearing on new vehicles	<5% copper brake pads start appearing on new vehicles	<5% copper brake pads start appearing on new vehicles
2015			
2016			
2017			
2018		<0.5% copper brake pads start appearing on new vehicles	<0.5% copper brake pads start appearing on new vehicles
2019			
2020			
2021	All new vehicle brake pads <0.5% copper	All new vehicle brake pads <5% copper	All new vehicle brake pads <5% copper
2022			
2023	All replacement pads <0.5% copper	All replacement pads <5% copper	All replacement pads <5% copper
2024			
2025		All new vehicle brake pads <0.5% copper	All new vehicle brake pads <0.5% copper
2026			
2027		All replacement pads <0.5% copper	
2028			

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

For each scenario, quantitative estimates of urban runoff copper reductions were generated through spreadsheet calculations. The resulting estimates summarized in Table 2 are in the form of a percentage reduction in copper in urban runoff in years of interest for TMDL compliance in Los Angeles County (2020, 2024, and 2028) and in 2032.

Table 2. Estimated Urban Runoff Copper Reduction from Brake Pads Alone

Year	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
2020	29%	17%	17%
2024	60%	45%	39%
2028	61%	60%	49%
2032	61%	61%	55%

The most significant uncertainties in these estimates are in brake pad copper reduction schedules, brake pad copper contents, and watershed response times (which are affected by watershed-specific characteristics and variation in annual rainfall volumes).

Background

A simple action—vehicle drivers hitting the brakes—released about 600,000 kilograms (1.3 million pounds) of copper into California's environment in 2010. Each time vehicle brakes engage, a tiny amount of fine dust wears off of the vehicle's brake pads. When it rains, some of this dust washes into urban runoff. Scientific studies indicate that dust generated by vehicle brakes is by far the most significant source of copper in urban watersheds. In California's most urbanized watersheds, brake pad copper is estimated to comprise more than 60% of all copper in urban runoff (Donigian 2009[1]).

A California law enacted in 2010, SB 346 (Kehoe) set in place a program that will nearly eliminate copper use in brake pads. SB 346 requires that brake pads sold in California contain no more than 5% copper by weight by 2021, and no more than 0.5% by 2025. According to a representative industry analysis, as of 2006 brake pads contained an average of about 8% copper by weight (BPP 2008). The law also limits dangerous—but fortunately less common—brake pad pollutants, by prohibiting sale of brake pads containing more than trace amounts of lead, mercury, asbestos, cadmium, and hexavalent chromium in 2014. To avoid replacing one environmental problem with another, SB 346 requires manufacturers to examine new formulations carefully and to select alternatives that pose less potential hazard to public health and the environment. Consumer safety will be ensured through a limited deadline extension process for the 2025 0.5% copper requirement (available starting only when a manufacturer demonstrates that no alternative brake friction materials will be safe and available) and by provisions allowing continued sales of replacement brake pads for older vehicles. Starting in 2014, a brake pad copper content certification and labeling system established by SB 346 will provide for ready identification of brake pads with the lowest copper content.

Following California's model, the State of Washington also enacted restrictions on brake pad copper content in 2010 (Washington State 2010). Washington's law provides slightly different exemptions than California's law—notably a much narrower exemption for

[1] See references list at the end of the memorandum.

"aftermarket" brake pads that replace the "original equipment" brake pads sold with new vehicles. Washington law also has another important difference from California law—it requires manufacturers to provide Washington State Department of Ecology with periodic reports of brake pad copper, antimony, nickel, and zinc content, starting in 2013.

Due to the importance of California's vehicle market and the interconnection of vehicle parts distribution systems throughout North America, brake pad manufacturers expect that it is unlikely that any manufacturer will produce California-specific or Washington-specific products (MEMA 2012a). Instead, copper reduction will be integrated throughout the entire North American brake pad market (MEMA 2012a).

In the two years since SB 346 was enacted, the vehicle industry has actively engaged in implementing the law (Moran 2011). Compliance certification markings, box markings, and certified chemical analysis methods have been adopted (SAE 2011; SAE 2012; MEMA 2012b). Washington State has adopted regulations specifying testing, marking, and reporting requirements (Washington Department of Ecology 2012). Although quantitative information about brake pad copper reductions is not yet available, strong industry attention to low-copper and copper-free brake pads and promotion of these pads by companies already offering them (Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012) provides evidence that implementation is underway and is proceeding in accordance with the process and time frames anticipated by the Brake Pad Partnership (BPP 1996-2012).

Summary of Available Information

This section summarizes the available information that forms the basis for the brake copper reduction estimates.

Brake Pad Copper Reduction Schedule. In 1999, the Brake Manufacturer's Council committed to offer new low-copper brake pad materials to customers within 5 years of any BPP decision that brake pads are a major copper source (Lawrence 1999). This commitment was triggered by the BPP in late 2008. As discussed above, many manufacturers are currently offering low copper and copper-free brake pads to customers. The timelines in SB 346 and Washington state law provided eight years after the 2013 reformulation commitment for vehicle manufacturers to re-engineer all vehicle platforms to incorporate the new brake pad formulations (BPP 1996-2012). This timeframe was specifically selected to allow vehicle manufacturers to complete the required brake system re-engineering in conjunction with their regular re-engineering of vehicle platforms. Both laws provide for a second overlapping vehicle re-engineering cycle to reach the 2025 0.5% copper standard, which required technology that was not in sight when the laws were adopted in 2010 (but that is now commercially available as documented above).

Brake Pad Copper Content. Through the BPP, brake pad manufacturers reported brake pad copper content annually from 1998-2006 for the highest sales volume new vehicles (BPP 2008). In 2006, original equipment brake pads contained an overall average of 8.2% copper by weight. This average represents a mixture of high-copper brake pads (10-20% copper) and brake pads with no intentionally added copper. In 2008, manufacturers collected formulation type data to estimate the fraction of the market comprised of no-copper brake pads (Phipps 2008). Because the BPP reporting covered only original equipment brake pads (those sold on new vehicles), the BPP developed a separate estimate of the copper content in aftermarket (replacement) brake pads (Rosselot 2009). Until Washington State's reporting begins, BPP data are the best available information about brake pad copper content.

<u>Brake Pad Replacement Frequency</u>. Brake pad material wears off gradually over the course of the lifetime of the pad. To support the work of the BPP, manufacturers shared propriety market survey data characterizing the replacement frequencies of original equipment and aftermarket brake pads (BPP 1996-2012; AAIA 2008). These data showed that on average, original equipment brake pads are replaced when a vehicle is 3-4 years old. Because older vehicles are driven fewer miles per year (FHWA 2009; Santos 2011), their aftermarket brake pads are only replaced at a rate of about 21% per year (AAIA 2008).

<u>Vehicle Fleet Characterization</u>. The California Department of Finance periodically publishes summaries of vehicle registration data (DOF 2009). These summaries provide vehicle age distributions and the fraction of vehicle registrations by type (light-duty, heavy-duty, motorcycle, trailer). In addition to these data, information from the Southern California Association of Governments' transportation monitoring and information system (SCAG 2012) and the BPP (BPP 1996-2012 and Rosselot 2010) provide the basis for assuming that neglecting contributions from vehicles other than light-duty vehicles will not introduce significant error in the copper reduction estimate.

<u>Copper in Urban Runoff</u>. The Brake Pad Partnership (BPP) completed peer-reviewed scientific studies to characterize brake pad emissions (BMC PEC 2006; Haselden 2004; Schlautman 2006), examine all environmental copper sources (Rosselot 2006a; Rosselot 2006b), and develop quantitative estimates of the brake pad copper contribution to total stormwater copper loads using linked air and watershed models (Pun 2006a; Pun 2006b; Donigian 2007; Donigian 2009).

The BPP's "Upper Colma" modeling watershed is most similar to watersheds in Los Angeles region because of its combination of high urbanization, high traffic levels, and location surrounded by other urban areas. In this watershed, brake pad copper was estimated to comprise 58-66% of total anthropogenic copper.

BPP modeling estimated watershed response time to brake pad copper reductions (Donigian 2009). For the Los Angeles region, watershed response time is assumed to be similar to the BPP's estimates for highly urbanized watersheds with concrete lined channels. In the most highly impervious watersheds, watershed response time is relatively quick, with >70% copper reductions estimated the first year after a change in brake pad reformulation and nearly 90% reduction in 5 years. Concrete channels were found to further reduce these watershed response time.

<u>Computational Assumptions</u>

The copper reduction estimates rely on a series of reasonable assumptions that were developed on the basis of available data. These assumptions are detailed in Table 3.

Table 3. Assumptions Used in Development of Copper Reduction Estimates

Assumption	**Basis**	**References**
Brake Pad Copper Reduction Schedule Assumptions – Original Equipment Brake Pads		
By January 1, 2021, all original equipment brake pads will contain less than 5% copper. By January 1, 2025, all original equipment brake pads will contain less than 0.5% copper	Requirements of SB 346	SB 346
Extension requests for 0.5% copper requirement will be relatively limited.	Difficulty of extension process and short time frame for each extension, long time frame for development of alternatives, industry press and informal communications indicating that alternatives are becoming available.	SB 346; BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012
Lower copper brake pads will be phased in on new vehicles at a constant rate over an 8-year period prior to each compliance deadline.	Estimates from brake pad and vehicle manufacturers, who have consistently explained that they plan to introduce new brake pads when completing the cyclical re-engineering of vehicle platforms. Recent industry press and brake pad manufacturer announcements have been consistent with the statements made during development of legislation.	MEMA 2010; BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012
Washington State will require new vehicle brake pads to contain less than 0.5% copper by January 1, 2025 (same schedule as California).	Washington State law establishes the same compliance date as California law for brake pads less than 5% copper, but does not establish a firm date for requiring brake pads less than 0.5% copper. Washington must conduct a review to set the compliance date. Washington's review will start in 2015. When the review is complete, manufacturers will have 8 years to comply. Washington's review process and decision will take 1-2 years, setting up timing for implementation on 1/1/25. To establish the compliance date, Washington must find that <0.5% copper pads are available. Market information indicates this may already be true. Formulation data that must be reported to Washington in 2013 is likely to provide a scientific basis for Washington's decision. The industry and the two states have worked to harmonize the implementation of the California and Washington laws.	Washington State 2010; Moran 2011; ; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Brake Pad Copper Reduction Schedule Assumptions – Aftermarket (Replacement) Brake Pads		
Non-compliant replacement brake pads for pre-2021 and pre-2025 vehicles may be sold indefinitely.	Provision of SB 346	SB 346
Under Washington state law, starting on January 1, 2021, all newly manufactured replacement brake pads must contain less than 5% copper. Non-compliant replacement brake pads manufactured prior to January 1, 2021 may be sold until December 31, 2030. Non-compliant replacement brake pads may be sold indefinitely, but only if they are identical to original equipment brake pads.	Washington State law	Washington State 2010; Washington Department of Ecology 2012
Washington State's exemption for original equipment brake pads that are identical to the ones sold with the new vehicle will have only a small effect.	Original equipment services pads that are identical to the ones sold with the vehicle comprise a very small fraction of the market because for cost reasons, even vehicle dealers switch from these pads to lower cost vehicle manufacturer approved service pads a few years later. Vehicle manufacturers protested the narrow nature of this exemption during development of Washington's legislation and its regulations.	BPP 1996-2012
Recognizing that brake pad sales lag behind shipments of new products due to the inventory "turn time" in the brake pad supply chain, only 45% of brake pads sold in a given year are shipped in that year. The remaining sales are comprised of brake pads shipped in the previous year (30%) and brake pads shipped two years prior (25%).	A typical replacement brake pad inventory "turn time" is <2 years. Some low volume pads may be held in inventories for as long as ten years. Inventory carrying costs hold down inventory volumes. Brake pad inventory turn time is longer than other retail inventory turn times because of the plethora of vehicle models and some manufacturers' historic lack of standardization of parts across vehicle models.	BPP 1996-2012
Replacement brake pads for vehicles manufactured with low copper brake pads will also be low in copper, even if the vehicle is manufactured prior to compliance deadlines.	Braking performance will be most easily matched with lower copper formulations. Lower copper formulations will almost certainly be lower cost, which is an important factor in the largely price-driven aftermarket.	BPP 1996-2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Replacement brake pads containing lower levels copper that are designed for vehicles manufactured with high copper brake pads will phase in at a constant rate starting in 2014. The end of the phase in period will be determined by Washington's compliance deadlines.	Since safety standard apply to new vehicles—and not to brake pads—there is no specific regulatory constraint on aftermarket brake pad formulations. Drivers for the aftermarket include cost, safety, and customer acceptance. Since copper is an expensive ingredient, cost considerations point toward early reformulation. Aftermarket manufacturers have a history of making products available to fit new vehicles within a few months of the vehicle's initial manufacture, suggesting that they will make products available on a schedule that phases in over the same general time period as the phase in for original equipment brake pads. Press releases and industry websites indicate that brake pads containing <5% copper and brake pads containing less than 0.5% are both already available. Manufacturers may be less motivated to introduce new products for old vehicles, which present the need to design pads with characteristics similar to those provided by high copper brake pads.	BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012
Brake Pad Copper Content Assumptions		
82% of Original Equipment brake pads contain copper; these pads contain 10-20% copper by weight. 18% of Original Equipment brake pads are semi-metallic, containing <0.5% copper. These pads contain a low level of copper (0.1%) due to the presence of traces of copper in other ingredients.	Analysis of brake pad formulation data collected in Brake Manufacturers' Council annual surveys and BPP Steering Committee discussions of brake pad copper content by formulation type.	MEMA 2010; Phipps 2008; BPP 1996-2012
Original equipment brake pads currently contain an overall average of 8.2% copper by weight	Brake pad copper content data collected in Brake Manufacturers' Council annual surveys for the BPP. Although this is the best available data set, the survey was not designed for use in loading estimates. The most recent survey was in 2006. Newer data are currently unavailable.	BPP 2008
Brake pads meeting the <5% copper requirement will contain an average of 4% copper by weight. Brake pads meeting the <0.5% copper requirement will contain an average of 0.1% copper by weight.	Due to variation in materials input and manufacturing processes for brake pads (which are heterogeneous materials), to ensure compliance, products will need to be designed with copper content well below compliance levels. Since copper does not serve a useful design purpose below 1% concentrations, brake pads containing less than 0.5% copper will only contain trace copper introduced via impurities in other ingredients (e.g., recycled metals).	BPP 1996-2012
Aftermarket brake pads currently contain an overall average of 5% copper by weight.	Estimate made for the Brake Pad Partnership based on the very limited available data on aftermarket brake pads. Copper content is lower due to the high cost of copper as an ingredient and the cost sensitivity of the aftermarket.	Rosselot 2009

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
About 34% of aftermarket brake pads currently contain less than 0.5% copper. The current rate of replacing high copper original equipment brake with <0.5% copper brake pads will not decline and will grow only as aftermarket brake pads are re-engineered.	As compared to original equipment brake pads, a greater fraction of replacement pads are likely to contain less than 0.5% copper. Informal estimates of the copper free fraction of replacement pads have been as high as 50%. In the absence of other information, 34% of replacement brake pads as assumed to be copper free; this value is the midpoint between 18% and 50%. Similarly, in the absence of other information, the fraction of vehicles that started with high copper brake pads but that receive copper free replacement brake pads is assumed to remain constant until re-engineering starts.	BPP 1996-2012; Antenora 2012; MEMA 2012
Brake Pad Replacement Assumptions		
Original equipment brake pads are replaced when vehicle is 3.5 years old.	Brake pads are typically replaced after 3-4 years of service, after about 35,000-40,000 miles of driving.	BPP 1996-2012
Vehicles more than 3.5 years old have their brake pads replaced once every 5 years.	Automotive Aftermarket Industry Association survey data of the aftermarket indicate that 20-22% of vehicles more than 3 years old have their brake pads replaced each year. Older vehicles likely have a lower brake pad replacement rate than new vehicles because vehicle miles traveled falls with vehicle age.	AAIA 2008; BPP 1996-2012; FHWA 2009; Santos 2011
Vehicle Fleet Assumptions		
The age distribution of California's vehicle fleet will remain essentially the same as the distribution in 2007	No available information suggests that future distributions will change dramatically. The gyrations in vehicle sales volumes during the economic downturn appear to have ended.	DOF 2009. Table J3: "Distribution Of Fee-Paid Registrations By Type And Year First Registered California, 2007."
Heavy-duty (truck) brake copper contributions are small.	SCAG vehicle miles traveled (VMT) data show trucks comprise less than 3.5% of total vehicle miles traveled in Los Angeles County. Trucks have larger brake pads, but since consumer acceptance issues (noise, braking comfort) that have driven copper in use in vehicles are not present in this market, copper use is believed to be low.	SCAG 2012; Gilroy 2011; BPP 1996-2012
Motorcycle contributions are small	Motorcycles are estimated to be <1% of statewide brake pad copper emissions.	Rosselot 2010
Trailer contributions are small	Trailers comprise less than 10% of total California vehicle registrations. Trailers probably comprise a relatively small portion of the vehicle miles traveled in the Los Angeles region because they are primarily used on heavy-duty trucks (see above) and for recreational purposes.	DOF 2009. Table J5: "Registration of Motor Vehicles and Trailers which Paid Fees by Type of Vehicle California, 1971 to 2007."; SCAG 2012
Other vehicle types exempted from SB 346 release negligible quantities of copper	Brake Pad Partnership informal analysis	BPP 1996-2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Vehicle Miles Traveled (VMT) Assumptions		
Brake pad wear is proportional to VMT	Information provided by brake pad manufacturers to the Brake Pad Partnership.	Phipps 2006
VMT will not change significantly in coming years.	SCAG data showing VMT was basically flat from 2002 through 2009. Increasing gasoline prices and legislation, regulation, and planning activities to reduce VMT because of climate change should stabilize—and may actually reduce—future VMT.	SCAG 2012
The relative fraction of vehicle miles traveled on highways (as compared to city streets) will not change significantly in coming years.	Brake Pad manufacturer data show that brake pad wear rates on city streets are 5-10 times greater than emissions on highways, due to lower use of brake pads per mile traveled on highways. As long as the relative proportion of vehicle miles traveled on theses two types of road does not change, this does not affect load estimates.	Phipps 2006
Urban Runoff Assumptions		
Urban Runoff Copper Fraction = 62%	In the most highly urbanized watersheds, brake pad copper comprises 58-66% of total anthropogenic copper.	Donigian 2009
Watershed response time in Los Angeles County = 1 year	In the most highly impervious San Francisco Bay area watersheds without concrete channels, watershed response time is relatively quick, with >70% copper reductions estimated the first year after brake pad reformulation and nearly 90% reduction in 5 years. Modeling suggests that channelized watersheds experience a slightly quicker wash out period than the natural channels modeled in the San Francisco Bay area. Weather introduces uncertainty into predicted copper reduction schedules. Wet weather and large storms mobilize copper in watersheds, increasing the speed of copper reductions. Dry years reduce the washout, increasing the length of time that it takes for brake pad copper reductions to be fully reflected in waterways. Modelers found that dry water year scenarios slightly increased washout time, by at most a few years.	Donigian 2009

Brake Pad Copper Reduction Scenarios

The following three scenarios were developed on the basis of available information to bracket the range of potential rates of brake pad copper reduction. Each scenario is based on a different potential pathway for the market transition to the brake pads containing less than 0.5% copper.

Scenario 1 (One-Step Reduction) – Virtually all original equipment (new vehicle) and aftermarket (replacement) brake pads are reformulated to <0.5% copper by January 1, 2021 (first SB 346 copper compliance deadline). Virtually all aftermarket brake pads containing higher copper levels that remain in distributor and retailer inventories are sold within two years of this date.

Brake pad, brake systems, and new vehicle manufacturers would greatly reduce their engineering costs for the transition to low copper brake pads if they can move directly to brake pads with less than 0.5% copper. This scenario describes the copper reductions that would occur if brake pad manufacturers complete product reformulation in a single cycle, thus avoiding two rounds of re-engineering of their products and their manufacturing processes. The primary basis for this scenario is the assumption that all manufacturers can quickly develop products containing less than 0.5% copper that meet all manufacturing, cost, and customer requirements.

Although available information about product formulation changes is currently limited, there is some evidence suggesting that this scenario may occur. The original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (Moran 2011). At least three major vehicle manufacturers have requested that suppliers provide brake pads with less than 0.5% copper for their new vehicle models (Murphy 2012). Press releases and communications with industry members indicate that companies are currently bringing to market brake pads with less than 0.5% copper that are designed to replicate the braking performance properties of higher copper formulations. These new brake pads will be appearing in some 2014 vehicle models (BPP 1996-2012; Murphy 2012).

For aftermarket brake pads, this scenario assumes that Washington State requirements will drive the market transition. Unlike California law, Washington law has very narrow exemptions for aftermarket brake pads (Washington State 2010). Due to the complexity of brake pad distribution chains, if higher copper brake pads enter national distribution systems after Washington's compliance deadlines, manufacturers and retailers will have trouble avoiding non-compliance with Washington requirements (BPP 2008-2010). Consequently, brake manufacturers have stated their intent to implement brake pad copper reductions nationally (MEMA 2012a).

The primary exemption for aftermarket brake pads under Washington law is an allowance for "inventory runoff" of brake pads manufactured prior to the compliance deadline (Washington State 2010). To ensure compliance, brake pad manufacture date must be marked on pads; this date marking is part of the nationwide brake pad compliance marking system (SAE 2012). Typical replacement brake pad inventory turnover time is less than two years (Brake Pad Partnership 1996-2012). Thus, after two years, most brake pads more than two years old have been sold.

Another consideration for the aftermarket is that copper is far more expensive than other brake pad ingredients (BPP 1996-2012). Since price is the primary customer interest in the aftermarket, manufacturers have a financial incentive to eliminate copper in aftermarket brake pads.

This scenario also may avoid the need for purchase of special chemical analysis equipment for manufacturers to monitor products for compliance with the 5% copper standard. In brake pad materials (friction materials), copper concentration measurements around 5% copper pose unique chemical analysis challenges that do not occur at the 0.5% level (Brake Pad Partnership 1996-2012). Developing manufacturing process controls for this copper concentration would cause manufacturers to incur one-time costs that have only short-term benefits.

The primary shortcomings of this scenario are:

(1) Some manufacturers may not successfully develop brake pads containing less than 0.5% copper that meet all manufacturing, cost, and customer requirements soon enough to transition all of their products by the above dates.

(2) Some manufacturers may delay transitions until legal deadlines.

(3) Washington State may provide broader exemptions when it implements its requirement for brake pads to contain less than 0.5% copper, delaying the aftermarket transition to the lowest copper brake pads.

This scenario is optimistic. It is included to show the earliest reasonable dates for achievement of brake copper reductions.

Scenario 2 (Two-Step Reduction) – Virtually all original equipment (new vehicle) brake pads are reformulated to <5% copper by January 1, 2021 and <0.5% copper by 2025 (SB 346 compliance deadlines), with minimal use of exemptions and extensions. Virtually all higher copper aftermarket (replacement) brake pads remaining in inventories are sold within two years of each compliance date.

This scenario assumes that brake pad manufacturers will implement a two-step transition to the lowest copper brake pads, based on legal deadlines. Under this scenario, in the first step manufacturers would replace current high copper products with products containing less than 5% copper. Manufacturers would delay introduction of products with less than 0.5% copper for several years, which would provide additional time for development of formulations containing less than 0.5% copper.

The 5% standard is included in California and Washington laws because when the laws were adopted, brake pad manufacturers indicated that most companies were capable of producing brake pads meeting the 5% standard (BPP 2008-2010). The long transition time provided in the laws before all new vehicles are required to meet the 5% standard was to provide adequate time for re-engineering of the braking systems of every new vehicle that currently uses higher copper brake pads (MEMA 2010).

When the laws were passed, manufacturers indicated that companies would need to develop new formulation approaches to formulate brake pads with less than 0.5% copper while meeting all manufacturing, cost, and customer requirements. SB 346 provided an additional four years after the 5% standard takes effect to provide extra time for manufacturers to develop the new formulation approaches.

SB 346 was designed to allow vehicle manufacturers to re-engineer vehicle brake systems concurrent with their other periodic vehicle platform re-engineering, which occurs about once every 8 years for most vehicles (Brake Pad Partnership 2008; MEMA 2010). Before a newly re-engineered brake system reaches the market, the brakes go through several years of engineering design, product validations, and performance and safety testing by brake pad manufacturers and vehicle manufacturers (Brake Pad Partnership 2008; MEMA 2010). The timelines in SB 346 provided about 4 years for these activities to be conducted in parallel with formulation development (2010-2013), which occur prior to the sales of the first re-engineered less than 5% copper brake pad new vehicles in 2014. Because the compliance deadline for brake pads with less then 0.5% copper is only four years after the 5% deadline, within 4 years of the introduction of the less than 5% copper brake pad vehicles (2018), manufacturers will begin introducing vehicles with less than 0.5% copper brake pads so as to completely re-engineer all vehicles to meet the 0.5% standard by 2025.

Although the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads, it appears that a few companies are currently bringing brake pads less than 5% copper but more than 0.5% copper to the market in order to provide customers with immediate access to lower copper brake pads (Crowe 2012; Honeywell undated; BPP 1996-2012). The fraction of the overall brake pad market that makes a two-step transition will largely be determined by the success of each company's product formulators in developing less than 0.5% products that meet their company's and customer's manufacturing, cost, and performance requirements.

For aftermarket brake pads, this scenario is based on the assumption that Washington State requirements will drive the aftermarket transition.

The primary shortcomings of this scenario are:

(1) This scenario is not consistent with early evidence suggesting that the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (see above).

(2) Washington State may provide broader exemptions when it implements its requirement for brake pads to contain less than 0.5% copper, delaying the aftermarket transition to the lowest copper brake pads.

Scenario 3 (Aftermarket Exemption from 0.5% Copper Standard) – Virtually all original equipment (new vehicle) brake pads are reformulated to <5% copper by January 1, 2021 and <0.5% copper by 2025 (SB 346 compliance deadlines), with minimal use of exemptions and extensions. Higher copper aftermarket (replacement) brake pads for vehicles manufactured prior to compliance dates continue to be sold indefinitely.

Like Scenario 2, this scenario assumes that original equipment brake pad manufacturers will implement a two-step transition to the lowest copper brake pads in accordance with the compliance dates in SB 346. Where it differs from Scenario 2 is in the aftermarket. This scenario assumes that Washington State deviates from the policy in its current law and provides a broad aftermarket brake pad exemption similar to the exemption in SB

346 when it implements its requirement for brake pads to contain less than 0.5% copper. The exemption in SB 346 is a permanent exemption for all aftermarket brake pads designed to fit vehicles manufactured prior to California's compliance deadlines in 2021 and 2025. Such an exemption would delay the aftermarket transition to the lowest copper brake pads by allowing high copper replacement brake pads to be sold for vehicles manufactured prior to compliance deadlines.

Under this scenario, aftermarket brake pad manufacturers would maintain the current copper content in their brake pads that are made for use in vehicles manufactured prior to 2021 and 2025. This would avoid the need for manufacturers to develop lower copper brake pads that meet the same performance characteristics as the higher copper brake pads.

Since this exemption is based on the premise that aftermarket brake pads should be designed to be similar to the original equipment brake pads, this scenario assumes that aftermarket brake pads for vehicles that originally have low copper or copper free brake pads will have the same copper content as the originals.

The primary shortcomings of this scenario are:

(1) This scenario is not consistent with early evidence suggesting that the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (see above).

(2) When establishing regulatory requirements, states ordinarily rely on the precedents established in their state's own authorizing legislation.

Results

Using the assumptions in Table 3, copper reductions were estimated for three scenarios. An attached Excel spreadsheet contains the calculations. The results are presented in Tables 4, 5, and 6. The tables present the estimated average on-road brake pad copper content, the estimated reduction as compared to current (baseline) levels, and the estimated subsequent reduction in copper levels in urban runoff. To account for the watershed lag time, the urban runoff copper reductions are estimated to occur one year after the brake pad copper reductions.

Although every effort was made to develop scenarios that bracket the range of possible copper reduction schedules and to base reduction estimates on reasonable assumptions, these estimates may not account for all possibilities. For example, if high copper brake pads continue to be used in the small populations of exempted vehicles (e.g., motorcycles), the ultimate reduction levels could be slightly less than the anticipated maximum reduction of 61%. In the relatively unlikely event that DTSC allows substantial extensions, the pace of reductions could be slower than estimated in any of the scenarios.

Although these estimates are based on the best available information, they are uncertain. The most significant uncertainties are in brake pad copper reduction schedules, brake pad copper contents, and watershed response times (which are affected by watershed-specific characteristics and variation in annual rainfall volumes). As the brake pad reformulation process unfolds, data will become available from Washington State and brake pad certification organizations that can reduce most of these uncertainties.

Table 4. Scenario 1 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 1 - One Step Reduction		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	3.2%	47%	
2020			**29%**
2023	0.2%	97%	
2024			**59%**
2027	0.1%	98%	
2028			**61%**
2031	0.1%	98%	
2032			61%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Table 5. Scenario 2 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 2 - Two Step Reduction		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	4.4%	28%	
2020			**17%**
2023	1.6%	73%	
2024			**45%**
2027	0.2%	96%	
2028			**60%**
2031	0.1%	98%	
2032			61%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Table 6. Scenario 3 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 3 - Aftermarket Exemption from 0.5% Copper		
	On-Road Average Brake Pad Copper	**Estimated Brake Pad Copper Reduction**	**Estimated Urban Runoff Copper Reduction from Brake Pads Alone**
Baseline (2013 and prior years)	6.1%	--	
2019	4.4%	28%	
2020			**17%**
2023	2.3%	63%	
2024			**39%**
2027	1.2%	80%	
2028			**49%**
2031	0.7%	88%	
2032			55%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Recommendations

1. When data from implementation of SB 346 and Washington State law become available, consider updating these copper reduction estimates. Washington State's collection of brake pad formulation data every 3 years starting in 2013 and certification agency records, which will be available by 2014, will provide the first data on brake pad copper content since 2006. Starting in 2014, certification agencies will make available lists of brake pads certifications. These lists can be used to determine the fraction of brake pads that are on the market that meet the 5% and 0.5% copper standards. This information can be used not only to update the estimates, but also to refine the assumptions to reduce some of the most important uncertainties in the copper reduction estimates.

2. To reduce peak copper levels, examine the potential for controlling localized high-copper discharges. Copper levels in urban runoff are a combination of baseline copper sources (largely brake pads), localized high-copper sources (e.g., copper roofs, copper-emitting industry), and irregular discharges of copper-containing wastewaters.

   While copper roofs are relatively uncommon, they have relatively high copper runoff concentrations (which may exceed 1,000 micrograms per liter) (TDC Environmental 2004). Event-based discharges may also contain high copper, particularly in dry weather. Examples of dry weather event-based discharges are: water from emptying pools, spas, and fountains (copper from copper pipe corrosion and algaecides) and improper discharge of solutions used to create a green patina on a copper roof (TDC Environmental 2004; LWA 2006).

   San Francisco Bay Area municipalities created resources for development of possible management strategies for other major copper sources (LWA 2006). These resources identify a specific set of potential control measures for each major copper source, define activity and effectiveness metrics for control measure implementation, and lay out a recommended sequence for implementation of control measures for each source category. The strategies for architectural copper (Section 2) and pool, spa, and fountain algaecides (Section 3, strategies CP-1 through CP-3) are of greatest potential interest for Los Angeles River Copper TMDL compliance. To facilitate effective implementation, each strategy involves a phased implementation process, starting with collecting information and conducting targeted education programs. Subsequently, strategies move from voluntary programs to focused regulatory. Strategy designs, which focus on controlling discharges at the source, aim to minimize both disruption to affected private entities and government implementation costs. To monitor effectiveness, the strategies include tracking and reporting of strategy-specific indicators.

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Scenario Summary

Year	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
Baseline (2013 and prior years)			
2014	0.5% copper brake pads begin to phase in to new vehicles	5% copper brake pads begin to phase into new vehicles	5% copper brake pads begin to phase into new vehicles
2015			
2016			
2017			
2018		0.5% copper brake pads begin to phase into new vehicles	0.5% copper brake pads begin to phase into new vehicles
2019			
2020			
2021	All OE Pads <0.5% copper	All OE Pads <5% copper	All OE Pads <5% copper
2022			
2023	All replacement Pads <0.5% copper	All replacement pads <5% copper	All replacement pads <5% copper
2024			
2025		All OE Pads <0.5% copper	All OE Pads <0.5% copper
2026			
2027		All replacement pads <0.5% copper	
2028			
2029			
2030			
2031			
2032			

Key TMDL compliance dates for the LA River are shown in **bold**

Results Summary

Year	Scenario 1 - One Step Reduction			Scer
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone	On-Road Average Brake Pad Copper
Baseline (2013 and prior years)	6.1%	--		6.1%
2014				
2015				
2016				
2017				
2018				
2019	3.2%	47%		4.4%
2020			**29.4%**	
2021				
2022				
2023	0.2%	97%		1.6%
2024			**59.9%**	
2025				
2026				
2027	0.1%	98%		0.2%
2028			**61.0%**	
2029				
2030				
2031	0.1%	98%		0.1%
2032			**61.0%**	

Key TMDL compliance dates for the LA River are shown in **bold**

nario 2 - Two Step Reduction		Scenario 3 - Aftermarket Exemption from 0.5% Copper		
Estimated Brake Pad Copper Reduction	**Estimated Urban Runoff Copper Reduction from Brake Pads Alone**	**On-Road Average Brake Pad Copper**	**Estimated Brake Pad Copper Reduction**	**Estimated Urban Runoff Copper Reduction from Brake Pads Alone**
--		6.1%	--	
28%		4.4%	28%	
	17.5%			**17.3%**
73%		2.3%	63%	
	45.4%			**38.9%**
96%		1.2%	80%	
	59.6%			**49.4%**
98%		0.7%	88%	
	61.0%			**54.6%**

Scenario 1 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	7.2%	28%	72%
2015		6.2%	39%	62%
2016		5.2%	49%	51%
2017		4.2%	59%	41%
2018		3.1%	69%	31%
2019		2.1%	80%	21%
2020		1.1%	90%	10%
2021 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	100%	0%

Aftermarket Replacement Brake Pads for Fraction of Vehicles with High Copper OE Brake Pads

Year Replacement Pad Manufactured	Replacement Pad Notes	High-Cu Replacement Pad Copper Content (Average Shipped)	High-Cu Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	New low copper pads start phasing in	5.3%	5.7%
2015		4.6%	5.2%
2016		3.8%	4.4%
2017		3.1%	3.7%
2018		2.3%	2.9%
2019		1.6%	2.2%
2020		0.8%	1.4%
2021	All new replacement brake pads contain <0.5% copper,	0.1%	0.7%
2022	but older brake pads in distribution system still are being sold	0.1%	0.3%
2023 and thereafter	All replacement brake pads contain <0.5% copper	0.1%	0.1%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Fraction of Vehicles with Low Copper OE Brake Pads

Assumed to be the same copper content as OE brake pad (i.e., 0.1%)

Scenario 2 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	0%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard	7.6%	10%	18%	72%
2015		7.0%	21%	18%	62%
2016		6.4%	31%	18%	51%
2017		5.8%	41%	18%	41%
2018	Fifth year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard, but now vehicles are engineered to meet 0.5% standard because this also is the first year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	4.7%	41%	28%	31%
2019		3.7%	41%	39%	21%
2020		2.7%	41%	49%	10%
2021	First year of 4 year process of re-engineering new vehicles previously re-engineered with <5% copper brake pads to have brake pads meeting 0.5% copper standard	1.7%	41%	59%	0%
2022		1.3%	31%	69%	0%
2023		0.9%	21%	80%	0%
2024		0.5%	10%	90%	0%
2025 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	0%	100%	0%

Aftermarket Replacement Brake Pads for Vehicles with High Copper OE Brake Pads (and, starting in 2021, for vehicles with OE brake pads between 5% and 0.5%)

Year Replacement Pad Manufactured	Replacement Pad Notes	Replacement Pad Copper Content (Average Shipped)	Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	Brake pads with <5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	5.7%	5.9%
2015		5.4%	5.6%
2016		5.0%	5.3%
2017		4.6%	4.9%
2018	Brake pads with <0.5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	3.9%	4.4%
2019		3.2%	3.8%
2020		2.4%	3.0%
2021	All new replacement brake pads contain <5% copper, but older brake pads in distribution system still are being sold	1.7%	2.3%
2022		1.3%	1.7%
2023		0.9%	1.2%
2024		0.5%	0.8%
2025	All new replacement brake pads contain <0.5% copper, but older brake pads in distribution system still are being sold	0.1%	0.4%
2026		0.1%	0.2%
2027 and thereafter	All replacement brake pads contain <0.5% copper	0.1%	0.1%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Vehicles with <0.5% Copper OE Brake Pads
Assumed to be the same copper content as OE brake pad for all vehicles with <0.5% copper OE pads.

Aftermarket Replacement Brake Pads for Vehicles with 5% Copper OE Brake Pads through 2020
Assumed to be the same copper content as OE brake pads for all vehicles with <5% copper OE pads through 2020; however, when the value in the table above is less, then the value in the table above is assumed. Starting in 2021, see above table for replacement pads for high-copper OE pads

Scenario 3 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	0%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard	7.6%	10%	18%	72%
2015		7.0%	21%	18%	62%
2016		6.4%	31%	18%	51%
2017		5.8%	41%	18%	41%
2018	Fifth year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard, but now vehicles are engineered to meet 0.5% standard because this also is the first year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	4.7%	41%	28%	31%
2019		3.7%	41%	39%	21%
2020		2.7%	41%	49%	10%
2021	First year of 4 year process of re-engineering new vehicles previously re-engineered with <5% copper brake pads to have brake pads meeting 0.5% copper standard	1.7%	41%	59%	0%
2022		1.3%	31%	69%	0%
2023		0.9%	21%	80%	0%
2024		0.5%	10%	90%	0%
2025 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	0%	100%	0%

Aftermarket Replacement Brake Pads for Vehicles with High Copper OE Brake Pads

Year Replacement Pad Manufactured	Replacement Pad Notes	Replacement Pad Copper Content (Average Shipped)	Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	Brake pads with <5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	5.7%	5.9%
2015		5.4%	5.6%
2016		5.0%	5.3%
2017		4.6%	4.9%
2018		4.3%	4.6%
2019		3.9%	4.2%
2020		3.6%	3.9%
2021	All new replacement brake pads contain <5% copper, but older brake pads in distribution system still are being sold	3.2%	3.5%
2022		3.2%	3.3%
2023 and thereafter	All replacement brake pads for high and mid-copper OE pads contain <5% copper and 16% (same percentage as in 2013) contain 0.1% Cu	3.2%	3.2%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Vehicles with <5% Copper or <0.5% Copper OE Brake Pads

Assumed to be the same copper content as OE brake pad until the value in the table above is less, then the value in the table above is assumed.

Estimated Vehicle Manufacturing Year Distributions by Year

Year Vehicle Manufactured	2013 and Prior	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013 and prior	100.0%	88.6%	78.3%	68.9%	60.5%	53.0%	46.2%	39.8%	33.9%	28.8%	24.6%
2014	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%
2015	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%
2016	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%
2017	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%
2018	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%
2019	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%
2020	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%
2021	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%
2022	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%
2023	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%
2024	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2025	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2026	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2027	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2028	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2029	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2030	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2031	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2032	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Assumed that vehicle age distributions will remain the same as those in 2007
California Department of Finance (2009). California Statistical Abstract Table J3. Distribution Of Fee-F

2024	2025	2026	2027	2028	2029	2030	2031	2032
21.1%	18.1%	15.5%	13.2%	11.3%	9.7%	8.2%	6.8%	5.6%
3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%	1.4%	1.2%
4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%	1.4%
5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%
5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%
6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%
6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%
7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%
8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%
9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%
10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%
11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%
0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%
0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%
0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%
0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%
0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%

ʾaid Registrations By Type And Year First Registered California, 2007.

Baseline Years

			Baseline for All Scenarios		
Year Vehicle Manufactured	**OE Pad Fraction**	**Aftermarket Pad Fraction**	**OE Pad Cu Concentration (Avg.)**	**Aftermarket Pad Cu Concentration (Avg.)**	**Average on-Road Brake Pad Copper Content**
2013 and prior	0.35	0.65	8.2%	5.0%	6.1%

Baseline On-Road Average Brake Pad Copper Content **6.1%**

2019 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.2%
2015	7.5%	0	1	2018	6.2%
2016	8.4%	0.5	0.5	2019	5.2%
2017	9.4%	1	0		4.2%
2018	10.3%	1	0		3.1%
2019	11.4%	1	0		2.1%

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.6%
2015	7.5%	0	1	2018	7.0%
2016	8.4%	0.5	0.5	2019	6.4%
2017	9.4%	1	0		5.8%
2018	10.3%	1	0		4.7%
2019	11.4%	1	0		3.7%

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.6%
2015	7.5%	0	1	2018	7.0%
2016	8.4%	0.5	0.5	2019	6.4%
2017	9.4%	1	0		5.8%
2018	10.3%	1	0		4.7%
2019	11.4%	1	0		3.7%

*For computational simplicity, replacement pad installations are grouped by calenda

**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
4.4%	0.1%	18.0%	82.0%	3.6%
3.7%	0.1%	28.3%	71.8%	2.7%
2.9%	0.1%	38.5%	61.5%	1.8%
2.2%	0.1%	48.8%	51.3%	3.2%
				4.2%
				3.1%
				2.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
5.3%	4.0%	0.1%	82.0%	0.0%
4.9%	4.0%	0.1%	71.8%	10.3%
4.4%	4.0%	0.1%	61.5%	20.5%
3.8%	3.8%	0.1%	51.3%	30.8%

On-Road Average Brake Pad Copper Content

Scenario 3

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
5.3%	4.0%	0.1%	82.0%	0.0%
4.9%	4.0%	0.1%	71.8%	10.3%
4.6%	4.0%	0.1%	61.5%	20.5%
4.2%	4.0%	0.1%	51.3%	30.8%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
1arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
0.01680
0.00182
0.00138
0.00267
0.00391
0.00324
0.00243
3.23%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
18.0%	4.3%	0.02007
18.0%	4.0%	0.00270
18.0%	3.5%	0.00265
18.0%	4.7%	0.00399
	5.8%	0.00542
	4.7%	0.00489
	3.7%	0.00425
Scenario 2		**4.40%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
18.0%	4.3%	0.02007
18.0%	4.0%	0.00270
18.0%	3.7%	0.00274
18.0%	4.9%	0.00412
	5.8%	0.00542
	4.7%	0.00489
	3.7%	0.00425

Scenario 3		**4.42%**

:t of aftermarket brake pads.

2023 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.2%
2015	5.1%	0	1	2023	6.2%
2016	5.9%	0	1	2019	5.2%
2017	6.4%	0	1	2020	4.2%
2018	6.8%	0	1	2021	3.1%
2019	7.5%	0	1	2022	2.1%
2020	8.4%	0.5	0.5	2023	1.1%
2021	9.4%	1	0		0.1%
2022	10.3%	1	0		0.1%
2023	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.6%
2015	5.1%	0	1	2023	7.0%
2016	5.9%	0	1	2019	6.4%
2017	6.4%	0	1	2020	5.8%
2018	6.8%	0	1	2021	4.7%
2019	7.5%	0	1	2022	3.7%
2020	8.4%	0.5	0.5	2023	2.7%

2021	9.4%	1	0		1.7%
2022	10.3%	1	0		1.3%
2023	11.4%	1	0		0.9%

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.6%
2015	5.1%	0	1	2023	7.0%
2016	5.9%	0	1	2019	6.4%
2017	6.4%	0	1	2020	5.8%
2018	6.8%	0	1	2021	4.7%
2019	7.5%	0	1	2022	3.7%
2020	8.4%	0.5	0.5	2023	2.7%
2021	9.4%	1	0		1.7%
2022	10.3%	1	0		1.3%
2023	11.4%	1	0		0.9%

*For computational simplicity, replacement pad installations are grouped by calenda

**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
1.6%	0.1%	48.8%	51.3%	0.9%
0.8%	0.1%	59.0%	41.0%	0.4%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.6%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
2.3%	2.3%	0.1%	82.0%	0.0%
1.7%	1.7%	0.1%	71.8%	10.3%
1.2%	1.2%	0.1%	61.5%	20.5%
3.8%	3.8%	0.1%	51.3%	30.8%
3.0%	3.0%	0.1%	41.0%	41.0%
2.3%	2.3%	0.1%	30.8%	41.0%
1.7%	1.7%	0.1%	20.5%	41.0%
1.2%	1.2%	0.1%	10.3%	41.0%

On-Road Average Brake Pad Copper Content

			Scenario 3	
Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
3.5%	3.5%	0.1%	82.0%	0.0%
3.3%	3.3%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
4.2%	4.0%	0.1%	51.3%	30.8%
3.9%	3.9%	0.1%	41.0%	41.0%
3.5%	3.5%	0.1%	30.8%	41.0%
3.3%	3.3%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
iarket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
0.00025
0.00004
0.00005
0.00051
0.00026
0.00007
0.00007
0.00051
0.00009
0.00010
0.00011
0.21%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
18.0%	1.9%	0.00461
18.0%	1.4%	0.00058
18.0%	1.0%	0.00051
18.0%	3.1%	0.00184
18.0%	2.5%	0.00158
28.3%	1.7%	0.00113
38.5%	1.1%	0.00080
48.8%	1.7%	0.00142

	1.7%	0.00160
	1.3%	0.00134
	0.9%	0.00103

Scenario 2	**1.64%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
18.0%	2.9%	0.00715
18.0%	2.7%	0.00114
18.0%	2.7%	0.00136
18.0%	3.4%	0.00202
18.0%	3.2%	0.00203
28.3%	2.6%	0.00174
38.5%	2.1%	0.00156
48.8%	2.2%	0.00186
	1.7%	0.00160
	1.3%	0.00134
	0.9%	0.00103

Scenario 3	**2.28%**

:t of aftermarket brake pads.

2027 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.2%
2015	2.6%	0	1	2023	6.2%
2016	3.0%	0	1	2024	5.2%
2017	3.5%	0	1	2025	4.2%
2018	4.2%	0	1	2026	3.1%
2019	5.1%	0	1	2027	2.1%
2020	5.9%	0	1	2023	1.1%
2021	6.4%	0	1	2024	0.1%
2022	6.8%	0	1	2025	0.1%
2023	7.5%	0	1	2026	0.1%
2024	8.4%	0.5	0.5	2027	0.1%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.6%
2015	2.6%	0	1	2023	7.0%
2016	3.0%	0	1	2024	6.4%

2017	3.5%	0	1	2025	5.8%
2018	4.2%	0	1	2026	4.7%
2019	5.1%	0	1	2027	3.7%
2020	5.9%	0	1	2023	2.7%
2021	6.4%	0	1	2024	1.7%
2022	6.8%	0	1	2025	1.3%
2023	7.5%	0	1	2026	0.9%
2024	8.4%	0.5	0.5	2027	0.5%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

Year Vehicle Manufactured	**% Vehicles on Road in 2027**	**OE Pad Fraction**	**Aftermarket Pad Fraction**	**Year aftermarket pad installed**	**OE Pad Cu Concentration (Avg.)**
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.6%
2015	2.6%	0	1	2023	7.0%
2016	3.0%	0	1	2024	6.4%
2017	3.5%	0	1	2025	5.8%
2018	4.2%	0	1	2026	4.7%
2019	5.1%	0	1	2027	3.7%
2020	5.9%	0	1	2023	2.7%
2021	6.4%	0	1	2024	1.7%
2022	6.8%	0	1	2025	1.3%
2023	7.5%	0	1	2026	0.9%
2024	8.4%	0.5	0.5	2027	0.5%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

*For computational simplicity, replacement pad installations are grouped by calenda

**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
0.1%	0.1%	48.8%	51.3%	0.1%
0.1%	0.1%	59.0%	41.0%	0.1%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content **Scenario 1**

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
0.2%	0.2%	0.1%	82.0%	0.0%
0.1%	0.1%	0.1%	71.8%	10.3%
1.2%	1.2%	0.1%	61.5%	20.5%
0.8%	0.8%	0.1%	51.3%	30.8%

0.4%	0.4%	0.1%	41.0%	41.0%
0.2%	0.2%	0.1%	30.8%	41.0%
0.1%	0.1%	0.1%	20.5%	41.0%
1.2%	1.2%	0.1%	10.3%	41.0%
0.8%	0.8%	0.1%	0.0%	41.0%
0.4%	0.4%	0.1%	0.0%	30.8%
0.2%	0.2%	0.1%	0.0%	20.5%
0.1%	0.1%	0.1%	0.0%	10.3%

On-Road Average Brake Pad Copper Content

			Scenario 3	
Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	**Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)**	**Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)**	**Fraction of Model Year Vehicles with High Copper OE Pads**	**Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads**
3.2%	3.2%	0.1%	82.0%	0.0%
3.2%	3.2%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
3.2%	3.2%	0.1%	51.3%	30.8%
3.2%	3.2%	0.1%	41.0%	41.0%
3.2%	3.2%	0.1%	30.8%	41.0%
3.2%	3.2%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%
3.2%	3.2%	0.1%	0.0%	41.0%
3.2%	3.2%	0.1%	0.0%	30.8%
3.2%	3.2%	0.1%	0.0%	20.5%
3.2%	3.2%	0.1%	0.0%	10.3%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
0.00013
0.00002
0.00003
0.00003
0.00004
0.00004
0.00005
0.00006
0.00006
0.00007
0.00007
0.00008
0.00009
0.00010
0.00011
0.10%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
18.0%	0.2%	0.00024
18.0%	0.1%	0.00002
18.0%	1.0%	0.00026
18.0%	0.7%	0.00020

18.0%	0.4%	0.00013
28.3%	0.2%	0.00007
38.5%	0.1%	0.00005
48.8%	0.7%	0.00039
59.0%	0.4%	0.00025
69.3%	0.2%	0.00013
79.5%	0.1%	0.00009
89.8%	0.3%	0.00025
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011
Scenario 2		**0.24%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	**Average on-Road Brake Pad Copper Content**	**Avg. On-Road Cu Content x % of All Vehicles on Road in 2027**
18.0%	2.7%	0.00353
18.0%	2.7%	0.00062
18.0%	2.7%	0.00070
18.0%	2.7%	0.00080
18.0%	2.7%	0.00094
28.3%	2.4%	0.00098
38.5%	2.0%	0.00103
48.8%	1.7%	0.00101
59.0%	1.4%	0.00088
69.3%	1.1%	0.00073
79.5%	0.7%	0.00056
89.8%	0.5%	0.00039
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011
Scenario 3		**1.25%**

:t of aftermarket brake pads.

2031 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.2%
2015	1.5%	0	1	2028	6.2%
2016	1.6%	0	1	2029	5.2%
2017	1.9%	0	1	2030	4.2%
2018	2.3%	0	1	2031	3.1%
2019	2.6%	0	1	2027	2.1%
2020	3.0%	0	1	2028	1.1%
2021	3.5%	0	1	2029	0.1%
2022	4.2%	0	1	2030	0.1%
2023	5.1%	0	1	2031	0.1%
2024	5.9%	0	1	2027	0.1%
2025	6.4%	0	1	2028	0.1%
2026	6.8%	0	1	2029	0.1%
2027	7.5%	0	1	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)

2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.6%
2015	1.5%	0	1	2028	7.0%
2016	1.6%	0	1	2029	6.4%
2017	1.9%	0	1	2030	5.8%
2018	2.3%	0	1	2031	4.7%
2019	2.6%	0	1	2027	3.7%
2020	3.0%	0	1	2028	2.7%
2021	3.5%	0	1	2029	1.7%
2022	4.2%	0	1	2030	1.3%
2023	5.1%	0	1	2031	0.9%
2024	5.9%	0	1	2027	0.5%
2025	6.4%	0	1	2028	0.1%
2026	6.8%	0	1	2029	0.1%
2027	7.5%	0	1	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.6%
2015	1.5%	0	1	2028	7.0%
2016	1.6%	0	1	2029	6.4%
2017	1.9%	0	1	2030	5.8%
2018	2.3%	0	1	2031	4.7%
2019	2.6%	0	1	2027	3.7%
2020	3.0%	0	1	2028	2.7%
2021	3.5%	0	1	2029	1.7%
2022	4.2%	0	1	2030	1.3%
2023	5.1%	0	1	2031	0.9%
2024	5.9%	0.5	0.5	2027	0.5%

2025	6.4%	1	0	2028	0.1%
2026	6.8%	1	0	2029	0.1%
2027	7.5%	1	0	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

*For computational simplicity, replacement pad installations are grouped by calenda

**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
0.1%	0.1%	48.8%	51.3%	0.1%
0.1%	0.1%	59.0%	41.0%	0.1%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	**Scenario 1**

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads

0.1%	0.1%	0.1%	82.0%	0.0%
0.1%	0.1%	0.1%	71.8%	10.3%
0.1%	0.1%	0.1%	61.5%	20.5%
0.1%	0.1%	0.1%	51.3%	30.8%
0.1%	0.1%	0.1%	41.0%	41.0%
0.1%	0.1%	0.1%	30.8%	41.0%
0.1%	0.1%	0.1%	20.5%	41.0%
0.1%	0.1%	0.1%	10.3%	41.0%
0.1%	0.1%	0.1%	0.0%	41.0%
0.1%	0.1%	0.1%	0.0%	30.8%
0.1%	0.1%	0.1%	0.0%	20.5%
0.1%	0.1%	0.1%	0.0%	10.3%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%

On-Road Average Brake Pad Copper Content

			Scenario 3	
Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	**Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)**	**Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)**	**Fraction of Model Year Vehicles with High Copper OE Pads**	**Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads**
3.2%	3.2%	0.1%	82.0%	0.0%
3.2%	3.2%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
3.2%	3.2%	0.1%	51.3%	30.8%
3.2%	3.2%	0.1%	41.0%	41.0%
3.2%	3.2%	0.1%	30.8%	41.0%
3.2%	3.2%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%
3.2%	3.2%	0.1%	0.0%	41.0%
3.2%	3.2%	0.1%	0.0%	30.8%
3.2%	3.2%	0.1%	0.0%	20.5%
3.2%	3.2%	0.1%	0.0%	10.3%

3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first set of
ıarket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2031
0.00007
0.00001
0.00001
0.00002
0.00002
0.00002
0.00003
0.00003
0.00004
0.00004
0.00005
0.00006
0.00006
0.00007
0.00007
0.00008
0.00009
0.00010
0.00011
0.10%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2031

18.0%	0.1%	0.00007
18.0%	0.1%	0.00001
18.0%	0.1%	0.00001
18.0%	0.1%	0.00002
18.0%	0.1%	0.00002
28.3%	0.1%	0.00002
38.5%	0.1%	0.00003
48.8%	0.1%	0.00003
59.0%	0.1%	0.00004
69.3%	0.1%	0.00004
79.5%	0.1%	0.00005
89.8%	0.1%	0.00006
100.0%	0.1%	0.00006
100.0%	0.1%	0.00007
100.0%	0.1%	0.00007
100.0%	0.1%	0.00008
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 2		**0.10%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2031
18.0%	2.7%	0.00181
18.0%	2.7%	0.00038
18.0%	2.7%	0.00039
18.0%	2.7%	0.00043
18.0%	2.7%	0.00051
28.3%	2.4%	0.00055
38.5%	2.0%	0.00053
48.8%	1.7%	0.00051
59.0%	1.4%	0.00049
69.3%	1.1%	0.00044
79.5%	0.7%	0.00038
89.8%	0.5%	0.00027

100.0%	0.1%	0.00006
100.0%	0.1%	0.00007
100.0%	0.1%	0.00007
100.0%	0.1%	0.00008
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 3	**0.73%**

aftermarket brake pads.

Brake Pad Copper Reduction - Metrics for Tracking Progress

Technical Memo

California Stormwater Quality Association

December 1, 2014

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

tdc environmental

MEMO

TO: CASQA **DATE:** December 1, 2014

FROM: Kelly D. Moran, Ph.D. **PROJECT:** 79

SUBJECT: Brake Pad Copper Reduction – Metrics for Tracking Progress

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To protect water quality, California law requires near elimination of copper in vehicle brake pads by 2025. Many California municipal urban runoff programs are relying on brake pad copper reduction as a piece of their plans to comply with requirements to reduce copper in urban runoff. This memorandum identifies quantitative metrics that can be used to track the pace of brake pad copper reduction and provides current and baseline values for each metric.

Based on data detailed below, it is apparent that brake pad copper reductions are underway—and are well ahead of regulatory deadlines. Average brake pad formulation copper content—currently 5.6%—has dropped about 30% since 2006. "Copper-free" (<0.5% copper) brake pad formulations have become widely available, comprising 41.2% of all available formulations. Most of the vehicle industry appears to be planning to transition to <0.5% copper brake pads prior to the first copper reduction compliance deadline in 2021.

Background

Scientific studies indicate that dust generated by vehicle brakes is by far the most significant source of copper in urban watersheds. In California's most urbanized watersheds, brake pad copper is estimated to comprise more than 60% of all copper in urban runoff.[1] A California law enacted in 2010, SB 346 (Kehoe) set in place a program that will nearly eliminate copper use in brake pads. SB 346 requires that brake pads sold in California contain no more than 5% copper by weight by 2021, and no more than 0.5% by 2025. The long implementation schedule in SB 346 was designed to provide time to develop new brake pad formulations and to effect a smooth transition by the vehicle industry to the lowest copper brake pads.

Following California's model, the State of Washington also enacted restrictions on brake pad copper content in 2010 (Washington State 2010).[2] Washington's law is similar to California's, but provides a much narrower exemption for "aftermarket" brake pads that replace the "original equipment" brake pads sold with new vehicles. The narrow exemption effectively requires essentially all brake pads to meet SB 346 deadlines.

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[1] Donigian, A.S., B. R. Bicknell and E. Wolfram (2009). *Modeling the Contribution of Copper from Brake Wear Debris to the San Francisco Bay. Phase 2.* Prepared by AQUA TERRA Consultants for the Brake Pad Partnership.

[2] Washington State (2010). Washington Senate Bill 6557 (Senate Environment, Water & Energy Committee). Brake Friction Material. Statutes of 2010, Chapter 70.285 RCW.

Due to the importance of California's vehicle market and the interconnection of vehicle parts distribution systems throughout North America, brake pad manufacturers expect that it is unlikely that any manufacturer will produce California-specific or Washington-specific products. Instead, copper reduction will be integrated throughout the entire North American brake pad market.[3] U.S. EPA and the vehicle industry will likely soon be signing a "Copper-free Brake Initiative" Memorandum of Understanding to cement an industry commitment to nationwide brake pad copper reductions.

SB 346 compliance certification markings (brake pad and box markings) and chemical testing methods have been established by the automobile industry.[4] Washington State has adopted regulations specifying testing, marking, and reporting requirements.[5] California regulations specifying certification, testing, and marking requirements are in development.[6]

The brake pad testing and certification system is up and running, with NSF International serving as the sole certification organization. More than 4,500 brake friction materials have been certified, many of them with at lowest copper (<0.5%) level.

Brake pad copper reduction is already well underway, as demonstrated by the data below. The success and speed of the transition was plainly apparent at the October 2014 Society of Automotive Engineers Brake Colloquium, where many brake pad manufacturers touted their <0.5% copper products and several vehicle manufacturers shared their positive evaluation of the new products and detailed plans for an orderly transition of their entire North American vehicle lines—and most global production—to <0.5% copper by 2021.

Society of Automotive Engineers conference presentations, industry marketing materials, and informal communications with industry members indicate that most of the automotive industry is moving directly to <0.5% copper for the 2021 compliance deadline, thus avoiding a second cycle of reformulations.

Brake Pad Copper Reduction Tracking Metrics

Publicly available data sources were reviewed to identify the best available quantitative metrics for tracking brake pad copper reductions. Because manufacturer sales data are proprietary, no public data set is available to calculate actual on-road brake copper content; however, two excellent quantitative metrics are available to track the pace of brake pad copper content reduction.

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[3] Motor and Equipment Manufacturers Association (MEMA) (2014). "Copper in Brake Friction" http://www.aftermarketsuppliers.org/Councils/Brake-Manufacturers-Council-BMC/Copper-in-Brake-Friction Accessed Nov. 7.

[4] Society of Automotive Engineers (SAE) (2011). *Measurement of Copper and Other Elements in Brake Friction Materials*. SAE Technical Standard J2975; Society of Automotive Engineers (SAE) (2012). *Friction Coefficient Identification and Environmental Marking System for Brake Linings*. SAE Technical Standard J866; Motor and Equipment Manufacturers Association (MEMA) (2012). 3-Stage Certification Logo.

[5] Washington Department of Ecology (2012). *Better Brakes Rule*. Chapter 173-901 Washington Administrative Code. Publication 12-04-027.

[6] California Department of Toxic Substances Control (2014). "Limiting Copper in Brake Pads" http://www.dtsc.ca.gov/PollutionPrevention/BrakePads.cfm Accessed Nov. 7.

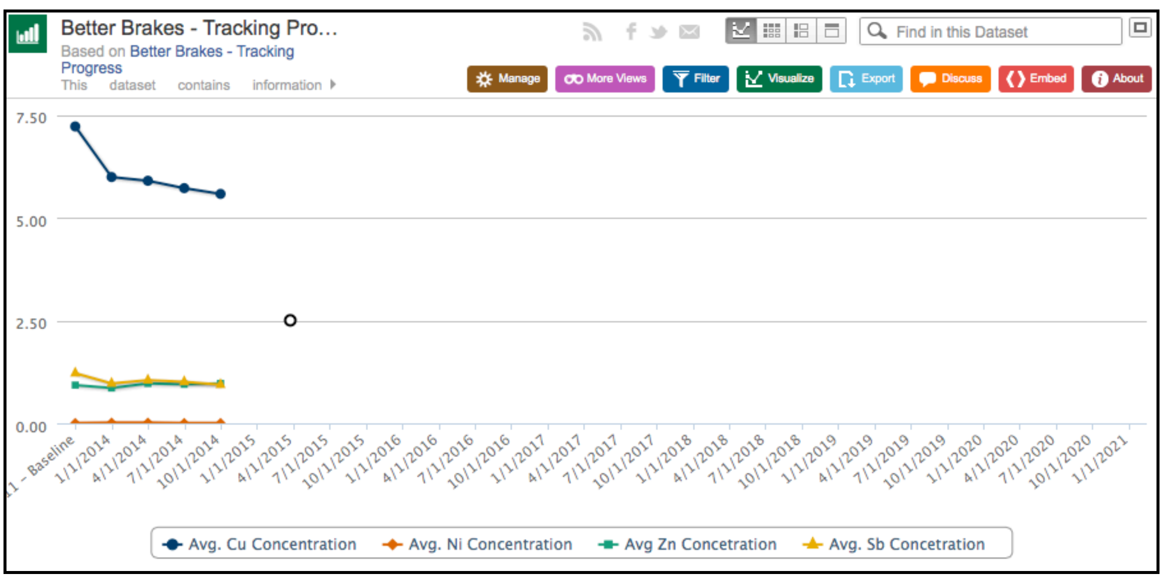
Metric #1 - Washington Ecology Report of Industry-Wide Average Brake Pad Formulation Copper Content

Unlike California's SB 346, Washington law requires manufacturers to provide Washington State Department of Ecology ("Ecology") with periodic reports of brake pad copper, antimony, nickel, and zinc content.[7] This reporting is accomplished in conjunction with the brake pad formulation certification process. After certification, the brake pad certification organization (NSF International) provides Ecology with quarterly reports containing a summary of the chemical testing report for each certified brake pad formulation. The chemical testing report includes the formulation's copper, antimony, nickel, and zinc content. The Washington process included a one-time "baseline" report of the copper, antimony, nickel, and zinc content in 2011 brake pad formulations.

Ecology uses the data it receives on each individual formulation to compute the industry-wide average copper, antimony, nickel, and zinc content for all certified brake pad formulations. Because manufacturers are not required to report sales data for each brake pad formulation, Ecology cannot calculate the true average on-road brake pad copper content. Consequently, the Ecology industry-wide average may not necessarily be the same as the true average on-road brake pad copper content.

Ecology has created a graph tracking the average certified brake pad formulation copper, antimony, nickel, and zinc (Figure 1). The graph shows the 2011 baseline values and data from quarterly reports, which started in January 2014. This graph is available on the Internet at http://www.ecy.wa.gov/programs/hwtr/laws_rules/BBtracking.html

Figure 1. Washington Ecology Tracking Graphic for Average Copper, Antimony, Nickel, and Zinc Content of Certified Brake Pad Formulations



Ecology intends to update the graph quarterly. Resources permitting, updates should be posted in each year in early February, May, August, and November.

7 This provision, which was originally drafted by CASQA to support anticipated compliance reporting needs of its members, was omitted from the final version of SB 346 to avoid duplication with the Washington law (which had already been adopted) and to minimize costs for the state of California.

According to a representative industry analysis provided to the Brake Pad Partnership, in 2006 brake pads contained an estimated average of about 8% copper by weight.[8] Ecology data indicate that brake pad copper content dropped to about 7.2% in 2011, and has subsequently fallen to 5.6% (October 2014), a 30% reduction from the 2006 Brake Pad Partnership estimate.

Metric #2 – Fraction of Brake Pad Formulations with the "N" (<0.5% copper) Certification

The sole current brake pad certification organization, NSF International, maintains a public list of all brake pad formulations that have been certified as to their copper content (and other metals and asbestos). The list, which provides the specific certification level for each certified formulation, is available in the Internet at http://info.nsf.org/Certified/autorp/listings.asp?standard=SAEJ2975. This report is updated daily with new certifications. Brake pad formulations with <0.5% copper have the "N" certification.

As of November 7, 2014, NSF had certified 4,679 formulations, 1,931 (41.2%) of which have the "N" certification (the remainder have higher copper content). This is a substantial increase since 2006, when about 18% of original equipment and about one-third of replacement ("aftermarket") brake pads were estimated to contain <0.5% copper.[9] Just in the short period since July 24, 2014, the number of "N" certified brake formulations has increased nearly 20%, and the fraction of "N" certified brake pads has increased from 39.2% to 41.2%.[10] Although the NSF website does not provide lists other than the current list, the trend can be tracked through periodic downloading of the NSF certification list.

At this time, no brake pad certification organization other than NSF International exists. Although additional certification organizations are not currently contemplated, there is a potential that the industry may use more than one certification organization. When this metric is updated, data from all certification organizations should be included.

Summary

Two quantitative metrics are available to track the pace of brake pad copper content reduction: (1) the Washington Ecology report of industry-wide average brake pad formulation copper content and (2) the fraction of brake pad formulations with the "N" (<0.5% copper) certification.

Currently, copper brake pad formulations meeting the lowest copper content standard (<0.5% copper) are widely available. Average brake pad formulation copper content (5.6%) has dropped about 30% since 2006. Most of the vehicle industry appears to be planning to transition to <0.5% copper brake pads prior to the first SB 346 copper reduction compliance deadline in 2021.

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[8] Brake Pad Partnership (BPP) (2008). *Copper Use Monitoring Program Results for Model Years 1998-2006*. Prepared by Sustainable Conservation for the Brake Pad Partnership Steering Committee.
[9] Phipps, M. (2008). "An Analysis of the 2006 Copper Monitoring Results." Prepared for the Brake Pad Partnership; and Brake Pad Partnership (BPP) (1996-2012), and information shared with author at Brake Pad Partnership Steering Committee meetings.
[10] On July 24, 2014, 1,612 of 4,108 total formulations had the "N" certification.

ATTACHMENT E:

MINIMUM CONTROL MEASURE GUIDANCE

Watershed Management Program

MCM Guidance

Public Information and Participation Program

Introduction

Permit §VI.D.5.a (LA)/ §VII.F.1 (LB)

Each participating city is required to develop and implement a Public Information and Participation Program (PIPP) that includes the requirements listed in Permit §VI.D.5.a (LB §VII.F). This document provides guidance that the participating cities can follow to implement a PIPP in compliance with the Permit.

The objectives of the PIPP are to:

- Measurably increase the knowledge of the target audiences about the MS4, the adverse impacts of stormwater pollution on receiving waters and potential solutions to mitigate the impacts.
- Measurably change the waste disposal and stormwater pollution generation behavior of target audiences by developing and encouraging the implementation of appropriate alternatives.
- Involve and engage a diversity of socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of stormwater pollution.

PIPP Implementation

Permit §VI.D.5.b (LA)/§VII.F.2 (LB)

The PIPP is implemented using the following approaches:

- By participating in a County-wide PIPP,
- By participating in one or more Watershed Group sponsored PIPPs, and
- individually within its jurisdiction.

Cities participating in a County-wide or Watershed Group PIPP provide contact info for their staff responsible for stormwater public education activities to the designated PIPP coordinator. Changes in contact information are provided within 30 days of the date that the change occurred.

Public Participation

Permit §VI.D.5.c (LA)/§VII.F.3 (LB)

Public Reporting

The means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and non-stormwater pollution prevention information is provided through the use of the countywide 888-CLEAN-LA hotline. In addition, each participating city:

- Includes the reporting information – updated when necessary – in public information and the government pages of the telephone book as they are developed or published.
- Identifies staff or departments who will serve as the contact person(s) and will make this information available on its website.
- Provides current, updated hotline contact information to the general public within its jurisdiction.

Events

Events are organized to target residents and population subgroups. The purpose of the events is to educate and involve the community in stormwater and non-stormwater pollution prevention activities, such as education seminars, clean-ups, and community catch basin stenciling.

Residential Outreach Program

Permit §VI.D.5.d (LA)/§VII.F.4 (LB)

With the exception of item 5, which is no longer an element of the countywide PIP Program, each city implements the following activities for the Residential Outreach Program as part of a countywide program:

1. Conduct stormwater pollution prevention public service announcements and advertising campaigns
2. Prepare public education materials that include information on the proper handling (i.e., disposal, storage and/or use) of:
    a. Vehicle waste fluids
    b. Household waste materials (i.e., trash and household hazardous waste, including personal care products and pharmaceuticals)
    c. Construction waste materials
    d. Pesticides and fertilizers (including integrated pest management (IPM) practices to promote reduced use of pesticides)
    e. Green waste (including lawn clippings and leaves)
    f. Animal wastes
3. Distribute activity specific stormwater pollution prevention public education materials at the following points of purchase:
    a. Automotive parts stores
    b. Home improvement centers / lumber yards / hardware stores/paint stores
    c. Landscaping / gardening centers
    d. Pet shops / feed stores
4. Maintain stormwater websites or provide links to stormwater websites via each participating city's website. This includes educational material and opportunities for the public to participate in stormwater pollution prevention and clean-up activities listed in Part VI.D.4 of the Permit.
5. Provide independent, parochial, and public schools within each participating city's jurisdiction with materials to educate school children (K-12) on stormwater pollution. Material may include videos, live presentations and other information. A useful source of materials to work with, or leverage, is other statewide agencies and associations. These associations include the State Water Board's "Erase the Waste" educational program and the California Environmental Education Interagency Network (CEEIN) to implement this requirement.
6. When implementing the above activities, use effective strategies to educate and involve ethnic communities in stormwater pollution prevention through culturally effective methods.

Industrial/Commercial Facilities Program

Each participating city is required to implement an industrial/commercial facilities program that includes the provisions listed in Permit § VI.D.6 (LB §VII.G). This document provides guidance that the participating cities can follow to implement an industrial/commercial facilities program in compliance with the Permit.

Introduction

Permit § VI.D.6.a (LA)/ §VII.G.1 (LB)

The Industrial/Commercial Facilities Program is designed to prevent illicit discharges into the MS4 and receiving waters, reduce industrial/commercial discharges of stormwater to the maximum extent practicable, and prevent industrial/commercial discharges from the MS4 from causing or contributing to a violation of receiving water limitations. The program consists of the following components:

- Track,
- Educate,
- Inspect and
- Ensure compliance with municipal ordinances at industrial/commercial facilities determined to be critical sources of pollutants in stormwater.

Track Critical Industrial/Commercial Sources

Permit § VI.D.6.b (LA)/ §VII.G.2 (LB)

The critical sources to be tracked are listed in Table ICF-1.

Table ICF-1: Critical Sources

<table>
<tr><th>Facility Category</th><th colspan="2">Facility</th></tr>
<tr><td rowspan="4">Commercial Facilities</td><td colspan="2">Restaurants</td></tr>
<tr><td colspan="2">Automotive service facilities (including those located at automotive dealerships)</td></tr>
<tr><td colspan="2">Retail Gasoline Outlets</td></tr>
<tr><td colspan="2">Nurseries and Nursery Centers (Merchant Wholesalers, Nondurable Goods, and Retail Trade)</td></tr>
<tr><td rowspan="4">Industrial Facilities</td><td colspan="2">USEPA “Phase I” Facilities[1]</td></tr>
<tr><td rowspan="3">Other federally-mandated facilities[2]</td><td>Municipal landfills</td></tr>
<tr><td>Hazardous waste treatment, disposal, and recovery facilities</td></tr>
<tr><td>Industrial facilities subject to § 313 “Toxic Release Inventory” reporting requirements of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)[3]</td></tr>
<tr><td>General Facilities</td><td colspan="2">All other commercial or industrial facilities determined to potentially contribute a substantial pollutant load to the MS4.</td></tr>
</table>

[1] as specified in 40 CFR §122.26(b)(14)(i)-(xi)
[2] as specified in 40 CFR §122.26(d)(2)(iv)(C)
[3] 42 U.S.C. § 11023

Critical source facilities are tracked in an electronic database management system. The information stored for each critical source in the inventory is listed in Table ICF-2.

Table ICF-2: Inventory Information for Critical Sources

Information Category		Information
General	Name	Facility Name
	Location	Facility address
		Facility latitude and longitude coordinates
		Receiving water
	Contact	Owner/operator name
		Mailing address
		Phone number
		Email (if available)
Business Type		Standard Industrial Classification (SIC) code and/or North American Industry Classification System (NAICS) code
		Narrative description of the activities performed and/or principal products produced
Water quality		Status of exposure of materials to stormwater
		Pollutants generated by facility activities (A-ICF-1)
		Identification of whether the facility is tributary to a waterbody segment with impairments[4] for pollutants that are also generated by the facility.
Prioritization		High, medium or low. The default priority is medium.
NPDES Permit		For applicable facilities, identify coverage under the State Water Board's General NPDES Permit for the Discharge of Stormwater Associated with Industrial Activities (Industrial General Permit) or other individual or general NPDES permits or any waiver issued by the Regional or State Water Board pertaining to stormwater discharges.
		For Industrial General Permit facilities, identify whether the facility has filed a No Exposure Certification with the State Water Board.

Update Inventory

The critical sources inventory is updated at least annually. The update is accomplished through the collection of new information from sources such as field activities and readily available inter/intra-agency records (e.g. business licenses, pretreatment permits, sanitary sewer connection permits and the State Water Resources Control Board's Storm Water Multiple Application and Report Tracking System (SMARTS)).

[4] CWA § 303(d) listed or subject to a TMDL

Prioritization

Prioritizing facilities by their potential water quality impact provides an excellent opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program. The three inventory fields under the "Water Quality" category of Table ICF-2 provide information that allows for such a facility prioritization. Based on these fields, the following tables establish a method to prioritize all industrial/commercial facilities into three graded tiers – High, Medium and Low. The City may follow an alternative prioritization method provided it results in a similar three-tiered scheme. In order to maintain a minimum inspection frequency equivalent to the mandates of the MS4 Permit, a condition must be applied to the prioritization process. This condition is explained on the following page.

Prioritization factors

Factor	Description
A	Status of exposure of materials and industrial/commercial activities to stormwater
B	Identification of whether the facility is tributary to a waterbody segment with impairments[5] for pollutants that are also generated by the facility
C	Other factors determined by the City, such as size of facility, presence of exposed soil or history of stormwater violations

Utilizing these factors, follow steps 1, 2 and 3 below:

1. Collect necessary information to evaluate factors

Factor	Initial method	Subsequent method
A	Satellite imagery	Results of stormwater inspection
B	Cross reference Table ICF-4 or 5 with tributary TMDL/ 303(d) pollutants*	Cross reference inspection results with tributary TMDL/ 303(d) pollutants
C	Varies	

* See Pages ICF-9 and 10.

2. Evaluate factors

Factor	Result	Score
A	Low or no exposure	0
	Moderate exposure	½
	Significant exposure	1
B	No**	0
	Yes***	1
C	Low	0
	Medium	½
	High	1

** No pollutant generation/impairment matches
*** ≥ 1 pollutant generation/impairment matches

3. Prioritize facilities

		C Score		
		0	½	1
A×B Score	0	Low	Medium	High
	½	Medium	High	High
	1	High	High	High

This method serves only as a guide to prioritization. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

[5] CWA § 303(d) listed or subject to a TMDL

Step 3 may also be expressed by the relationships $A \cdot B + C \geq 1 \rightarrow$ High, $1 > A \cdot B + C > 0 \rightarrow$ Medium and $A \cdot B + C = 0 \rightarrow$ Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

Prioritization Condition

The facility prioritization impacts the inspection frequency. In fact the main objective of prioritizing the facilities is to adjust the inspection schedule to focus efforts on water quality priorities. The intent is not to reduce the total number of inspections. In order to maintain a total number of inspections in line with the expectations of the MS4 Permit (i.e. result in the same number of average inspections per year as a semi-quinquennial frequency), one additional condition must be imposed:

The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities.

Prioritization condition

Prioritization Frequency

The default priority for a facility is Medium. Prioritization and reprioritization may be conducted at any time based on the discretion of the City. Figure ICF-2 is a flowchart of the prioritization process.

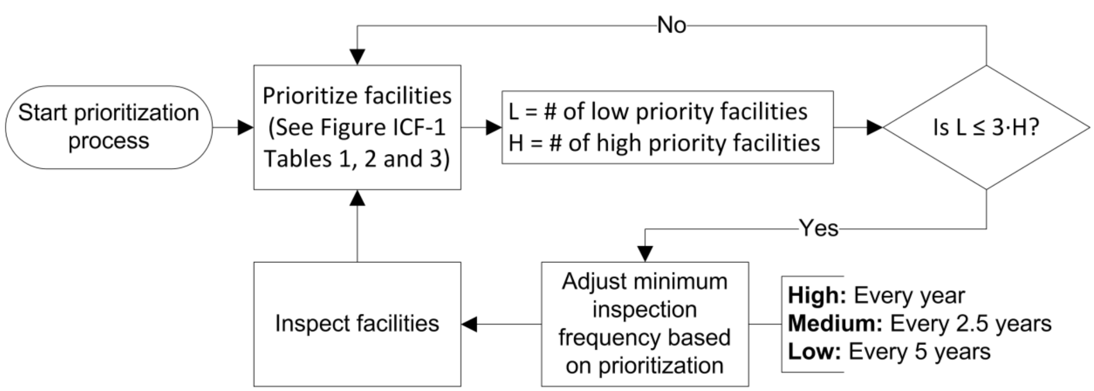

Figure ICF-2: Prioritization Process

Educate Industrial/Commercial Sources

Permit § VI.D.6.c (LA)/ §VII.G.3 (LB)

At least once during the five-year period of the MS4 Permit, the owner/operator of each of the inventoried critical sources is notified of the BMP requirements applicable to the facility/source.

Business Assistance Program

The Business Assistance Program provides technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. Assistance is targeted to select business sectors or small businesses upon a determination that their activities may be contributing substantial pollutant loads to the MS4 or receiving water. Assistance may include technical guidance and provision of educational materials. The Program includes at least one of the following components:

- **Technical Guidance** – Provide on-site technical assistance, telephone, or e-mail consultation regarding the responsibilities of businesses to reduce the discharge of pollutants, procedural requirements, and available guidance documents. Guidance methods include but are not limited to:
    - Technical guidance through the critical source inspection program. During an inspection the inspector provides to the business owner/operator 1) on-site technical assistance and 2) contact information for continued consultation. The inspector may also refer staff to relevant fact sheets from the *CASQA Industrial and Commercial BMP Handbook*.
    - Technical guidance initiated with businesses through an informational letter, email, webpage or social media. The notice provides contact information of relevant stormwater staff for business assistance as well as hyperlinks to available guidance documents such as the *CASQA Industrial and Commercial BMP Handbook*.
- **Educational Materials** – Distribute stormwater pollution prevention educational materials to operators of 1) auto repair shops, car wash facilities, restaurants and 2) mobile sources including automobile/equipment repair, washing, or detailing, power washing services, mobile carpet, drape, or upholstery cleaning services, swimming pool, water softener, and spa services, portable sanitary services and commercial applicators and distributors of pesticides, herbicides and fertilizers, if present. Material sources and distribution methods include but are not limited to:
    - Distribution method – The presence of these businesses within an agency's jurisdiction may be determined through business licenses or other readily available inter/intra-agency records.
    - Material sources – Educational materials are available at USEPA's Nonpoint Source (NPS) Outreach Toolbox at http://cfpub.epa.gov/npstbx/index.html. The toolbox is a database of nationwide public education materials that is intended for use by state and local campaigns. The toolbox contains a variety of resources to help develop an effective and targeted outreach campaign.

Inspect Critical Industrial/Commercial Sources

Modified from Permit §VI.D.6.d-e (LA)/ §VII.G.4-5(LB)

Frequency of Inspections

Following the facility prioritization method described in this guidance document, the City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in the following section. The prioritization condition on Page ICF-4 ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

The City will conduct the first compliance inspection of industrial/commercial facilities within one year of the approval of the Watershed Management Program by the Executive Officer. There will be a minimum interval of six months between the first and the second mandatory compliance inspections.

Exclusions to the Frequency of Industrial Inspections

Exclusion of Facilities Previously Inspected by the Regional Water Board
The State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database[6] is reviewed at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval is two years after the effective date of the MS4 Permit (LA: December 28, 2014, LB: March 28,, 2016) and the second interval is four years after the effective date (LA: December 28, 2016, LB: March 28, 2018). If it is determined through the review that the Regional Water Board conducted an inspection of a facility within the prior 24 month period, then the facility does not require an inspection.

No Exposure Verification
The initial inspection identifies those facilities that have filed a No Exposure Certification with the State Water Board. Three to four years after the effective date of the MS4 Permit, a second inspection is performed for at least 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status.

Scope of Inspections

A template inspection form is included as Attachment ICF-A.

Scope of Commercial Inspections

Commercial critical source facilities are inspected to confirm that stormwater and non-stormwater BMPs are effectively implemented in compliance with municipal ordinances. At each facility, inspectors verify that the operator is implementing effective source control BMPs for each corresponding activity. The implementation of additional BMPs is required where stormwater from the MS4 discharges to a significant ecological area (SEA), a water body subject to TMDL provisions[7], or a CWA §303(d) listed impaired water body. For those BMPs that are not adequately protective of water quality standards, additional site-specific controls may be required.

Scope of Mandatory Industrial Facility Inspections

At each industrial critical source the inspector confirms that the facility

- Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Storm Water Pollution Prevention Plan (SWPPP) is available on-site; or
- Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement;
- Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table ICF-3, unless the pollutant generating activity does not occur. Additional BMPs must be implemented where stormwater from the MS4 discharges to a water body subject to TMDL Provisions in Part VI.E of the MS4 Permit, or a CWA § 303(d) listed impaired water body. If the specified BMPs are not adequately protective of water quality standards, additional site-specific controls may be required. For critical sources that discharge to MS4s that discharge to SEAs, operators must implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to

[6] SMARTS is accessible at https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp
[7] As described in Part VI.E of the MS4 Permit

exceedances of water quality standards.

- Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification are notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2 of the MS4 Permit.

Source Control BMPs

Permit § VI.D.6.f (LA)/ §VII.G.6 (LB)

Effective source control BMPs for the activities listed in Table ICF-3 are implemented at commercial and industrial facilities, unless the pollutant generating activity does not occur:

Significant Ecological Areas (SEAs)

Permit § VI.D.6.g (LA)/ §VII.H (LB)

For critical sources that discharge to MS4s that discharge to SEAs, each Permittee will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards.

Progressive Enforcement

Permit § VI.D.6.h (LA)/ §VII.I (LB)

Each Permittee will implement its Progressive Enforcement Policy to ensure that Industrial / Commercial facilities are brought into compliance with all stormwater requirements within a reasonable time period. See Part VI.D.2 of the MS4 Permit for requirements for the development and implementation of a Progressive Enforcement Policy.

Table ICF-3: Source Control BMPs at Commercial and Industrial Facilities

Pollutant-Generating Activity	BMP Description	BMP Fact Sheet*
Unauthorized Non-Storm water Discharges	Effective elimination of non-stormwater discharges	SC-10
Accidental Spills/ Leaks	Implementation of effective spills/ leaks prevention and response procedures	SC-11
Vehicle/ Equipment Fueling	Implementation of effective fueling source control devices and practices	SC-20
Vehicle/ Equipment Cleaning	Implementation of effective equipment/vehicle cleaning practices and appropriate wash water management practices	SC-21
Vehicle/ Equipment Repair	Implementation of effective vehicle/ equipment repair practices and source control devices	SC-22
Outdoor Liquid Storage	Implementation of effective outdoor liquid storage source controls and practices	SC-31
Outdoor Equipment Operations	Implementation of effective outdoor equipment source control devices and practices	SC-32
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices	SC-33
Storage and Handling of Solid Waste	Implementation of effective solid waste storage/ handling practices and appropriate control measures	SC-34
Building and Grounds Maintenance	Implementation of effective facility maintenance practices	SC-41
Parking/ Storage Area Maintenance	Implementation of effective parking/ storage area designs and housekeeping/ maintenance practices	SC-43
Stormwater Conveyance System Maintenance	Implementation of proper conveyance system operation and maintenance protocols	SC-44
Pollutant-Generating Activity	**BMP Description from Regional Water Board Resolution No. 98-08**	
Sidewalk Washing	1. Remove trash, debris, and free standing oil/grease spills/leaks (use absorbent material, if necessary) from the area before washing; and 2. Use high pressure, low volume spray washing using only potable water with no cleaning agents at an average usage of 0.006 gallons per square feet of sidewalk area.	
Street Washing	Collect and divert wash water to the sanitary sewer – publically owned treatment works (POTW). Note: POTW approval may be needed.	

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

Table ICF-4: Potential Pollutants from Industrial Activities*

	Potential Pollutants								
Activity or Facility Type	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle & Equipment Fueling			✕	✕					
Vehicle & Equipment Washing and Steam Cleaning	✕	✕	✕	✕		✕	✕		
Vehicle & Equipment Maintenance and Repair			✕	✕			✕		
Outdoor Loading & Unloading of Materials	✕	✕	✕	✕	✕	✕	✕		
Outdoor Container Storage of Liquids		✕	✕	✕		✕	✕		✕
Outdoor Process Equipment Operations and Maintenance	✕		✕	✕			✕		
Outdoor Storage of Raw Materials, Products, and Byproducts	✕	✕	✕	✕	✕	✕	✕		
Waste Handling & Disposal			✕	✕	✕	✕	✕	✕	
Contaminated or Erodible Surface Areas	✕	✕	✕	✕	✕	✕	✕	✕	
Building and Grounds Maintenance	✕	✕	✕		✕	✕		✕	✕
Building Repair, Remodeling, and Construction	✕		✕		✕	✕			
Parking/Storage Area Maintenance			✕	✕	✕		✕		

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

** This includes all toxic pollutants other than pesticides

Table ICF-5: Potential Pollutants by Industrial/Commercial Facility Type*

Activity or Facility Type	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Airplane mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Boat mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Equipment repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Automobile and other vehicle body repair or painting			X	X			X		
Mobile automobile or other vehicle washing	X	X	X			X	X		
Automobile (or other vehicle) parking lots and storage			X		X		X		
Retail or wholesale fueling			X	X	X		X		
Pest control services									X
Eating or drinking establishments		X		X	X	X	X	X	X
Mobile carpet, drape or furniture cleaning	X			X					
Cement mixing or cutting	X								
Masonry	X								
Painting and coating			X	X			X		
Botanical or zoological gardens and exhibits	X	X			X	X		X	X
Landscaping	X	X			X	X		X	X
Nurseries and greenhouses	X	X			X	X		X	X
Golf courses, parks and other recreational areas/facilities	X	X			X	X		X	X
Cemeteries	X	X			X	X		X	X
Pool and fountain cleaning		X	X	X	X	X		X	
Marinas			X	X	X	X	X	X	
Port-a-Potty servicing		X			X	X		X	

* Source: Orange County Drainage Area Management Plan, 2003

** This includes all toxic pollutants other than pesticides

Planning and Land Development Program

The Cities are required to implement a Planning and Land Development program that includes the provisions listed in the MS4 Permit (LA MS4 Permit §VI.D.7, LB MS4 Permit §VII.J). This document provides guidance that the participating cities can follow to implement a Planning and Land Development program in compliance with the MS4 Permit.

Introduction *Permit §VI.D.7.a (LA)/§VII.J.1 (LB)*

The Planning and Land Development Program for all New Development and Redevelopment projects subject to the MS4 Permit includes measures to:

- Lessen the water quality impacts of development by using smart growth practices such as compact development, directing development towards existing communities via infill or redevelopment, and safeguarding of environmentally sensitive areas.
- Minimize the adverse impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and the beneficial uses of water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code §21000 et seq.).
- Minimize the percentage of impervious surfaces on land developments by minimizing soil compaction during construction, designing projects to minimize the impervious area footprint, and employing Low Impact Development (LID) design principles to mimic pre-development hydrology through infiltration, evapotranspiration and rainfall harvest and use.
- Maintain existing riparian buffers and enhance riparian buffers when possible.
- Minimize pollutant loadings from impervious surfaces such as roof tops, parking lots, and roadways through the use of properly designed, technically appropriate BMPs (including Source Control BMPs such as good housekeeping practices), LID Strategies, and Treatment Control BMPs.
- Properly select, design and maintain LID and Hydromodification Control BMPs to address pollutants that are likely to be generated, reduce changes to pre-development hydrology, assure long-term function, and avoid the breeding of vectors.[1]
- Prioritize the selection of BMPs to remove stormwater pollutants, reduce stormwater runoff volume, and beneficially use stormwater to support an integrated approach to protecting water quality and managing water resources in the following order of preference:
    - On-site infiltration, bioretention and/or rainfall harvest and use.
    - On-site biofiltration, off-site groundwater replenishment, and/or off-site retrofit.

[1] Treatment BMPs when designed to drain within 96 hours of the end of rainfall minimize the potential for the breeding of vectors. See California Department of Public Health *Best Management Practices for Mosquito Control in California* (2012) at http://www.westnile.ca.gov/resources.php

Applicability

Permit §VI.D.7.b (LA)/§VII.J.2-3 (LB)

New Development Projects

The New Development and Redevelopment categories below will require a Standard Urban Stormwater Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with MS4 Permit requirements. Development projects subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are listed below:

1. All development projects (including single family hillside homes) equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious surface area
2. Industrial parks with 10,000 square feet or more of surface area
3. Commercial malls with 10,000 square feet or more surface area
4. Retail gasoline outlets with 5,000 square feet or more of surface area
5. Restaurants (SIC 5812) with 5,000 square feet or more of surface area
6. Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces
7. Automotive service facilities (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA), where the development will:
   a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and
   b. Create 2,500 square feet or more of impervious surface area
9. Redevelopment projects in subject categories that meet Redevelopment thresholds identified below

Redevelopment Projects

Redevelopment projects subject to agency conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are:

1. Land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on development categories identified above.
2. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.
3. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire

development.

4. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency Redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.
5. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

Special Provisions

1. Street and road construction of 10,000 square feet or more of impervious surface area
   a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. The Cities will require a Standard Urban Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with the approved green streets manual requirements.
2. Single family hillside homes will require a less extensive plan. To the extent that an agency may lawfully impose conditions, mitigation measures or other requirements on the development or construction of a single-family home in a hillside area as defined in the applicable agency's Code and Ordinances, the Cities will require that during the construction of a single-family hillside home, the following measures are implemented:
   a. Conserve natural areas
   b. Protect slopes and channels
   c. Provide storm drain system stenciling and signage
   d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability
   e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

New Development/ Redevelopment
Project Performance Criteria

Permit §VI.D.7.c (LA)/§VII.J.4 (LB)

Integrated Water Quality/Flow Reduction/Resources Management Criteria

All New Development and Redevelopment projects identified above will control pollutants, pollutant loads, and runoff volume emanating from the project site by: (1) minimizing the impervious surface area and (2) controlling runoff from impervious surfaces through infiltration, bioretention and/or rainfall harvest and use.

Projects will retain on-site the Stormwater Quality Design Volume (SWQDv) defined as the runoff from the 0.75-inch, 24-hour rain event or the 85th percentile, 24-hour rain event, as determined from the Los Angeles County 85th percentile precipitation isohyetal map[2], *whichever is greater*. Exceptions include technical infeasibility, opportunity for regional groundwater replenishment, local ordinance equivalence, or hydromodification, as described in the sections below.

When evaluating the potential for on-site retention, the Cities will consider the maximum potential for evapotranspiration from green roofs and rainfall harvest and use.

Alternative Compliance for Technical Infeasibility or Opportunity for Regional Groundwater Replenishment

In instances of technical infeasibility or where a project has been determined to provide an opportunity to replenish regional groundwater supplies at an offsite location, the Cities may allow projects to comply with the MS4 Permit through the alternative compliance measures as described below:

1. To demonstrate technical infeasibility, the project applicant must demonstrate that the project cannot reliably retain 100 percent of the SWQDv on-site, even with the maximum application of green roofs and rainwater harvest and use, and that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Conditions where technical infeasibility may result including those indicated in

[2] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

2. Table PLD- **1** below. To utilize alternative compliance measures to replenish groundwater at an offsite location, the project applicant will demonstrate *(i)* why it is not advantageous to replenish groundwater at the project site, *(ii)* that groundwater can be used for beneficial purposes at the offsite location, and *(iii)* that the alternative measures will also provide equal or greater water quality benefits to the receiving surface water than the Water Quality/Flow Reduction/Resource Management Criteria.

Table PLD- 1: Technical Infeasibility Criteria

1.	The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv on-site.
2.	Locations where seasonal high groundwater is within 5 to 10 feet of the surface,
3.	Locations within 100 feet of a groundwater well used for drinking water,
4.	Brownfield development sites where infiltration poses a risk of causing pollutant mobilization,
5.	Other locations where pollutant mobilization is a documented concern. Pollutant mobilization is considered a documented concern at or near properties that are contaminated or store hazardous substances underground.
6.	Locations with potential geotechnical hazards
7.	Smart growth and infill or Redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the on-site volume retention requirement.

Alternative Compliance Measures

When a project applicant has demonstrated that it is technically infeasible to retain 100 percent of the SWQDv on-site, or is proposing an alternative offsite project to replenish regional groundwater supplies, the agency will require one of the following mitigation options:

1. On-site Biofiltration

If using biofiltration due to demonstrated technical infeasibility, then the project must biofiltrate 1.5 times the portion of the SWQDv that is not reliably retained on-site, as calculated by Equation 1 below.

$$B_v = 1.5 * [SWQD_v - R_V]$$ *Equation 1*

<u>Where</u>:

Bv = biofiltration volume

SWQDv = the stormwater runoff from a 0.75 inch, 24-hour storm or the 85th percentile storm[3], *whichever is greater*.

Rv = volume reliably retained on-site

The MS4 Permit does not mention flowrate based biotreatment BMPs; however, proprietary biotreatment systems are often sized using flowrate rather than volume. Additionally, in cases where a pump is needed prior to entering the biotreatment BMP, the system requires sizing based on the controlled flow from the pump. Therefore, if it is infeasible to size a biotreatment BMP with volume-based calculations, the flowrate may be substituted in lieu of volume. Similarly, the flow rate must be determined using the design storm of 0.75 inch, 24-hour storm event or the 85th percentile storm[1], whichever is greater.

Conditions for On-site Biofiltration include the following:

a. Biofiltration systems will meet the design specifications provided in Attachment H to the MS4 Permit unless otherwise approved by the Regional Water Board Executive Officer.

[3] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

b. Biofiltration systems discharging to a receiving water that is included on the Clean Water Act section 303(d) list of impaired water quality-limited water bodies due to nitrogen compounds or related effects will be designed and maintained to achieve enhanced nitrogen removal capability. See Attachment H of the MS4 Permit for design criteria for underdrain placement to achieve enhanced nitrogen removal.

2. Offsite Infiltration

Offsite infiltration when implemented will use infiltration or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv, less the volume of stormwater runoff reliably retained on-site, at an approved offsite project and provide pollutant reduction (treatment) of the stormwater runoff discharged from the project site in accordance with the Water Quality Mitigation Criteria. The required offsite mitigation volume will be calculated by Equation 2 below.

$$M_v = 1.0 * [SWQD_v - R_v]$$ *Equation 2*

Where:

M_v = mitigation volume

$SWQD_v$ = runoff from the 0.75 inch, 24-hour storm event or the 85th percentile storm[4], *whichever is greater*

R_v = the volume of stormwater runoff reliably retained on-site.

3. Groundwater Replenishment Projects

Regional projects to replenish regional groundwater supplies at offsite locations may be proposed, provided the groundwater supply has a designated beneficial use in the Basin Plan. Regional groundwater replenishment projects must use infiltration, groundwater replenishment, or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv for New Development and Redevelopment projects, subject to conditioning and approval for the design and implementation of post-construction controls, within the approved project area. The projects must provide pollutant reduction (treatment) of the stormwater runoff discharged from development projects, within the project area, subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution in accordance with the Water Quality Mitigation Criteria.

Regional groundwater replenishment projects being implemented in lieu of onsite controls will mitigate the volume as calculated using Equation 2 above.

Regional groundwater replenishment projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment projects which did not implement on-site retention BMPs. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater

[4] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board*.

4. Offsite Project -Retrofit Existing Development

   Use infiltration, bioretention, rainfall harvest and use and/or biofiltration BMPs to retrofit an existing development, with similar land uses as the New Development or land uses associated with comparable or higher stormwater runoff event mean concentrations (EMCs) than the new development. Comparison of EMCs for different land uses will be based on published data from studies performed in southern California. The retrofit plan will be designed and constructed to:

   a. Intercept a volume of stormwater runoff equal to the mitigation volume (Mv) as described above in Equation 2, except biofiltration BMPs will be designed to meet the biofiltration volume or flowrate as described in Equation 1, and

   b. Provide pollutant reduction (treatment) of the stormwater runoff from the project site as described in the Water Quality Mitigation Criteria.

5. Conditions for Offsite Projects

   Project applicants seeking to utilize these alternative compliance provisions may propose other offsite projects, which the agency in which the project is located may approve if they meet the requirements of this subpart.

   a. Location of offsite projects. Offsite projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment project. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board.*

   b. Project applicant must demonstrate that equal benefits to groundwater recharge can be met on the project site.

   c. A prioritized list of potential offsite mitigation, groundwater replenishment and/or retrofit projects will be developed within each agency, and when feasible, the mitigation will be directed to the highest priority project within the same HUC-12 or if approved by the Regional Water Board Executive Officer, the HUC-10 drainage area, as the New Development project.

   d. Infiltration/bioretention will be the preferred LID BMP for offsite mitigation or groundwater replenishment projects. Offsite retrofit projects may include green streets, parking lot retrofits, green roofs, and rainfall harvest and use. Biofiltration BMPs may be considered for retrofit projects when infiltration, bioretention or rainfall harvest and use is technically infeasible.

   e. The agency in which the project is located will develop a schedule for the completion of offsite projects, including milestone dates to identify, fund, design, and construct the projects. Offsite projects will be completed as soon as possible, and at the latest, within 4 years of the certificate of occupancy for the first project that contributed funds toward the construction of the offsite project, unless a longer period is otherwise authorized by the Executive Officer of the Regional Water Board. For public offsite projects, the agency in which the project is located must provide in their annual reports a summary of total offsite project funds raised to date and a description (including location, general design concept, volume of water expected to be retained, and total estimated budget) of all pending public offsite projects. Funding sufficient to address the offsite volume must be transferred to the agency (for public offsite mitigation projects) or to an escrow account (for private offsite mitigation projects) within one year of the initiation of construction.

f. Offsite projects must be approved by the agency in which the project is located and may be subject to approval by the Regional Water Board Executive Officer, if a third-party petitions the Executive Officer to review the project. Offsite projects will be publicly noticed on the Regional Water Board's website for 30 days prior to approval.

g. The project applicant must perform the offsite projects as approved by either the agency or the Regional Water Board Executive Officer or provide sufficient funding for public or private offsite projects to achieve the equivalent mitigation stormwater volume.

6. Regional Stormwater Mitigation Program

An agency or agency group may apply to the Regional Water Board for approval of a regional or sub-regional stormwater mitigation program to substitute in part or wholly for New and Redevelopment requirements for the area covered by the regional or sub-regional stormwater mitigation program. Upon review and a determination by the Regional Water Board Executive Officer that the proposal is technically valid and appropriate, the Regional Water Board may consider for approval such a program if its implementation meets all of the following requirements:

a. Retains the runoff from the 85th percentile, 24-hour rain event or the 0.75 inch, 24-hour rain event, whichever is greater;

b. Results in improved stormwater quality;

c. Protects stream habitat;

d. Promotes cooperative problem solving by diverse interests;

e. Is fiscally sustainable and has secure funding; and

f. Is completed in five years including the construction and start-up of treatment facilities.

7. Water Quality Mitigation Criteria

All New Development and Redevelopment projects that have been approved for offsite mitigation or groundwater replenishment projects will also provide treatment of stormwater runoff from the project site. These projects will design and implement post-construction stormwater BMPs and control measures to reduce pollutant loading as necessary to:

a. Meet the pollutant specific benchmarks listed in Table PLD2 at the treatment systems outlet or prior to the discharge to the MS4, and

b. Ensure that the discharge does not cause or contribute to an exceedance of water quality standards at the agency's downstream MS4 outfall.

The project proponent may be allowed to install flow-through modular treatment systems including sand filters, or other proprietary BMP treatment systems with a demonstrated efficiency at least equivalent to a sand filter. The sizing of the flow through treatment device will be based on a rainfall intensity of 0.2 inches per hour, or the one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, *whichever is greater*.

Table PLD- 2: Benchmarks Applicable to New Development Treatment BMPs.

Conventional Pollutants					
Pollutant	Suspended Solids mg/L	Total P mg/L	Total N mg/L	TKN mg/L	
Effluent Concentration	14	0.13	1.28	1.09	
Metals					
Pollutant	Total Cd µg/L	Total Cu µg/L	Total Cr µg/L	Total Pb µg/L	Total Zn µg/L
Effluent Concentration	0.3	6	2.8	2.5	23

New developments and redevelopments will not cause or contribute to an exceedance of applicable water quality-based effluent limitations established in the MS4 Permit pursuant to Total Maximum Daily Loads (TMDLs).

8. Hydromodification (Flow/ Volume/ Duration) Control Criteria

All New Development and Redevelopment projects located within natural drainage systems will implement hydrologic control measures, to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems. The purpose of the hydrologic controls is to minimize changes in post-development hydrologic stormwater runoff discharge rates, velocities, and duration. This will be achieved by maintaining the project's pre-project stormwater runoff flow rates and durations.

<u>*Description*</u>

Hydromodification control in natural drainage systems will be achieved by maintaining the Erosion Potential (Ep) in streams at a value of 1, unless an alternative value can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and prevent damage to stream habitat in natural drainage system tributaries[5]. Hydromodification mitigation approaches should meet the criteria below:

a. Hydromodification control may include one, or a combination of on-site, regional or sub-regional hydromodification control BMPs, LID strategies, or stream and riparian buffer restoration measures. Any in-stream restoration measure shall not adversely affect the beneficial uses of the natural drainage systems.

b. Natural drainage systems that are subject to the hydromodification assessments and controls,

[5] See Attachment J of the MS4 Permit, "*Determination of Erosion Potential*"

as described in this section, include all drainages that have not been improved (e.g., channelized or armored with concrete, shotcrete, or rip-rap) or drainage systems that are tributary to a natural drainage system, except as provided in Exemptions to Hydromodification Controls, see below. The clearing or dredging of a natural drainage system does not constitute an "improvement."

c. Until the State Water Board or the Regional Water Board adopts a final Hydromodification Policy or criteria, the Hydromodification Control Criteria described in this section will be implemented to control the potential adverse impacts of changes in hydrology that may result from New Development and Redevelopment projects located within natural drainage systems.

Exemptions to Hydromodification Controls

New Development and Redevelopment projects may be exempt from implementation of hydromodification controls where assessments of downstream channel conditions and proposed discharge hydrology indicate that adverse hydromodification effects to beneficial uses of Natural Drainage Systems are unlikely. Conditions for exemptions include the following:

a. Projects involving replacement, maintenance or repair of an agency's existing flood control facility, storm drain, or transportation network.

b. Redevelopment Projects in the center of urban areas that do not increase the effective impervious area or decrease the infiltration capacity of pervious areas compared to the pre-project conditions.

c. Projects that have any increased discharge directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q100) of 25,000 cfs or more, or other receiving water that is not susceptible to hydromodification impacts.

d. Projects that discharge directly or via a storm drain into concrete or otherwise engineered (not natural) channels (e.g., channelized or armored with rip rap, shotcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to hydromodification impacts.

e. LID BMPs implemented on single family homes are sufficient to comply with hydromodification criteria.

Hydromodification Control Criteria

The Hydromodification Control Criteria to protect natural drainage systems are as follows:

a. Except for exemptions described above, projects disturbing an area greater than 1 acre but less than 50 acres within natural drainage systems will be presumed to meet pre-development hydrology if one of the following demonstrations is made:

    i. The project is designed to retain on-site, through infiltration, evapotranspiration, and/or harvest and use, the stormwater volume from the runoff of the 95th percentile, 24-hour storm, or

ii. The runoff flow rate, volume, and velocity for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. This condition may be substantiated by simple screening models, including those described in Hydromodification Effects on Flow Peaks and Durations in Southern California Urbanizing Watersheds (Hawley et al., 2011) or other models acceptable to the Executive Officer of the Regional Water Board, or

> The MS4 Permit states projects will meet Hydromodification Control Criteria if "*The...duration for the post-development condition* ***do[es] not exceed*** *the pre-development condition for the 2-year, 24-hour rainfall event*." The runoff duration (Tc) is generally associated with longer values resulting in lower concern for hydromodification impacts. Implementation of LID BMPs generally results in runoff not immediately (or not at all) discharging from the site, increasing the time of concentration. Thus, the interpretation presented herein is that Hydromodification Control Criteria would be met if the runoff duration for the post-development condition is **not less than** the pre-development condition for the 2-year, 24-hour rainfall event.

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit. Alternatively, agencies can opt to use other work equations to calculate Erosion Potential with Executive Officer approval.

b. Projects disturbing 50 acres or more within natural drainage systems will be presumed to meet pre-development hydrology based on the successful demonstration of one of the following conditions:

i. The site infiltrates on-site at least the runoff from a 2-year, 24hour storm event, or

ii. The runoff flow rate, volume, and velocity for the post-development condition does not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. These conditions must be substantiated by hydrologic modeling acceptable to the Regional Water Board Executive Officer, or

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit.

Alternative Hydromodification Criteria

The requirement for Hydromodification Controls will be satisfied by implementing the hydromodification requirements in the County of Los Angeles Low Impact Development Manual (2009) for all projects disturbing an area greater than 1 acre within natural drainage systems.

3. Watershed Equivalence

Regardless of the methods through which applicants implement alternative compliance measures, the subwatershed-wide (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) result of all development must be at least the same level of water quality protection as would have been achieved if all projects utilizing these alternative compliance provisions had complied with the Integrated Water Quality/Flow Reduction/Resource Management Criteria, described herein.

4. Annual Report

Annual Reports will be provided to the Regional Water Board to include a list of mitigation project descriptions and estimated pollutant and flow reduction analyses (compiled from design specifications submitted by project applicants, as approved. Within 4 years of the MS4 Permit adoption, the Annual Reports will include a comparison of the expected aggregate results of alternative compliance projects to the results that would otherwise have been achieved by retaining on site the SWQDv.

Implementation *Permit §VI.D.7.d (LA)/§VII.J.5 (LB)*

Local Ordinance Equivalence

Alternative requirements in the local ordinances for the agencies of this WMP will provide equal or greater reduction in stormwater discharge pollutant loading and volume as would have been obtained through strict conformance with the Integrated Water Quality/Flow Reduction Resources Management Criteria, Alternative Compliance Measures for Technical Infeasibility, or Opportunity for Regional Groundwater Replenishment sections herein and, if applicable, the Hydromodification (Flow/Volume Duration) Control Criteria section herein.

Project Coordination

A process for effective approval of post-construction stormwater control measures will be developed to include:

a. Detailed LID site design and BMP review including review of BMP sizing calculations, BMP pollutant removal performance, and municipal approval; and

b. An established structure for communication and delineated authority between and among municipal departments that have jurisdiction over project review, plan approval, and project construction through memoranda of understanding or an equivalent agreement.

Maintenance Agreement and Transfer

Prior to issuing approval for final occupancy, the Cities will require that all New Development and Redevelopment projects subject to post-construction BMP requirements, with the exception of simple LID BMPs implemented on single family residences, provide an operation and maintenance plan, monitoring plan, where required, and verification of ongoing maintenance provisions for LID practices, Treatment Control BMPs, and Hydromodification Control BMPs including but not limited to: final map conditions, legal agreements, covenants, conditions or restrictions, CEQA mitigation requirements, conditional use permits, and/ or other legally binding maintenance agreements (see Attachments PLD-A and PLD-B for MCA and MCA Termination sample templates, respectively). Agencies will require maintenance records be kept on site.

Verification at a minimum will include the developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either:

a. A signed statement from the public entity assuming responsibility for BMP maintenance; or

b. Written conditions in the sales or lease agreement, which require the property owner or tenant to assume responsibility for BMP maintenance and conduct a maintenance inspection at least once a year; or

c. Written text in project covenants, conditions, and restrictions (CCRs) for residential properties assigning BMP maintenance responsibilities to the Home Owners Association; or

d. Any other legally enforceable agreement or mechanism that assigns responsibility for the maintenance of BMPs.

All development projects subject to post-construction BMP requirements will provide a plan for the operation and maintenance of all structural and treatment controls. The plan will be submitted for examination of relevance to keeping the BMPs in proper working order. Where BMPs are transferred to agency for ownership and maintenance, the plan will also include all relevant costs for upkeep of BMPs in the transfer. Operation and Maintenance plans for private BMPs will be kept on-site for periodic review by agency inspectors.

A tracking system and an inspection and enforcement program will be maintained for New Development and Redevelopment post-construction stormwater as shown in Table PLC-3. Enforcement action will be taken per the established Progressive Enforcement Policy as appropriate based on the results of the inspection. See Section for requirements for the development and implementation of a Progressive Enforcement Policy (Appendix A-3-1_PEP).

Table PLD-3: Tracking, Inspection, and Enforcement Program Components

Program	Description	Components	
GIS or other Electronic System	A GIS or other electronic system will be implemented for tracking projects that have been conditioned for post-construction BMPs.	− Municipal Project ID − State WDID No. − Project Acreage − BMP Type and Description − BMP Location (coordinates) − Date of Maintenance Agreement − Date of Acceptance	− Maintenance Records − Inspection Date and Summary − Corrective Action − Date Certificate of Occupancy Issued − Replacement or Repair Date
Inspections[6]	Inspect all development sites upon completion of construction and prior to the issuance of occupancy	Proper installation of: − LID measures, − Structural BMPs,	

[6] The inspection may be combined with other inspections provided it is conducted by trained personnel.

	certificates.	− Treatment control BMPs, and − Hydromodification control BMPs.
Operation and Maintenance[7]	Verify proper operation and maintenance of post-construction BMPs. Inspection at least once every 2 years after project completion.	− Follow a Post-construction BMP Maintenance Inspection checklist (See Attachment PLD-C) − Assess operation and maintenance conditions relating to post-construction BMPs, including BMP repair, replacement, or re-vegetation.

Plan Certification

Each SUSMP/LID Plan should contain proper certifications. The following approach is suggested for SUSMP/LID Plan submittals:

- Form signed by the property owner/applicant stating the category in which the project falls under to easily define the NPDES requirements (see Attachment PLD-D for Form PC sample template).
- Form signed by the property owner/applicant certifying that the BMPs will be implemented, monitored, and maintained per SUSMP/LID Plan requirements (see Attachment PLD-E for Form P1 sample template).
- Form signed and stamped by a California registered civil engineer stating the proposed structural BMPs and certifying the methods and requirements are in compliance with the MS4 Permit requirements (see Attachment PLD-F for Form P2 sample template).

[7] For post-construction BMPs operated and maintained by parties other than the agency in which the BMP(s) is located, the agency will require the other parties to document proper maintenance and operations.

Development Construction Program

The Cities are required to develop, implement and enforce a construction program that includes the provisions listed in MS4 Permit §VI.D.8 (LB §VII.K). This document provides guidance to assist the Cities in implementing a construction program in compliance with the MS4 Permit.

Objectives

Permit §VI.D.8.a (LA)/§VII.K.1 (LB)

The objectives of the construction program are to:

- Prevent illicit construction-related discharges of pollutants into the MS4 and receiving waters.
- Implement and maintain structural and non-structural BMPs to reduce pollutants in stormwater runoff from construction sites.
- Reduce construction site discharges of pollutants to the MS4 to the MEP.
- Prevent construction site discharges to the MS4 from causing or contributing to a violation of water quality standards.

Erosion and Sediment Control Ordinance

Permit §VI.D.8.b (LA)/ §VII.K.1 (LB)

The construction program requires an established, enforceable erosion and sediment control ordinance for all construction sites that disturb soil.

Applicability

Permit §VI.D.8.c (LA)/ §VII.K.1.v (LB)

The construction program addresses construction activity as defined in Table DC-1.

Table DC-1: Definitions

Construction Activity	
Definition	Any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance.
Examples	Grading, vegetation clearing, soil compaction, paving, repaving and linear underground/overhead projects (LUPs) that result in land disturbance.
Exclusions	Emergency construction required to immediately protect public health and safety, *routine maintenance* as defined below and agricultural activities.
Routine Maintenance (construction program exclusion)	
Definition	Projects required to maintain the integrity of structures, including but not limited to the following:
Examples	Maintaining the original line and grade, hydraulic capacity, or original purpose of the facility.
	Performing restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
	Performing road shoulder work, regrading dirt/gravel roadways/shoulders and cleaning out ditches.
	Update existing lines (includes replacing with new materials or pipe) and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
	Repair leaks
Exclusion	New lines (i.e. not associated with existing facilities and not part of a project to update or replace existing lines) or facilities constructed to comply with applicable codes, standards and regulations.

The greater part of the construction program is dedicated to construction sites that disturb one acre or more of soil (with the exception of agricultural activities). This coincides with the size threshold for coverage under the State Water Resources Control Board's NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. The program provisions exclusive to sites less than one acre are addressed first.

Construction Sites Less than One Acre

Permit §VI.D.8.d (LA)/§VII.K.1.vi (LB)

BMPs (< 1 acre)

Through the use of the erosion and sediment control ordinance and/or building permit, construction sites are required have in place an effective combination of erosion and sediment control BMPs from Table DC-2 to prevent erosion and sediment loss and the discharge of construction wastes.

Table DC-2: Applicable Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Inventory (< 1 acre)

All construction sites with soil disturbing activities that require a permit, regardless of size, are identified and stored in an inventory. Existing permit databases or other tracking systems may be used to file this information. The list of permitted sites is provided to the Regional Water Board upon request.

Inspections (< 1 acre)

Construction sites are inspected on as needed based on the evaluation of the factors that are a threat to water quality. In evaluating the threat to water quality, the following factors are considered: soil erosion potential, site slope, project size and type, sensitivity of receiving water bodies, proximity to receiving water bodies, nonstormwater discharges, past record of noncompliance by the operators of the construction site and any water quality issues relevant to the particular MS4.

Enforcement (< 1 acre)

The Progressive Enforcement Policy (MS4 Permit §VI.D.2) is implemented to ensure that construction sites are brought into compliance with the erosion and sediment control ordinance within a reasonable time period.

Construction Sites One Acre or Greater

Operators of public and private construction sites within a city's jurisdiction are required to select, install, implement, and maintain BMPs that comply with the erosion and sediment control ordinance.

Construction Site Inventory / Electronic Tracking System *Permit §VI.D.8.g (LA)/§VII.K.1.ix (LB)*

An electronic system is used to inventory all issued grading permits, encroachment permits, demolition permits, building permits, or construction permits (and any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance). A database management system or GIS system is recommended. This inventory is continuously updated as new sites are permitted and sites are completed. The inventory / tracking system contains at a minimum the items listed in Table DC-3.

Table DC-3: Inventory Information for Constructions Sites

Information Type		Information
General	Name	Project Name
	Location	Site address and/or latitude and longitude coordinates
		Receiving water
	Contact	Names of owner and contractor
		Mailing addresses of owner and contractor
		Phone numbers of owner and contractor
		Emails (if available) of owner and contractor
Status		Start and end dates
		Permit approval date and anticipated completion date
		Erosion and Sediment Control Plan (ESCP) approval date
		Status of NOI submittal and CGP coverage
		Current construction phase (where feasible)
Size		Size of project and area of disturbance
Water quality		Proximity to waterbodies listed as impaired[1] by sediment related pollutants
		Proximity to waterbodies for which a sediment-related TMDL has been adopted and approved by USEPA
		Status as a significant threat to water quality (based on a consideration of factors listed in Appendix 1 to the CGP)
Inspection		Inspection frequency
Post construction		List of post-construction structural BMPs subject to O&M requirements

Construction Plan Review and Approval Procedures *Permit §VI.D.8.h (LA)/§VII.K.1.x (LB)*

Plan review procedures are developed and implemented such that the following minimum requirements are met:

- Prior to issuing a grading or building permit, each operator of a construction activity within the city's jurisdiction of which the project is located is required to prepare and submit an ESCP prior to the disturbance of land for review and written approval. The construction site operator is prohibited from commencing construction activity prior to receipt of written approval by the city of which the project is located. An ESCP is not approved unless it contains appropriate site-

[1] CWA §303(d) listed or subject to a TMDL

specific construction site BMPs that meet the minimum requirements of the erosion and sediment control ordinance.

- ESCPs must include the elements of a Storm Water Pollution Prevention Plan (SWPPP). SWPPPs prepared in accordance with the requirements of the Construction General Permit can be accepted as ESCPs.
- At a minimum, the ESCP must address the following elements:
  - Methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.
  - Methods used to protect native vegetation and trees.
  - Sediment/Erosion Control.
  - Controls to prevent tracking on and off the site.
  - Nonstormwater controls (e.g., vehicle washing, dewatering, etc.).
  - Materials Management (delivery and storage).
  - Spill Prevention and Control.
  - Waste Management (e.g., concrete washout/waste management; sanitary waste management).
  - Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.
- The ESCP must include the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.
- The ESCP must be developed and certified by a Qualified SWPPP Developer (QSD).
- All structural BMPs must be designed by a licensed California Engineer.
- The landowner or the landowner's agent must sign a statement on the ESCP as follows (see Attachment DC-A for sample OC-1 template):

  "I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."

- Prior to issuing a grading or building permit, the city of which the project is located verifies that the construction site operators have existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.
- A checklist is used to conduct and document review of each ESCP (see Attachment DC-B for the ESCP Checklist sample template).

BMP Implementation Level *Permit §VI.D.8.i (LA)/§VII.K.1.xi (LB)*

The Cities will implement technical standards for the selection, installation and maintenance of construction BMPs for all construction sites within its jurisdiction.

The BMP technical standards require:

- The use of BMPs that are tailored to the risks posed by the project. Sites are ranked from Low Risk (Risk 1) to High Risk (Risk 3). Project risks are calculated based on the potential for erosion from the site and the sensitivity of the receiving water body. Receiving water bodies that are listed on the Clean Water Act (CWA) Section 303(d) list for sediment or siltation are considered High Risk. Likewise, water bodies with designated beneficial uses of SPWN, COLD, and MIGR are also considered High Risk. The combined (sediment/receiving water) site risk is calculated using the methods provided in Appendix 1 of the Construction General Permit. At a minimum, the BMP technical standards include requirements for High Risk sites as defined in Table DC-7.
- The use of BMPs for all construction sites, sites equal or greater to 1 acre, and for paving projects per Table DC-6 and Table DC-8.
- Detailed installation designs and cut sheets for use within ESCPs.
- Maintenance expectations for each BMP, or category of BMPs, as appropriate.

Permittees are encouraged to adopt respective BMPs from latest versions of the California BMP Handbook, Construction or Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual and addenda. Alternatively, Permittees are authorized to develop or adopt equivalent BMP standards consistent for Southern California and for the range of activities presented in Tables DC-5 through DC-8.

The local BMP technical standards are readily available to the development community and are clearly referenced within the Cities' stormwater or development services websites, ordinances, permit approval processes and/or ESCP review forms. The local BMP technical standards are also readily available to the Regional Water Board upon request.

Local BMP technical standards are available for the BMPs listed in Tables DC-5 through DC-8.

Table DC-4: Minimum Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Table DC-5: Additional BMPs Applicable to Construction Sites Disturbing 1 Acre or More

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
Sediment Controls	Fiber Rolls
	Gravel Bag Berm
	Street Sweeping and/ or Vacuum
	Storm Drain Inlet Protection
	Scheduling
	Check Dam
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/ Exit
	Stabilized Construction Roadway
	Entrance/ Exit Tire Wash
Non-Storm Management	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Spill Prevention and Control

Table DC-6: Additional Enhanced BMPs for High Risk Sites

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
	Slope Drains
Sediment Controls	Silt Fence
	Fiber Rolls
	Sediment Basin
	Check Dam
	Gravel Bag Berm
	Street Sweeping and/or Vacuum
	Sand Bag Barrier
	Storm Drain Inlet Protection
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/Exit
	Stabilized Construction Roadway
	Entrance/Exit Tire Wash
	Advanced Treatment Systems*
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations (Ground water dewatering only under NPDES Permit No. CAG994004)
	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management

*Applies to public roadway projects.

Table DC-7: Minimum Required BMPs for Roadway Paving or Repair Operation (For Private or Public Projects)

#	BMP
1.	Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
2.	Install gravel bags and filter fabric or other equivalent inlet protection at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat.
3.	Prevent the discharge of release agents including soybean oil, other oils, or diesel to the stormwater drainage system or receiving waters.
4.	Minimize non stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
5.	Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
6.	Collect liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
7.	Collect solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
8.	Cover the "cold-mix" asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
9.	Cover loads with tarp before haul-off to a storage site, and do not overload trucks.
10.	Minimize airborne dust by using water spray or other approved dust suppressant during grinding.
11.	Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near stormwater drainage system or receiving waters.
12.	Protect stockpiles with a cover or sediment barriers during a rain.

Construction Site Inspection *Permit §VI.D.8.j (LA)/§VII.K.1.xii (LB)*

The Cities' legal authority is used to implement procedures for inspecting public and private construction sites. The inspection procedures are implemented as follows:

Inspection Frequency

- Inspect the public and private construction sites as specified in Table DC-8.
- All phases of construction are inspected as follows:
  - Prior to Land Disturbance – Prior to allowing an operator to commence land disturbance, each Permittee shall perform an inspection to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan.
  - During Active Construction, including Land Development[2] and Vertical Construction[3] – In accordance with the frequencies specified in Table DC-8, inspections are performed to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan throughout the construction process.
  - Final Landscaping / Site Stabilization[4] – At the conclusion of the project and as a condition of approving and/or issuing a Certificate of Occupancy, the constructed site is inspected to ensure that all graded areas have reached final stabilization and that all

[2] Activities include cuts and fills, rough and finished grading; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; stockpiling of select material for capping operations; and excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvement.

[3] The build out of structures from foundations to roofing, including rough landscaping.

[4] All soil disturbing activities at each individual parcel within the site have been completed.

trash, debris, and construction materials, and temporary erosion and sediment BMPs are removed.

- Based on the required frequencies above, each construction project is inspected a minimum of three times.

Table DC-8: Inspection Frequencies for Sites One Acre or Greater

<table>
<tr><th>Site</th><th>Inspection Frequency Shall Occur</th></tr>
<tr><td>All sites 1 acre or larger that discharge to a tributary listed by the state as an impaired water for sediment or turbidity under the CWA §303(d)</td><td rowspan="2">(1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA[5], (2) within 48 hours of a ½-inch rain event and at (3) least once every two weeks</td></tr>
<tr><td>Other sites 1 acre or more determined to be a significant threat to water quality[6]</td></tr>
<tr><td>All other construction sites with 1 acre or more of soil disturbance not meeting the criteria above</td><td>At least monthly</td></tr>
</table>

Inspection Standard Operating Procedures

Standard operating procedures are implemented, and revised as necessary, that identify the inspection procedures followed by the Cities' inspectors (see Attachment DC-C for suggested standard operating procedures). Inspections of construction sites – and the standard operating procedures – include, but are not limited to:

1. Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.
2. Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions (see Attachment DC-B for the ESCP Checklist sample template).
3. Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.
4. Visual observation and record keeping of nonstormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.
5. Development of a written or electronic inspection report generated from an inspection checklist used in the field (see Attachment DC-D and DC-E for the Large Site and Small Site[7] Inspection Forms, respectively).
6. Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies listed in Table DC-8.

Enforcement *Permit §VI.D.8.k (LA)/§VII.K.1.xiii (LB)*

The Progressive Enforcement Policy is implemented to ensure that construction sites are brought into compliance with all stormwater requirements within a reasonable time period.

[5] www.srh.noaa.gov/forecast

[6] In evaluating the threat to water quality, the following factors shall be considered: soil erosion potential; site slope; project size and type; sensitivity of receiving water bodies; proximity to receiving water bodies; nonstormwater discharges; past record of non-compliance by the operators of the construction site; and any water quality issues relevant to the particular MS4.

[7] A "large site" refers to a site greater than or equal to 1 acre while a "small site" refers to a site less than one acre.

Permittee Staff Training *Permit §VI.D.8.l(LA)/§VII.K.1.xiv(LB)*

Staff whose primary job duties are related to implementing the construction stormwater program are adequately trained.

The Cities may conduct in-house training or contract with consultants. Training is provided to the following staff positions of the MS4:

- Plan Reviewers and Permitting Staff – Staff and consultants are trained as qualified individuals, knowledgeable in the technical review of local erosion and sediment control ordinance, local BMP technical standards, ESCP requirements, and the key objectives of the State Water Board QSD program. The training is provided either internally to staff or staff is required to obtain QSD certification.
- Erosion Sediment Control/Stormwater Inspectors – Inspectors are either 1) knowledgeable in inspection procedures consistent with the State Water Board sponsored program QSD, 2) a Qualified SWPPP Practitioner (QSP) or 3) a designated person on staff trained in the key objectives of the QSD/QSP programs supervises inspection operations. The training is provided either provided internally to staff or staff is required to obtain QSD/QSP certification. Each inspector is knowledgeable of the local BMP technical standards and ESCP requirements.
- Third-Party Plan Reviewers, Permitting Staff, and Inspectors – If outside parties are utilized to conduct inspections and/or review plans, these staff are trained per the requirements listed above. Outside contractors can self-certify, providing they certify they have received all applicable training required in MS4 Permit §VI.D.8 and have documentation to that effect.

Public Agency Activities Program

Each participating city is required to develop and implement a program for public agency facilities and activities that includes the requirements listed in MS4 Permit §VI.D.9 (LB §VII.L). This document provides guidance to assist the Cities in implementing a public agency activities program in compliance with the MS4 Permit.

Objectives *Permit §VI.D.9.a (LA)/§VII.L.1 (LB)*

The objectives of the Public Agency Activities program are to:

- Minimize stormwater pollution impacts from Permittee-owned or operated facilities.
- Minimize stormwater pollution impacts from public agency activities.
- Identify opportunities to reduce stormwater pollution impacts from areas of existing development.

MS4 Permit requirements for Public Agency Facilities and Activities consist of the following components which will be discussed in more detail in the sections below:

- Public Construction Activities Management
- Public Facility Inventory
- Inventory of Existing Development for Retrofitting Opportunities
- Public Facility and Activity Management
- Vehicle and Equipment Wash Areas
- Landscape, Park, and Recreational Facilities Management
- Storm Drain Operation and Maintenance
- Streets, Roads, and Parking Facilities Maintenance
- Emergency Procedures
- Municipal Employee and Contractor Training

1. Public Construction Activities Management *Permit §VI.D.9.b (LA)/§VII.L.2 (LB)*

Each participating city is required to develop and implement a Development Construction Program that meets the requirements the Development Construction Section of this WMP, and Part VI.D.8 of the LA MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects. In addition, each participating city is required to develop and implement a Planning and Land Development Program that meets the requirements in the Planning and Land Development Section of this WMP, and the MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects.

2. Public Facility Inventory *Permit §VI.D.9.c (LA)/§VII.L.3 (LB)*

The Public Agency Activities Program requires the maintenance of an inventory of all Permittee-owned or operated (i.e., public) facilities that are potential sources of stormwater pollution. The incorporation of facility information into a GIS is recommended. Sources that are tracked include but are not limited to the following:

- Animal control facilities
- Chemical storage facilities
- Composting facilities

- Equipment storage and maintenance facilities (including landscape maintenance-related operations)
- Fueling or fuel storage facilities (including municipal airports)
- Hazardous waste disposal facilities
- Hazardous waste handling and transfer facilities
- Incinerators
- Landfills
- Materials storage yards
- Pesticide storage facilities
- Fire stations
- Public restrooms
- Public parking lots
- Public golf courses
- Public swimming pools
- Public parks
- Public works yards
- Public marinas
- Recycling facilities
- Solid waste handling and transfer facilities
- Vehicle storage and maintenance yards
- Stormwater management facilities (e.g., detention basins)
- All other Permittee-owned or operated facilities or activities that are determined to contribute a substantial pollutant load to the MS4.

The following minimum fields of information are included in the inventory for each Permittee-owned or operated facility:

- Name of facility
- Name of facility manager and contact information
- Address of facility (physical and mailing)
- A narrative description of activities performed and potential pollution sources.
- Coverage under the Industrial General Permit or other individual or general NPDES permits or any applicable waiver issued by the Regional or State Water Board pertaining to stormwater discharges.

The inventory is updated at least once during the 5-year MS4 Permit term. The update are accomplished through collection of new information obtained through field activities or through other readily available inter and intra-agency informational databases (e.g., property management, land-use approvals, accounting and depreciation ledger account, and similar information).

3. Inventory of Existing Development for Retrofit Opportunities

Permit §VI.D.9.d (LA)/§VII.L.4 (LB)

The Public Agency Activities Program requires the development of an inventory of retrofitting opportunities. Retrofit opportunities are identified within the public right-of-way or in coordination with a TMDL implementation plan(s). The goals of the existing development retrofitting inventory are to address the impacts of existing development through regional or sub-regional retrofit projects that reduce the discharges of stormwater pollutants into the MS4 and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards as defined in the MS4 Permit.

Existing areas of development are screened to identify candidate areas for retrofitting using watershed models or other screening level tools. The areas of existing development identified during the screening process are then evaluated and ranked to prioritize retrofitting candidates. Criteria for this evaluation may include, but is not limited to the following:

- Feasibility, including general private and public land availability;
- Cost effectiveness;
- Pollutant removal effectiveness;
- Tributary area potentially treated;
- Maintenance requirements;
- Landowner cooperation;
- Neighborhood acceptance;
- Aesthetic qualities;
- Efficacy at addressing concern; and
- Potential improvements to public health and safety.

The results of this evaluation are considered in the following programs:

- Highly feasible projects expected to benefit water quality are given a high priority to implement source control and treatment control BMPs in the WMP.
- High priority retrofit projects are considered as candidates for off-site mitigation projects per LA MS4 Permit §VI.D.7.c.iii(4)(d) (LB §VII.J.4.iii(4)).
- Where feasible, the existing development retrofit program is coordinated with flood control projects and other infrastructure improvement programs per LA MS4 Permit §VI.D.9.e.ii(2) (LB §VII.L.5.ii(2)).

Site specific retrofit projects are encouraged through cooperation with private landowners. The following practices are considered in cooperating with private landowners to retrofit existing development:

- Demonstration retrofit projects;
- Retrofits on public land and easements that treat runoff from private
- developments;
- Education and outreach;
- Subsidies for retrofit projects;
- Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
- Public and private partnerships;
- Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

4. Public Facility and Activity Management *Permit §VI.D.9.e (LA)/§VII.L.5 (LB)*

4.1. Industrial General Permitted Facilities

Permit §VI.D.9.e.i & §VI.D.9.e.v (LA)/§VII.L.5.i (LB)

All Permittee owned or operated facilities where industrial activities are conducted that require coverage are required to obtain coverage under the Industrial General Permit by submitting a Notice of Intent (NOI) to the State Water Resources Control Board (State Board) and preparing a Stormwater

Pollution Prevention Plan (SWPPP). Facilities that may require coverage are listed by category in 40 Code of Federal Regulations (CFR) Section 122.26(b)(14), and include:

- Facilities subject to stormwater effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR Subchapter N)
- Manufacturing facilities
- Mining and oil and gas facilities
- Hazardous waste treatment, storage, or disposal facilities
- Landfills, land application sites, and open dumps that receive industrial waste
- Recycling facilities
- Steam electric generating facilities
- Transportation facilities
- Sewage treatment plants
- Certain facilities if materials are exposed to stormwater

Municipally owned or operated facilities that have obtained coverage under the IGP implement and maintain BMPs consistent with the associated SWPPP, and are therefore not required to implement and maintain the activity specific BMPs as described in the sections below.

4.2. Flood Management Projects *Permit §VI.D.9.e.ii (LA)/§VII.L.5.ii (LB)*

The following measures are implemented for municipally owned or operated flood management projects:

- Procedures are developed to assess the impacts of flood management projects on the water quality of receiving water bodies;
- Existing structural flood control facilities area evaluated to determine if retrofitting the facility to provide additional pollutant removal from stormwater is feasible.

4.3. Contracted Public Agency Activities *Permit §VI.D.9.e.iv (LA)/§VII.L.5.iv (LB)*

Any contractors hired to conduct Public Agency Activities, including, but not limited to the following must be contractually obligated to implement and maintain the activity specific BMPs outlined in the sections below:

- Storm and/or sanitary sewer system inspection and repair,
- Street sweeping,
- Trash pick-up and disposal, and
- Street and right-of-way construction and repair

It is the responsibility of each Permittee to ensure that these BMPs are being properly implemented and maintained through oversight of contracted activities. Example contractor/lessor contract language is provided in attachment PA-A.

4.4. BMPS for Municipal Activities

Permit §VI.D.9.e.iii & Permit §VI.D.9.e.vi (LA)/§VII.L.5.iii & VII.L.5.vi (LB)

Municipal maintenance and field staff are the ones responsible for implementing effective source control BMPs[1], such as those described in Table PA-1 (or an equivalent set of BMPs) when such activities occur at municipally owned or operated facilities and field operations (i.e. project sites). These sites include, but are not limited to the facility types identified in the Public Facility Inventory, and at any area that includes the activities described in Table PA-1, or that have the potential to discharge pollutants in stormwater. The Caltrans Stormwater Quality Handbook Maintenance Staff Guide (Caltrans Handbook)[2] is an additional resource that describes BMPs to prevent the stormwater-related pollutants most likely to come from common maintenance facility operations and field activities. It provides a straightforward working-level approach to implementing BMPs for common maintenance activities by categorizing these activities into Families, and associating each Family with certain types of BMPs in Activity Cut Sheets. The activities described in Sections 5-10 below are representative of typical municipal operations, and correspond to the activities and BMPs listed in Table PA-1. Where appropriate, each section will identify the appropriate Maintenance Activity Family and corresponding Caltrans Activity Cut Sheets from this table for ease of reference.

Although Table PA-1 and the CalTrans Handbook are excellent references for selecting BMPs for some of the most common municipal activities, they may not represent a comprehensive inventory of activities encountered by maintenance staff and field personnel. Likewise, for those BMPs that are not adequately protective of water quality standards, additional site-specific BMPS may be needed. For example, the implementation of additional BMPs is required where stormwater from the storm drain system discharges to a water body subject to a TMDL, a Clean Water Act §303(d) listed water body, or a significant ecological area (SEA). Attachment PA-B contains a map of SEAs in LA County and Attachment K of the LA MS4 Permit contains a matrix of Permittees and TMDLs.

[1] BMP is defined by the California Stormwater Quality Association as "*any program, technology, process, siting criteria, operating method, measure, or device which controls, prevents, removes, or reduces pollution*". Source Control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction, and may consist of programmatic controls such as street sweeping. Treatment Control BMPs are methods of treatment to remove pollutants from stormwater, and can include constructed treatment devices such as an infiltration basin.

[2] The handbook is available at http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/management_ar_rwp/CTSW-RT-02-057.pdf and may also be found by entering the words "Caltrans Stormwater Quality Handbook Maintenance Staff Guide" in a web search engine.

Table PA-1: General and Activity Specific BMPs and Their Associated Caltrans Handbook Activity Cut Sheet

Maintenance Activity Family	BMP	Caltrans Activity Cut Sheet Number
General BMPs	Scheduling and Planning	B-4
	Spill Prevention and Control	
	Sanitary/Septic Waste Management	
	Material Use	
	Safer Alternative Products	
	Vehicle/Equipment Cleaning, Fueling and Maintenance	
	Illicit Connection Detection, Reporting and Removal	
	Illegal Spill Discharge Control	
	Maintenance Facility Housekeeping Practices	
Flexible Pavement	Asphalt Cement Crack and Joint Grinding/ Sealing	B-9
	Asphalt Paving	B-10
	Structural Pavement Failure (Digouts) Grinding and Paving	B-11
	Emergency Pothole Repairs	B-13
	Sealing Operations	B-14
Rigid Pavement	Portland Cement Crack and Joint Sealing	B-15
	Mudjacking and Drilling	B-16
	Concrete Slab and Spall Repair	B-17
Slope/ Drains/ Vegetation	Shoulder Grading	B-19
	Nonlandscaped Chemical Vegetation Control	B-21
	Nonlandscaped Mechanical Vegetation Control/Mowing	B-23
	Nonlandscaped Tree and Shrub Pruning, Removal	B-24
	Fence Repair	B-25
	Drainage Ditch and Channel Maintenance	B-26
	Drain and Culvert Maintenance	B-28
	Curb and Sidewalk Repair	B-30
Litter/ Debris/ Graffiti	Sweeping Operations	B-32
	Litter and Debris Removal	B-33
	Emergency Response and Cleanup Practices	B-34
	Graffiti Removal	B-36
Landscaping	Chemical Vegetation Control	B-37
	Manual Vegetation Control	B-39
	Landscaped Mechanical Vegetation Control/ Mowing	B-40
	Landscaped Tree and Shrub Pruning, Removal	B-41
	Irrigation Line Repairs	B-42
	Irrigation (Watering), Potable and Nonpotable	B-43
Environmental	Storm Drain Stenciling	B-44
	Roadside Slope Inspection	B-45
	Roadside Stabilization	B-46
	Stormwater Treatment Devices	B-48
	Traction Sand Trap Devices	B-49
Public Facilities	Public Facilities	B-50
Bridges	Welding and Grinding	B-52
	Sandblasting, Wet Blast with Sand Injection, Hydroblasting	B-54
	Painting	B-56
	Bridge Repairs	B-57
Other Structures	Pump Station Cleaning	B-59
	Tube and Tunnel Maintenance and Repair	B-61
	Tow Truck Operations	B-63
	Toll Booth Lane Scrubbing Operations	B-64
Electrical &	Sawcutting for Loop Installation	B-65
Traffic Guidance	Thermoplastic Striping and Marking	B-67
	Paint Striping and Marking	B-68
	Raised/ Recessed Pavement Marker Application/Removal	B-70

	Sign Repair and Maintenance	B-71
	Median Barrier and Guard Rail Repair	B-73
	Emergency Vehicle Energy Attenuation Repair	B-75
Storm Maintenance	Minor Slides and Slipouts Cleanup/ Repair	B-78
Management and Support	Building and Grounds Maintenance	B-80
	Storage of Hazardous Materials (Working Stock)	B-82
	Material Storage Control (Hazardous Waste)	B-84
	Outdoor Storage of Raw Materials	B-85
	Vehicle and Equipment Fueling	B-86
	Vehicle and Equipment Cleaning	B-87
	Vehicle and Equipment Maintenance and Repair	B-88
	Aboveground and Underground Tank Leak and Spill Control	B-90

5. Vehicle and Equipment Wash Areas

Permit §VI.D.9.f (LA)/§VII.L.6 (LB)

This section corresponds to Maintenance Activity Family Management and Support and corresponding Caltrans Activity Cut Sheet B-87.

Vehicle and equipment cleaning at a municipal facility may introduce a number of potential pollutants into the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for all fixed vehicle and equipment washing; including fire fighting and emergency response vehicles. In addition, maintenance and field staff are responsible for preventing discharges of wash water from entering the storm drain system. Table PA-2 shows the potential pollutants associated with vehicle and equipment cleaning.

Table PA-2: Potential Pollutants Generated from Cleaning Activities

Activity	**Potential Pollutants**					
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Metals	Oil & Grease	Organics

Discharges of wash waters to the storm drain system are prevented by implementing the following measures at existing facilities with vehicle or equipment wash areas:

- Wash water is self-contained and hauled away for proper disposal offsite.
- Wash areas are equipped with a clarifier, or an alternative pre-treatment device, and water is plumbed to the sanitary sewer in accordance with applicable waste water provider regulations.
- Wastewater from all new vehicle and equipment wash facilities, or redeveloped or replaced existing facilities is prevented from discharging to the MS4 by equipping the facility with a clarifier, or an alternative pre-treatment device, and plumbing water to the sanitary sewer in accordance with applicable waste water provider regulations, or by self-containing all water water/wash water and hauling to a point of legal disposal.

6. Landscape, Park, and Recreational Facilities Management

Permit §VI.D.9.g (LA)/ §VII.L.7 (LB)

This section corresponds to multiple Activity Cut Sheets within the Slope/Drains/Vegetation, Landscape, Environmental, and Management and Support Families.

Maintenance practices at parks and recreational facilities generally include fertilizer and pesticide applications, vegetation maintenance and disposal, irrigation, swimming pool chemical maintenance and draining, and trash and debris management. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1for all public right-of-ways, flood control facilities and open channels, lakes and reservoirs, and landscape, park, and recreational facilities and activites. Table PA-3 shows the potential pollutants associated with recreational facilities..

Table PA-3: Potential Pollutants Generated from Recreational Facilities

Activity	Potential Pollutants				
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Bacteria	Pesticides

6.1 Model Integrated Pest Management Program

Permit §VI.D.9.g.ii & VI.D.9.g.iii (LA)/§VII.L.7.ii & VII.L.7.iii (LB)

An IPM policy is in place to minimize pesticide and fertilizer use, and encourage the use of IPM techniques for Public Agency facilities and activities. The attached IPM Program template (Attachment PA-C), adapted from the Orange County Drainage Area Management Plan (DAMP) IPM Policy developed by the University of California, Division of Agriculture and Natural Resources, provides an example of an effective IPM program. This IPM Program template is based on regulations, management guidelines, and research-based recommendations established by federal, state and local agencies and universities with particular expertise in pest management.

As part of the IPM policy, a commitment and schedule to reduce the use of pesticides that cause impairment t of surface waters is implemented through the following procedures:

- An inventory of all pesticides used by municipal departments, divisions, and operational units is prepared and updated annually.
- Pesticides used by staff and hired contractors are quantified.
- The use of IPM alternatives is demonstrated, where feasible, to reduce pesticide use.

Municipal maintenance and field staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.

7. Storm Drain Operation and Maintenance

Permit §VI.D.9.h (LA)/ §VII.L.8 (LB)

This section corresponds to the Litter/Debris/Graffiti Family: Litter and Debris Removal Cut Sheet, pg. B-33, and the Environmental Family: Storm Drain Stenciling Cut Sheet, pg. B-44

The storm drain system functions primarily to collect and convey surface runoff to receiving waters during storms in order to prevent flooding. It is a common municipal activity to maintain the storm drain system so that it functions hydraulically as intended during storms. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for storm drain operation and maintenance, and ensuring that all material removed from the MS4 does not reenter the system by dewatering solid material in a contained area and disposing of liquid material in accordance with any of the following measures:

- Self-containing and hauling off for legal disposal; or
- Applying to the land without runoff; or
- Equipping with a clarifier or alternative pre-treatment device and plumbing to the sanitary sewer in accordance with applicable waste water provider regulations.

Table PA-4 shows potential pollutants generated during storm drain operation and maintenance.

Table PA-4: Potential Pollutants Generated from Storm Drain Operation and Maintenance

	Potential Pollutants								
Activity	Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Inspection and Cleaning of Conveyance Structures	×	×	×		×		×		×
Controlling Illicit Connections and Discharges	×	×	×	×	×	×	×	×	×
Controlling Illegal Dumping	×	×	×	×	×	×	×	×	×
Maintenance of Inlet and Outlet Structures	×		×		×	×			

7.1 Catch Basin Cleaning *Permit §VI.D.9.h.iii (LA)/ §VII.L.8.iii (LB)*

There is no preferred method for cleaning catch basins as long as the method used is successful in removing accumulated sediment and debris. The methods used are determined in the field with the goal of minimizing the amount of escaped material, and preventing this material from entering the storm drain system. A template catch basin cleaning log is provided in Attachment PA-D.

7.1.1 Catch Basins Cleaning in Areas not Subject to a Trash TMDL

In areas that are not subject to a trash TMDL, catch basin inlets are prioritized based on the amount of trash generated, and inspected according to the schedule in Table PA-5.

Table PA-5: Inspection Frequencies for Catch Basin Inlets

Trash Generating Frequency	Priority	Inspection Frequency
Consistently generates the highest volumes of trash and/or debris	A	A minimum of three times during the wet season (October-April) and once during the dry season every year
Consistently generates moderate volumes of trash and/or debris	B	A minimum of once during the wet season and once during the dry season every year
Generates low volumes of trash and/or debris	C	A minimum of once per year

An inventory of catch basins is maintained and updated regularly. This inventory includes the following components:

- GPS coordinates of each catch basin
- Priorities for inspection
- Rationale or data to support catch basin priority designations
- Inspection and cleaning records

Catch basins are cleaned as necessary based on the inspections conducted. At a minimum, catch basins determined to be at least 25% full of trash are cleaned out.

7.1.2 Catch Basin Cleaning in Areas Subject to a Trash TMDL

In areas subject to a Trash TMDL, all applicable provisions of LA MS4 Permit Section VI.E (LB Part Part VIII) in conformance with the appropriate TMDL implementation schedule, are implemented. This includes an effective combination of full capture, partial capture, institutional controls, or minimum frequency of assessment and collection as described in LA MS4 Permit Section VI.E (LB Part Part VIII).

7.2 Catch Basin Labels and Open Channel Signage

Permit §VI.D.9.h.vi (LA)/ §VII.L.8.vi (LB)

All municipally owned storm drain inlets are labeled with a "No Dumping, Drains to Ocean" message, and inspected for legibility prior to the wet season (October-April) every year. Catch basins with illegible labels are recorded and re-stenciled or re-labeled within 180 days of inspection. In addition, signs referencing local code(s) that prohibit littering and illegal dumping are posted at designated public access points to open channels, creeks, urban lakes, and other relevant water bodies.

7.3 Trash Management

Permit §VI.D.9.h.iv-v & Permit §VI.D.9.h.vii (LA)/§VII.L.8.iv-v (LB)

The following Trash Management BMPs described below are employed to mitigate the impacts of anthropogenic trash on receiving waters.

7.3.1 Trash Management at Public Events

The following measures are implemented for any event in the public right of way or wherever it is foreseeable that substantial quantities of trash and litter may be generated, including events located in areas that are subject to a trash TMDL:

- Proper management of trash and litter generated; and
- Arrangement for temporary screens to be placed on catch basins; or
- Provide clean out of catch basins, trash receptacles, and grounds in the event area within one business day subsequent to the event.

7.3.2 Trash Receptacles

Covered trash receptacles are located in areas identified as high trash generation areas and maintained and cleaned out as necessary to prevent trash overflow. Examples of areas that may be considered high trash generating areas include:

- High vehicle or pedestrian traffic areas
- Commercial areas
- Industrial areas
- Construction areas
- High density residential areas
- Areas adjacent to vacant lots

7.3.3 Additional Trash Management Practices

In areas that are not subject to a trash TMDL, additional trash management practices will be employed no later than five years after the effective date of the LA MS4 Permit (4 years after the effective date of the LB MS4 Permit). Trash excluders or equivalent devices must be installed on or in catch basins or outfalls to prevent the discharge of trash to the MS4 or receiving waters, unless the installation of such BMP(s) alone will cause flooding (not due to lack of maintenance). Alternatively, additional trash BMPs that provide substantially equivalent removal of trash may be implemented. Additional BMPs may include, but are not limited to:

- Increased street sweeping
- Adding trash cans near trash generation sites
- Prompt enforcement of trash accumulation
- Increased trash collection on public property
- Increased litter prevention messages or trash nets within the MS4

The BMPs chosen will provide equivalent trash removal performance as excluders, and will be demonstrated though the annual report. When outfall trash capture is provided, revision of the schedule for inspection and cleanout of catch basins will also be reported in the annual report.

The State Water Resources Control Board (State Water Board) is considering the adoption of amendments to the Water Quality Control Plans for Ocean Waters of California and for the Inland Surface Water, Enclosed Bays, and Estuaries of California for Trash (Trash Amendments) citing a strong need for statewide consistency in trash management. The proposed Trash Amendments will include five elements: (1) Water Quality Objective, (2) Prohibition of Discharge, (3) Implementation, (4) Compliance Schedule, and (5) Monitoring, which will outline NPDES Permittee requirements for trash management. The development of the Trash Amendments will continue to be monitored, and any additional required trash management practices in areas not subject to a trash TMDL will be implemented per the guidance provided by these amendments.

7.4 Storm Drain Maintenance *Permit §VI.D.9.h.viii (LA)/ §VII.L.8.viii (LB)*

The following BMPs constitute the Storm Drain Maintenance Program:

- Municipally-owned open channels and drainage structures are visually inspected for debris at least annually.
- Trash and debris from is removed from open channel storm drains a minimum of once per year, before the storm season.
- The discharge of contaminants is minimized during MS4 maintenance and clean outs;
- Material removed is properly disposed of by containing and hauling away for legal disposal

7.5 Infiltration from Sanitary Sewer to MS4/Preventive Maintenance

Permit §VI.D.9.h.ix (LA)/§VII.L.8.ix (LB)

Thorough, routine, preventive surveys and maintenance of both municipally owned and operated Storm Drain Systems as well as Sanitary Sewer Systems infiltration and seepage of contaminants from the sanitary sewer system into the storm drain system is prevented. Sanitary Sewer System routine preventative maintenance is described in the Sewer System Management Plan (SSMP), which is a component of the Statewide General Waste Discharge Requirements (WDR) for Sanitary Sewer Systems.

Where necessary, controls implemented to limit infiltration of seepage from sanitary sewers to the MS4 include:

- Adequate plan checking for construction and new development;
- Incident response training for its municipal employees that identify sanitary sewer spills;
- Code enforcement inspections;
- MS4 maintenance and inspections;
- Interagency coordination with sewer agencies; and

- Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

7.6 Permittee Owned Treatment Control BMPs *Permit §VI.D.9.h.x (LA)/§VII.L.8.x (LB)*

All municipally owned treatment control BMPs, including post-construction BMPs, are regularly inspected and maintained to ensure their proper operation.
Any residual water generated during BMP maintenance is disposed of using one of the following procedures:

- Hauled away and legally disposed of; or
- Applied to the land without runoff; or
- Discharged to the sanitary sewer system; or
- Treated or filtered to remove bacteria, sediments, nutrients, and meet the limitations set in Table PA-6 below prior to discharge to the storm drain system.

Table PA-6: Discharge Limitations for Dewatering Treatment BMPs

Parameter	Units	Limitation
Total Suspended Solids	Mg/L	100
Turbidity	NTU	50
Oil and Grease	Mg/L	10

8. Streets, Roads, and Parking Facilities Maintenance

Permit §VI.D.9.i(LA)/§VII.L.9 (LB)

This section corresponds to multiple Activity Cut Sheets within the Flexible Pavement, Rigid Pavement, Litter/Debris/Graffiti, Traffic Guidance, and Management and Support Families.

Streets and roads may collect litter and debris from nearby activities, as well as from vehicular traffic. They also require routine maintenance that may generate waste materials. Table PA-7 shows potential pollutants generated from street, road, and parking facilities maintenance.

Table PA-7: Potential Pollutants Generated from Street, Road, and Parking Facility Maintenance

	Potential Pollutants						
Activity	Sediment	Trash	Metals	Bacteria	Oil & Grease	Organics	Oxygen Demanding Substances
Street and Road Maintenance	×	×	×		×	×	
Parking Facility Maintenance	×	×	×	×	×	×	×

8.1 Street Sweeping *Permit §VI.D.9.i.i-ii(LA)/§VII.L.9.i-ii (LB)*

Streets and/or street segments are swept according to the following designations:

- Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris should be swept at least two times per month.
- Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris should be swept at least once per month.
- Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris shall be swept as necessary but in no case less than once per year.

8.2 Road Reconstruction *Permit §VI.D.9.iii (LA)/§VII.L.9.iii (LB)*

Projects that include roadbed or street paving, repaving, patching, digouts, or resurfacing roadbed surfaces implement the following BMPS:

- Restricting paving and repaving activities to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
- Installing sand bags or gravel bags and filter fabric at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat;
- Preventing the discharge of release agents including soybean oil, other oils, or diesel into the MS4 or receiving waters.
- Preventing non-stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
- Cleaning equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
- Collecting liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Collecting solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Covering the “cold-mix” asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
- Covering loads with tarp before haul-off to a storage site, and not overloading trucks.
- Minimizing airborne dust by using water spray during grinding.
- Avoiding the stockpiling of soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near MS4 or receiving waters.
- Protecting stockpiles with a cover or sediment barriers during a rain.

8.3 Parking Facilities Maintenance *Permit §VI.D.9.iv (LA)/ §VII.L.9.iv (LB)*

Municipally owned parking lots that are uncovered and exposed to stormwater are kept clear of debris and excessive oil buildup by inspecting lots at least 2 times per month and cleaning at least once per month.

9. Emergency Procedures *Permit §VI.D.9.j (LA)/ §VII.L.10 (LB)*

Participating Agencies may conduct repairs of essential public service systems and infrastructure in emergency situations with a self-waiver of the provisions of the MS4 Permit as follows:

- Cities will abide by all other regulatory requirements, including notification to other agencies as appropriate.
- Where the self-waiver has been invoked, Cities will submit to the Regional Water Board Executive Officer a statement of the occurrence of the emergency, an explanation of the

circumstances, and the measures that were implemented to reduce the threat to water quality, no later than 30 business days after the situation of emergency has passed.

Minor repairs of essential public service systems and infrastructure in emergency situations (that can be completed in less than one week) are not subject to the notification provisions. Appropriate BMPs to reduce the threat to water quality will be implemented.

10. Municipal Employee and Contractor Training *Permit §VI.D.9.k (LA)/Permit §VII.L.11 (LB)*

An annual training program on the requirements of the overall stormwater management program is implemented for all municipal field staff whose interactions, jobs, and activities affect stormwater quality prior to June 30 every year. The Cities also ensure that contractors performing privatized/contracted municipal services have appropriate training in the stormwater management program. The goals of the annual training are to:

- Promote a clear understanding of the potential for municipal activities to pollute stormwater
- Identify opportunities to require, implement, and maintain appropriate BMPs in their line of work

In addition to the annual stormwater program training, the Cities implement an annual training program to train all of their employees and contractors who use or have the potential to use pesticides or fertilizers (whether or not they normally apply these as part of their work). Training programs address:

- The potential for pesticide-related surface water toxicity
- Proper use, handling, and disposal of pesticides
- Least toxic methods of pest prevention and control, including IPM
- Reduction of pesticide use

Outside contractors can self-certify, providing they certify they have received all applicable training required in the MS4 Permit and have documentation to that effect.

Illicit Connections & Illicit Discharges Elimination Program

Each participating city is required to develop and implement an Illicit Connections & Illicit Discharge Elimination (IC/ID) Program that includes the requirements listed in Permit §VI.D.10.a (LB §VII.M). This document provides guidance to assist the Cities in implementing an IC/ID program in compliance with the Permit.

Introduction *Permit §VI.D.10.a (LA)/§VII.M.1 (LB)*

Illicit connections and illicit discharges (IC/IDs) as defined in Table ICID-1 are potential significant sources of pollutants into and from the MS4. The Illicit Connection and Illicit Discharge (IC/ID) Program provides a comprehensive process for detecting, investigating and eliminating IC/IDs in an efficient and timely manner. The program consists of the following components:

- Procedures for conducting source investigations for IC/IDs
- Procedures for eliminating the source of IC/IDs
- Procedures for public reporting of illicit discharges
- Spill response plan and
- IC/ID education and training for City staff.

The purpose of this program is to effectively prohibit illicit discharges into the MS4.

Table ICID-1: IC/IDs Defined

Prohibition	Definition	Examples
Illicit Connections	Any man-made conveyance that is connected to the MS4 without a permit, excluding roof drains and other similar type connections.	Unpermitted channels, pipelines, conduits, inlets or outlets that are connected directly to the MS4.
Illicit Discharges	Any discharge into the MS4 or from the MS4 into a receiving water that is prohibited under local, state, or federal statutes, ordinances, codes or regulations. This includes any non-stormwater discharge, except those authorized in MS4 Permit §III.A.10.2.	Sanitary wastewater, Vehicle wash water, wash-down from grease traps, motor oil, antifreeze and fuel spills into or from the MS4.

Legal Authority

Adequate Legal Authority is required to prohibit IC/IDs to the MS4 and enable enforcement capabilities to eliminate the sources of IC/IDs.

Illicit Discharge Source Investigation and Elimination *Permit §VI.D.10.b (LA)/ §VII.M.2 (LB)*

The purpose of the IC/ID Program is accomplished in part by developing clear, step-by-step written procedures for conducting investigations of illicit discharges.

Investigation

Standardized procedures for conducting investigations to identify the source of all suspected illicit discharges are included in as an attachment (Illicit Discharge Investigation and Elimination Guidance). Procedures include the following:

- **Initiation** – Investigate the source of all observed discharges. After becoming aware of an illicit discharge, conduct an investigation to identify and locate the source within 72 hours.
- **Prioritization** – Investigate illicit discharges suspected of being sanitary sewage and/or significantly contaminated first.
- **Tracking** – Track all investigations and document the information listed in Table ICID-2.

Table ICID-2: Recorded Information for Illicit Discharge Investigations

Item	Information
1	Date(s) the illicit discharge was observed
2	Results of the investigation
3	Follow-up of the investigation
4	Date the investigation was closed

Elimination

Standardized procedures to eliminate illicit discharges once the sources are located are included as an attachment. Procedures include the following:

- **Notification** – Immediately notify the responsible party (RP)/parties of the problem and require the responsible party to initiate all necessary corrective actions to eliminate the illicit discharge.
    - If it is determined that an illicit discharge originates within an upstream jurisdiction, notify the upstream jurisdiction and the Regional Board. The Notification is conducted within 30 days of determination and information is collected regarding combined efforts to identify the source.
- **Spill response** – The Spill Response Plan is implemented when the source for illicit discharges cannot be traced to a suspected RP. Permanent solutions to such discharges are described in the following section (Flow Diversion).
- **Follow-up** – Conduct and document follow-up investigations upon notification that an illicit discharge has been eliminated to verify that it has been satisfactorily eliminated and cleaned-up.
- **Enforcement** – Enforcement procedures are included in the Progressive Enforcement Policy. The Progressive Enforcement Policy includes a list of enforcement actions.

Progressive Enforcement Policy

The Progressive Enforcement Policy is implemented to ensure that illicit discharges/ illicit connections are eliminated within a reasonable time period. The procedures are followed when the source of the nature of the discharges is known. Procedures typically include:

- Written warnings for minor violations
- Formal notice of violation with specific actions and time frames for compliance
- Compensation from the RP for any costs related to remediation, inspection, investigation, clean-up and oversight activities
- Cease and desist orders

- Civil penalties (infractions), or referral for criminal penalties or further legal action.

Flow Diversion

In the event that an ongoing illicit discharge cannot be eliminated (following the full execution of legal authority and in accordance with the Progressive Enforcement Policy) or the RPs cannot be identified, the discharge is either treated or diverted to the sanitary sewer. In either instance, the Regional Board is notified within 30 days of such determination. Notification includes the following information:

- Written plan that describes the efforts that have been undertaken to eliminate the discharge.
- Description of actions to be undertaken.
- Anticipated cost and
- Schedule for completion.

Identification and Response to Illicit Connections *Permit §VI.D.10.c (LA)/§VII.M.3 (LB)*

Illicit connections can be concentrated sources of pollutants either through direct discharge or infiltration of sewage or other prohibited discharges into the MS4. To reduce this source of pollutants, the following program is implemented for the identification of illicit connections. Key components of this program include investigating and responding in order to actively prevent and eliminate illicit connections.

Investigation

Standardized procedures for identifying illicit connections are included as an attachment (Illicit Connection Investigation Guidance). Procedures include the following:

- **Initiation** – Investigate within 21 days from the discovery or upon receiving a report of a suspected illicit connection. The elements of the investigation are listed in Table ICID-3.
- **Tracking** – Track all investigations and document the information listed in Table ICID-3.

Response

If the source investigation concludes that a connection to the MS4 is both 1) permitted or documented and 2) discharging only stormwater or nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs, then the investigation is closed and no further action is taken. Upon confirmation of a connection to the MS4 is illicit, one of two options is taken:

1. **Permit or document the connection.** The permitted or documented connection may only discharge stormwater and nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs. Retaining a record of the connection and its investigation qualifies as documentation.
2. **Eliminate the connection.** The connection is eliminated within 180 days of completion of the investigation, using formal enforcement authority if necessary.

Table ICID-3: Recorded Information for Illicit Connection Investigations

Item	Information
1	Any relevant illicit discharge information from Table ICID-2
2	Source of the connection
3	Nature and volume of the discharge through the connection
4	RP for the connection (if identified)
5	Response including any formal enforcement taken

Public Reporting of Non-Stormwater Discharges and Spills *Permit §VI.D.10.d (LA)/§VII.M.4 (LB)*

Central Point of Contact

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s through a central contact point are promoted, publicized, and facilitated. This includes phone numbers and an internet site for complaints and spill reporting. The reporting hotline is provided to staff to leverage the field staff that has direct contact with the MS4 in detecting and eliminating illicit discharges.

The LACFCD, in collaboration with the County, provides the central point of contact and through the 888-CLEAN-LA reporting hotline and internet site.

Open Channels

Signage is posted adjacent to open channels (see MS4 Permit IV.D.9.h.vi.(4)). The signage includes information regarding dumping prohibitions and public reporting of illicit discharges.

Complaints

Written procedures are maintained that document how complaint calls are received, and tracked to ensure that all complaints are adequately addressed in the attached form (Record Keeping & Documentation). Following the adaptive management process outlined in the MS4 Permit, the procedures are periodically evaluated to determine whether changes or updates are needed to ensure that the procedures accurately document the employed methods. After the evaluation, any identified changes will be made to the procedures.

Documentation is maintained for all complaint calls. This includes recording the location of the reported spill or IC/ ID and the actions undertaken in response the complaint, including referrals to other agencies.

Spill Response Plan *Permit §VI.D.10.e (LA)/§VII.M.5 (LB)*

A spill response plan (Attachment ICID-E) is implemented for all sewage and other spills that may discharge into its MS4. The spill response plan identifies agencies responsible for spill response and cleanup, telephone numbers and e-mail address for contacts, and contains the following:

- **Agency Coordination** – Coordinate with spill response teams throughout all appropriate departments, programs and agencies so that maximum water quality protection is provided.
- **Spill Response** – Respond to spills for containment within 4 hours of becoming aware of the

spill, except where such spills occur on private property, in which case respond within 2 hours of gaining legal access to the property. Initiate investigation of all public and employee spill complaints within one business day of receiving the complaint to assess validity.

- **Reporting** – Spills that may endanger health or the environment are reported to appropriate public health agencies and the California Emergency Management Agency (Cal EMA).

Illicit Connection and Illicit Discharge Education and Training *Permit §VI.D.10.f (LA)/§VII.M.6 (LB)*

A training program regarding the identification of IC/IDs is implemented for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Contact information, including the procedure for reporting an illicit discharge, is readily available to field staff.

Applicable Staff

Table ICID-4 is a list of field programs where program staff may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Appropriate field staff, supervising staff and contractors involved in these programs require training in IC/ID identification and reporting following the schedule provided in Table ICID-5.

Contracted Staff
Contractors that provide these municipal services may attend city training or certify to the participating city and retain documentation that staff has received applicable training. Otherwise this provision is accomplished through a contractual requirement for contracted staff to receive the training.

Table ICID-4: Municipal Field Programs

Main Field Program Types	Sub-Category Types/Activities
Lake Management	Fertilizer & Pesticide Management
	Mowing, Trimming/Weeding, Planting
	Managing Landscape Waste
	Controlling Litter
	Erosion Control
	Controlling Illegal Dumping
	Bacteria Control
	Monitoring
Landscape Maintenance	Mowing, Trimming/Weeding, Planting
	Irrigation
	Fertilizer & Pesticide
	Managing Landscape Waste
	Erosion Control
Roads, Streets, and Highways Operations and Maintenance	Sweeping & Cleaning
	Street Repair & Maintenance
	Bridge & Structure Maintenance
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning
	Graffiti Cleaning
	Sidewalk Repair
	Controlling Litter
	Fountain Maintenance
Solid Waste Handling	Solid Waste Collection
	Waste Reduction & Recycling
	Hazardous Waste Collection
	Litter Control
Water and Sewer Utility O&M	Water Line Maintenance
	Sanitary Sewer Maintenance
	Spill/Leak/Overflow Control
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities
	Fire Fighting Training
	Fire Station Activities

Training Schedule

The training schedule for all applicable staff is listed in Table ICID-5.

Table ICID-5: IC/ID Program Training Schedule

Category	Schedule
Current Staff	Twice during the term of the MS4 Permit
New Staff	Within 180 days of starting employment

Training Elements

The IC/ID elements addressed by the training program are listed in Table ICID-6.

Table ICID-6: Minimum IC/ID Training Program Elements

Item	Information
1	IC/ID identification, including definitions and examples
2	Investigation
3	Elimination
4	Clean-up
5	Reporting
6	Documentation

Documentation

Documentation of training program activities and training modules are retained and made available for review by the Regional Board.

PROGRESSIVE ENFORCEMENT POLICY

2014 Stormwater Enforcement Guide

Insert City Seal

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Attachments

PROGRESSIVE ENFORCEMENT POLICY

STORMWATER ENFORCEMENT GUIDE

INTRODUCTION

This Stormwater Progressive Enforcement Policy (PEP) provides procedures to enforce provisions of the Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4 Order No. R4-2012-0175. Pursuant to Section VI.D.2.a of the Order, Permittees are required to develop and implement a PEP to ensure that (1) regulated Industrial/ Commercial facilities, (2) construction sites, (3) development and redevelopment sites with post-construction controls, and (4) illicit discharges are each brought into compliance with all storm water and non-storm water requirements. The PEP provides the City with a guidance for enforcing the MS4 Permit Provisions and identifies enforcement procedures designed to encourage a timely response.

PROGRESSIVE ENFORCEMENT

Progressive enforcement is an escalating series of actions that allows for the efficient and effective use of enforcement. In some situations, an informal response (written warning/inspection report) is sufficient to inform the responsible party that there is a deficiency and to require the responsible party to return to compliance. If violations continue, the enforcement response should be quickly escalated to increasingly more formal and serious actions until compliance is achieved. Progressive enforcement is not appropriate in all circumstances. For example, where there is a situation needing immediate response, immediate issuance of a cleanup and abatement order may be appropriate.

COMPLIANCE CRITERIA

The City conducts on-site compliance inspections and conducts investigations, in response to complaints, under their authority provided in their municipal code and ordinances to verify compliance. Typical noncompliance issues related to stormwater may include:

- Prohibited discharges to the storm drain system.
- Site's existing condition is likely to result in exposure of pollutants to stormwater contact and possible pollutant discharge to the storm drain system such as:
  - Poor housekeeping activities that results in pollutant exposure.
  - Unattended spills and leaks.
  - Uncovered or improperly stored wastes, materials, or other items of concern.
  - Open waste receptacles such as tallow bins, compactors, and trash bins.
  - Leaky or contaminated equipment stored or used outdoors.
  - Track-out of dirt and sediment or other materials to street or outdoor areas.
- Illicit connections to the storm drain system.
- Best Management Practices (BMPs) are not in place to address pollutant generating activities, which may include erosion and sediment controls and post construction controls.

Complaint Response

The City may receive complaints regarding stormwater ordinance from their staff members, public, local agencies, or the Regional Water Board. The City initiates, within one business day,[1] investigation of complaints from facilities within its jurisdiction. The initial investigation includes, at minimum, a limited inspection of the facility to confirm validity of the complaint and to determine if the facility is in compliance with municipal storm water ordinance and, if necessary, to oversee corrective action. Emergency complaints are investigated immediately.

PROGRESSIVE ENFORCEMENT GUIDELINES

Informal Enforcement

The City implements professional judgment regarding the circumstances surrounding an enforcement action and chooses to resolve routine noncompliance quickly and efficiently through informal means that are not accompanied by sanctions (*e.g.*, civil charges or penalties). When deemed appropriate, the City employs the procedures described below to correct noncompliance informally.

Written Warning/ Inspection Report

Under circumstances where an inspection reveals routine noncompliance that can be corrected within a reasonably short time, staff may choose to issue a written warning/inspection report that describes the minor deficiencies/violations and includes a schedule for correcting the noncompliance[2]. The purpose of the written warning is to give the responsible party an opportunity to comply voluntarily and thus avoid sanctions that might be imposed by an escalated enforcement response.

For residential zones, the City employs an informal enforcement process and escalates to formal enforcement actions for those residents that do not comply with stormwater regulations.

Formal Enforcement / Administrative Enforcement

In the event that the City determines, based on an inspection or illicit discharge investigation conducted, that a responsible party has failed to adequately comply with the informal enforcement process within the required timeframe, the City may initiate administrative enforcement actions or will implement enforcement actions as established through authority in its municipal code. The City's goal is to achieve compliance through an extensive inspection program, educational outreach efforts and, if necessary, the initiation of appropriate enforcement action(s). The goal of any enforcement action is to: (1) return the facility to compliance in a timely manner; (2) eliminate economic benefit realized by the noncompliant facility; and (3) punish violators and prevent future noncompliance.

Notice of Violations

Under circumstances where the responsible party has failed to comply with the informal enforcement process or where the violations are significant, the City may choose to issue a Notice of Violation (NOV). The purpose of an NOV is to inform the responsible party of the observed violations, the applicable stormwater municipal codes that the responsible party has failed to comply with and the

[1] The City may comply with the Permit by taking initial steps (such as logging, prioritizing, and tasking) to "initiate" the ingestigation within that one business day. However, the Regional Water Board would expect that the initial investigation, including a site visit, to occur within four business days (per MS4 Order No.R4-2012-0175 Section VI.D.2.b)
[2] The City may choose to issue/write inspection report on site or provide to the responsible party at a later time.

potential consequences of failing to correct the violations. The NOV also gives the responsible party an opportunity to correct the violations described in the NOV within a specified time. Under circumstances where the responsible party fails to adequately respond to the NOV by failing to address or correct the violations noted in the NOV, the severity of the enforcement response will continue to escalate as described below.

Failure to Return to Compliance/ Second Notice of Violation

The City's municipal code stormwater ordinance authorizes assessment of administrative penalties which can be carried out by issuing a Failure to Return to Compliance Notice or second NOV . The second NOV is a stronger enforcement option which may be used in circumstances where the responsible party has failed to comply with the requirements as indicated on the first NOV.

Cease and Desist Order

In the event the City's municipal code stormwater ordinance authorizes a Cease and Desist Order (CDO), the City may issue a CDO, as an alternative to the second NOV, when immediate action by the responsible party is necessary to eliminate a continuing or threatened serious violation of the stormwater ordinance.

Misdemeanors

The City's may escalate enforcement when evidence of noncompliance indicates that the violator of the stormwater ordinance has acted intentionally with intent to cause, allow to continue or conceal a discharge in violation of the ordinance.

Issuance of Citation/Infractions

At the discretion of the City's, and as established through authority in its municipal code, the City may issue citations and/or infractions.

Cost Recovery

In the event that a complaint response or violation requires clean-up and or extensive investigation, the City has the authority, as established in the municipal code, to require the responsible party to reimburse the city or County for all costs incurred by the related violation. Cost recovery fees that may be collected include, but are not limited to, investigation, enforcement, compliance assistance, damage, control, and clean-up.

Abatement

When a responsible party fails to cease or control a nuisance condition that results in or is likely to result in further or continuing violations, the City's may request abatement of conditions on private property if necessary, or in the event of imminent danger to public safely or the environment, the City itself may abate the nuisance condition.

Permit Revocation

Sites violating the stormwater permit may be subject to permit revocation procedures as authorized in the City's municipal code.

City's/District Attorney

Severe or continuing violations should be referred to the City's or District Attorney for consideration of criminal charges.

TIMEFRAMES FOR CORRECTING DEFICIENCIES/VIOLATIONS

Depending upon the nature of the deficiencies/violations observed, City's may specify compliance deadlines for the responsible party in the inspection report or NOV.

- Prohibited discharges: discharges are to be stopped immediately and up to two weeks. The City may require the responsible party to provide a written description of correction, long-term compliance plan.
- Illicit connection: discharge via the illicit connection are to be stopped immediately and up to two weeks. The City may require the responsible party to provide proof that connection was permanently terminated. Re-inspection typically is required.
- Pollutant exposure/prohibited conditions violations: Up to two weeks to correct violations. The City may require the responsible party to provide proof of compliance for the observed violations.

EXTENSIONS OF COMPLIANCE DEADLINES

There are instances when a responsible party is not able to comply with requirements within the time frame specified. The City may grant a reasonable extension to the responsible party if the City determines that an extension is warranted, as follows:

- A request for extension must be received in writing (mail, e-mail, fax, hand delivered, etc.) by the City no later than the last day of the initial specified compliance deadline date.
- The extension request must explain why the extension is needed and warranted, as well as include a summary of actions taken to date by the responsible party to comply with requirements of the NOV.
- No more time is provided than should reasonably be needed for the responsible party to competently correct the noted deficiencies/violations. The City grants shorter extensions during the wet season.

Appropriate reasons to grant an extension may include, but are not limited to:

- Confirmed delays due to contractor or other service provider outside of responsible party's control.
- Extensive corrections involving work that would conceivably take longer than the time frame provided.
- In general, extensions should not be granted to allow the continuation of unauthorized non-storwater discharges.

The City may require an action plan or statement to be submitted by the responsible party within the initial compliance time frame, as a condition of granting an extension. The action plan or statement should specify the corrections that are to be made and specify an anticipated time frame for completion. The action plan or statement should be signed and dated by the responsible party.

REFERRALS TO THE REGIONAL BOARD

The City may refer violations of its municipal storm water ordinance and/or California Water Code section 13260 by industrial and commercial facilities and construction site operators to the Regional Water Board provided that the City has made a good faith effort of applying enforcement procedures to achieve compliance with its own ordinance. At a minimum, the City's good faith effort must be documented with:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

Referral of Violations of the General Industrial/Construction Permits

For those facilities or site operators in violation of municipal stormwater ordinances and subject to the Industrial and/or Construction General Permits (IGP/CGP), the City may escalate referral of such violations to the Regional Water Board (promptly via telephone or electronically) after one inspection and one written notice of violation (copied to the Regional Water Board) to the facility or site operator regarding the violation. In making such referrals, the City shall include, at a minimum, the following documentation:[3]

- Name of the facility or site,
- Operator of the facility or site,
- Owner of the facility or site,
- WDID Number (if applicable),
- Records of communication with the facility/site operator regarding the violation, which shall include at least one inspection report,
- The written notice of violation (copied to the Regional Water Board),
- For industrial sites, the industrial activity being conducted at the facility that is subject to the Industrial General Permit, and
- For construction sites, site acreage and Risk Factor rating.

RECORDS RETENTION

City shall maintain records, per their existing record retention policies, and make them available on request to the Regional Water Board, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.[4]

[3] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.v
[4] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.iii

Sources

Los Angeles County Stormwater Quality Management Program (2001)

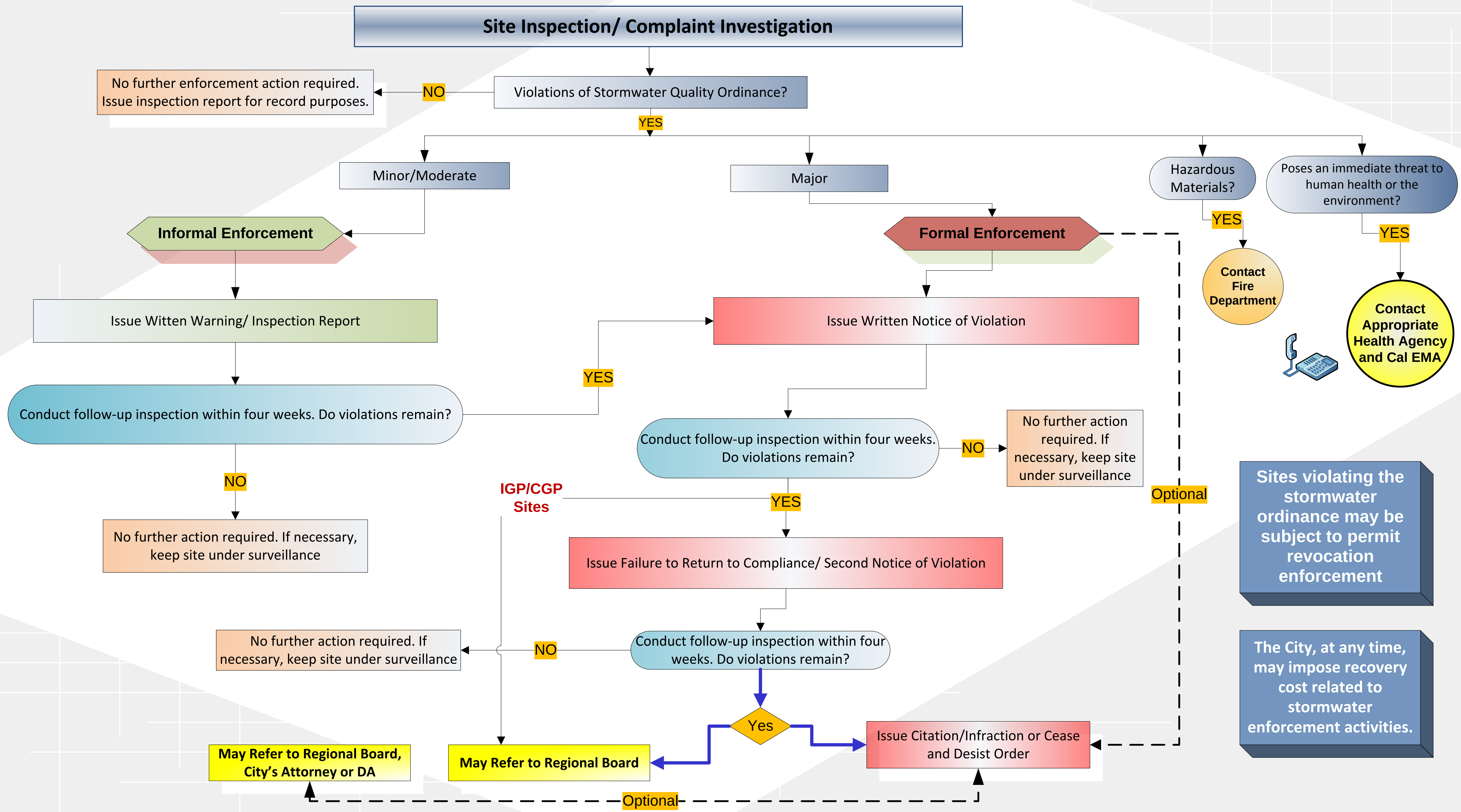
Orange County Municipal Storm Water Drainage Area Management Plan (2003)

Sacramento County Environmental Management Department. Inspection & Enforcement Policy - Commercial/Industrial Stormwater Compliance Program (2012).

Deficiencies/ Violation Degrees

Minor	Moderate	Major
Typically involves conditions that threaten to result in pollutant discharge to the storm system and/or waterways, if not corrected. The immediate threat to human health or the environment is low. **Examples:** **1.** Unattended automotive fluid drips and spills likely to result in moderate discharges to the storm drain system. **2.** Discharge of a moderate amount of car body wet sanding effluent from a single vehicle to outdoor pavement that has not yet impacted the storm drain system. **3.** Unattended spilled restaurant grease on outdoor pavement. Spill appears to be recent, is less than a quart, has not yet impacted the storm drain system and poor housekeeping do not appear to be habitual. **4.** Oily, uncovered engines, or other oily, possibly leaky items stored outside. **5.** Open and missing dumpster and tallow bin lids.	Typically involves less significant pollutant discharges to the storm system and/or receiving waters or conditions that threaten to result in minor to moderate pollutant discharges to the storm system and/or receiving waters. May include small or incidental discharges of hazardous or toxic substances. The violation does not present a major threat to human health and safety, but is likely to result in degradation of receiving water quality. **Examples:** **1.** Discharge of moderate amounts of automotive fluids to storm drain system results from neglected spills and poor housekeeping. **2.** Discharge of moderate amount (less than 20 gallons of diluted effluent) of auto body wet sanding effluent to storm drain system. **3.** More than a quart of spilled restaurant grease on outdoor pavement is neglected, possibly getting tracked out of trash enclosure. Neglect appears to be habitual but so far, impact to storm drain is moderate. **4.** Moderate amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system. **5.** Repeat minor violations may be considered moderate.	Includes significant pollutant discharges to the storm system and/or receiving waters as well as creation of conditions that threaten imminent discharge of significant pollutants to the storm system and/or receiving waters. This also includes, but is not limited to, significant discharges of hazardous or toxic substances. Major violations have the potential to present a major threat to human health or safety and/or the environment. The intent of the violator should be considered: Patterns of willful disregard for safety and the environment, recalcitrance, and repeat violations should contribute to designation of a violation as major, but are not necessary. **Examples:** **1.** Intentional discharge of waste oil to the storm drain. **2.** Discharge of significant volumes of auto body wet sanding effluent to storm drain from work on multiple vehicles, as practice. Especially where repeat violations or evidence of habitual discharge is evident. **3.** Significant amount of spilled restaurant grease is intentionally washed into storm drain, especially if hazardous degreasing agent is used. **4.** Significant amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system, especially if repeat violation. **5.** Repeat moderate violations may be considered major.

PROGRESSIVE ENFORCEMENT FLOW CHART



Watershed Management Program

Attachments to MCM Guidance

Insert City Seal

CITY STORMWATER PROGRAM INDUSTRIAL/COMMERCIAL FACILITY INSPECTION REPORT

Facility:	Address:
Contact:	Title:
Email:	Phone:
Inspector:	Date:
Inspection Type: ☐ Routine ☐ Follow-up ☐ Response to Complaint	BMP materials provided and explained: ☐ Yes ☐ No
SIC/NAICS code and/or business type:	

Industrial Facilities Only

(1) Covered under IGP (WDID is current) or other NPDES Permit: ☐ Yes ☐ No | (2) NEC filed: ☐ Yes ☐ No | SWPPP on-site: ☐ Yes ☐ No

If (1) and (2) above are "No", notified contact of need for IGP coverage and will refer facility to Regional Board: ☐ Yes ☐ No

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	BMP	Yes	No	N/A
Vehicle & Equipment Maintenance	**Fueling** - Effective fueling source control devices & practices	☐	☐	☐
	Cleaning – Effective cleaning practices & wash water management practices	☐	☐	☐
	Repair – Effective repair practices & source control devices	☐	☐	☐
Equipment Operations	**Outdoor equipment operations** – Effective source control devices & practices	☐	☐	☐
Storage & Handling	**Outdoor liquids** – Effective source controls & practices	☐	☐	☐
	Outdoor raw materials – Effective source control practices & structural devices	☐	☐	☐
	Solid waste – Effective storage & handling practices & appropriate control measures	☐	☐	☐

	BMP	Yes	No	N/A
Facility Maintenance	**Building & grounds maintenance** – Effective maintenance practices	☐	☐	☐
	Parking & storage area maintenance – Effective designs & housekeeping/maintenance practices	☐	☐	☐
	Stormwater conveyance system maintenance – Proper operation & maintenance protocols	☐	☐	☐
	Sidewalk washing – Remove debris & free standing oil/grease. Use high pressure/low volume spray washing with potable water, no cleaning agents & average rate of 0.006 gal/ft^2.	☐	☐	☐
Spills, Leaks & Discharges	**Accidental spills/leaks** – Effective spill/leak prevention & response procedures	☐	☐	☐
	Unauthorized nonstormwater discharges – Effective elimination	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED)

Include description of activities performed and/or principal products produced

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this ordinance if the corrective actions are not implemented by:

____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

____________________	____________________	____________________
Site Representative Signature	Printed Name	Date

Recording requested by and mail to:

Name: City of [Insert City]
Department of Public Works
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

********************************** Space Above This Line For Recorder's Use ***********************************

MASTER COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no., lot no., etc.):

____

Site Address ____

Owner(s) do hereby covenant and agree to and with the City of [Insert City]to maintain all on-site structural Best Management Practices (BMPs) in accordance with the Site Map and the Operations & Maintenance (O&M) Plan set forth in Attachment 1 hereto and incorporated herein by this reference. The specific structural BMPs are listed as follows:

____

____

Owner(s) shall maintain the listed drainage devices above on the property indicated and as shown on plans permitted by the City of [Insert City]in a good and functional condition to safeguard the property owners and adjoining properties from damage and pollution.

Owner(s) hereby consent to inspection of the Property by an inspector authorized by the City Manager, or his or her designee, for the purpose for verifying compliance with the provisions of this Agreement.

Owner(s) shall provide printed educational materials with any sale of the property which provide information on what stormwater management facilities are present, the type(s) and location(s) of maintenance signs that are required, and how the necessary maintenance can be performed.

Owner(s) shall provide actual notice of this Agreement and its terms to any respective successor(s) in interest to the Property prior to transfer of said interest to such successor(s) in interest. This covenant and agreement shall run with the land and shall be binding upon any future owners, encumbrances, their successors, heirs or assigns and shall continue in effect until the City of [Insert City] approves its termination.

(Print Name of Property Owner)	(Print Name of Property Owner)
(Signature of Property Owner)	(Signature of Property Owner)

Dated this __________ day of __________ 20 _____.

*********************************** Space Below This Line For Notary's Use ***********************************

ALL PURPOSE ACKNOWLEDGEMENT

State of ______________________________ }
}
County of ______________________________ }

On ______________________ before me, ____________________________________ personally appeared
(Insert Name of Notary Public and Title)
____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature ________________________ (Seal)

Recording requested by and mail to:

Name: City of [Insert City]
Public Works Department
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

*********************************** Space Above This Line For Recorder's Use ***********************************

MASTER TERMINATION OF COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no, lot not, etc.):

____

Site Address ____

We do hereby, with approval of the City of [Insert City], Engineering Division, terminate the covenant and agreement entered into with the City of [Insert City]as recorded on the ___________ day of __________________________20_______, as Document No.

____

____

This covenant and agreement is terminated for the reason that:

____

____

______________________________________ ______________________________________
(Print Name of Property Owner) (Print Name of Property Owner)

______________________________________ ______________________________________
(Signature of Property Owner) (Signature of Property Owner)

Dated this __________ day of __________ 20 _____.

Termination approved by: ____ Date: __________________________
(Authorized City Representative)

*********************************** Space Below This Line For Notary's Use ***********************************

ALL PURPOSE ACKNOWLEDGEMENT

State of ______________________________ }
}
County of ______________________________ }

On _______________________ before me, _____________________________________ personally appeared
(Insert Name of Notary Public and Title)
____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _________________________ (Seal)

Insert City Seal

City of [Insert City]NPDES Program

POST-CONSTRUCTION BMP VERIFICATION & INSPECTION FORM

PROJECT INFORMATION	
Facility/Project Name:	Inspection Date:
Address:	Inspector:
Contact Name:	Contact Phone:

Project Category

☐ Priority Project ☐ Small Site LID Project ☐ Single Family Residence ☐ Green Street
☐ Public Project ☐ Private Project

Project Type:

☐ Commercial ☐ Industrial ☐ Residential ☐ Multi-Use
☐ Road/Street ☐ Parking Lot ☐ Automotive repair ☐ Restaurant ☐ Other:

Operation/Maintenance:

☐ Reviewed ☐ Not Reviewed ☐ Not Available
Preparer's Name: Preparer's Title:
Address: City: Zip: Phone:

Inspection Type

☐ Prior to Certificate of Occupancy ☐ Special Investigation ☐ Response to Complaint
☐ Routine Inspection (Annual) ☐ Follow-up Inspection

CHECKLIST FOR ROUTINE SOURCE CONTROL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Storm Drain System Stenciling/Signage		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Material Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Trash Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Efficient Irrigation Systems & Landscape Design		☐ Yes ☐ No	☐ Yes ☐ No
Protect Slopes & Channels		☐ Yes ☐ No	☐ Yes ☐ No
Loading Dock Areas		☐ Yes ☐ No	☐ Yes ☐ No
Maintenance Bays		☐ Yes ☐ No	☐ Yes ☐ No
Vehicle Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Process Areas		☐ Yes ☐ No	☐ Yes ☐ No
Equipment Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Fueling Areas		☐ Yes ☐ No	☐ Yes ☐ No
Hillside Landscaping		☐ Yes ☐ No	☐ Yes ☐ No
Wash-water Controls for Food Prep Areas		☐ Yes ☐ No	☐ Yes ☐ No
Community Car Wash Racks		☐ Yes ☐ No	☐ Yes ☐ No

CHECKLIST FOR STRUCTURAL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Infiltration Trench/Basin		☐ Yes ☐ No	☐ Yes ☐ No
Infiltration Well/Dry Well		☐ Yes ☐ No	☐ Yes ☐ No
Detention Basin		☐ Yes ☐ No	☐ Yes ☐ No
Porous Pavement		☐ Yes ☐ No	☐ Yes ☐ No
Bio-infiltration		☐ Yes ☐ No	☐ Yes ☐ No
Vegetated Swale		☐ Yes ☐ No	☐ Yes ☐ No
Bio-filtration		☐ Yes ☐ No	☐ Yes ☐ No
Proprietary Control Measure (describe):		☐ Yes ☐ No	☐ Yes ☐ No
Media Filtration		☐ Yes ☐ No	☐ Yes ☐ No
Filter Insert		☐ Yes ☐ No	☐ Yes ☐ No
Regional or Watershed BMPs		☐ Yes ☐ No	☐ Yes ☐ No
Other (describe):		☐ Yes ☐ No	☐ Yes ☐ No

INSPECTION RESULTS:

- ☐ Visible / No Apparent Problems
- ☐ BMP Failure
- ☐ Significant Engineering / Design Flaws
- ☐ Unauthorized Modifications
- ☐ BMP Missing / Removed / Not Located
- ☐ Trash / Debris Exceeding Cap. (bypass)
- ☐ Evidence of Pollution / Dumping
- ☐ Vector Control Issues (Mosquitoes)
- ☐ Inadequate Maintenance

DESCRIPTION OF CORRECTIVE ACTION(S) REQUIRED:

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If any corrective actions have been noted above, then based on this verification inspection, you are in noncompliance with Municipal Code Chapter [-]. You must implement the required corrective action(s) by:

____

Corrective Action Due Date

After this date, your facility will be re-inspected to verify that all necessary corrective measures have been taken. FAILURE TO IMPLEMENT THE CORRECTIVE ACTION(S) WILL SUBJECT YOU TO ELEVATED ENCORCEMENT, WHICH CAN INCLUDE INFRACTION OR MISDEMEANOR PENALTIES.

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

______________________	______________________	______________
Contact Signature	Printed Name	Date

Insert City Seal

STORMWATER PLANNING PROGRAM PRIORITY PROJECT CHECKLIST

FORM PC

Project Name	Owner Name	Developer Name
Project Address	Owner Address	Developer Address
Plan Check #	Owner Phone	Developer Phone

Type of Project

Does the proposed project fall into one of the following categories? Please check Yes/No	YES	NO
PRIORITY PROJECTS		
1. A new project equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious* surface area		
2. A new industrial park with 10,000 square feet or more of surface area		
3. A new commercial mall with 10,000 square feet or more surface area		
4. A new retail gasoline outlet with 5,000 square feet or more of surface area		
5. A new restaurant (SIC 5812) with 5,000 square feet or more of surface area		
6. A new parking lot with either 5,000 ft^2 or more of impervious* surface or with 25 or more parking spaces		
7. A new automotive service facility (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area		
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA)*, where the development will: a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and b. Create 2,500 square feet or more of impervious surface area		
9. Redevelopment*		
SPECIAL PROVISION PROJECTS		
10. Green street* project		
11. Single family hillside* home		

If checked YES, numerical criteria will apply to items 1,2,6-9 and items 3-5 (for project areas of 5,000 ft^2 or more of surface area.) If any of the boxes are checked YES, this project will require the preparation of a Low Impact Development (LID) Plan and a Maintenance Agreement Transfer*

* Defined on back.

Applicant Name

Applicant Signature

Applicant Title

Date

DEFINITIONS:

Impervious are those surfaces that do not allow stormwater runoff to percolate into the ground. Typical impervious surfaces include: concrete, asphalt, roofing materials, etc. However, some specially designed concrete/asphalt do allow water to percolate (pervious).

Hillside means property where the slope is 25% or greater and where grading contemplates cut or fill slopes. Single family hillside homes will require a less extensive plan. During the construction of a single-family hillside home, the following measures are implemented:

a. Conserve natural areas

b. Protect slopes and channels

c. Provide storm drain system stenciling and signage

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability

e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

Green Streets means any street and road construction of 10,000 square feet or more of impervious surface area

a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. Stormwater mitigation measures must be in compliance with the approved green streets manual requirements.

Redevelopment means land-disturbing activities that result in the creation, addition, or replacement of 5,000 ft^2 or more of impervious surface area on an already developed site.

Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of facility, nor does it include modifications to existing single family structures, or emergency construction activities required to immediately protect public health and safety.

Significant Ecological Area means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and would be disturbed or degraded by human activities and developments. Also, an area designated by the City as approved by the Regional Water Quality Control Board.

Maintenance Agreement and Transfer: All developments subject to LID and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and/or conditional use permits. Verification at a minimum shall include:

- The developer's and/or owner's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and
- A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and conduct a maintenance inspection at least once a year; or
- Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or
- Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or
- Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

Insert City Seal

STORMWATER PLANNING PROGRAM

PRIORITY DEVELOPMENT & REDEVELOPMENT PROJECTS

PLAN CHECK # ______________________

FORM P1

Project Name	______________________
Project Location	______________________
Company Name	______________________
Address	______________________
Contact Name / Title	______________________
Phone / FAX / Email	______________________

GENERAL PROJECT CERTIFICATION

A completed original of this form must accompany all LID Plan submittals.

Best Management Practices (BMPs) have been incorporated into the design/maintenance/construction of this project to accomplish the following:

1. Minimize impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances.
2. Maximize the percentage of pervious surfaces to allow more percolation of stormwater into the ground.
3. Minimize the amount of stormwater directed to impermeable surfaces and to the MS4.
4. Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices.
5. Minimize breeding of Vectors
6. Reduce pollutant loads in stormwater from the development site.

I certify that this Low Impact Development Plan and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered/evaluated the information submitted.

Post Construction / Maintenance Certification

As the responsible party, I certify that the proposed BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner/lessee will be notified of the BMPs in use at this site and I will include written conditions in the sales or lease agreement, which requires the new owner (or lessee) to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

In consideration of the execution of City of [Insert City] approval of the proposed Low Impact Development (LID) Plan including any proposed treatment system, the applicant hereby agrees to indemnify, save and keep the City of [Insert City], its officers, agents and employees free and harmless from and against any and all claims for injury, damage, loss, liability, cost and expense of any nature whatsoever, which the City of [Insert City], its officers, agents, or employees may suffer, sustain, incur, pay out as a result of any and all actions, suits, proceedings, claims and demands which may be brought, made, or filed against the City of [Insert City], its officers, agents or employees by reason of or arising out of, or in any manner connected with any and all operations permitted by this approval. This indemnification extends to further agree that the City of [Insert City]is not responsible for any additional requirements or restrictions due to changes in regulations, policies or enforcement practices of the California Regional Water Quality Control Board, or any other applicable regulatory agencies.

______________________	______________________
Property Owner Name	Property Owner Signature
______________________	______________________
Applicant Title	Date

PLANNING BEST MANAGEMENT PRACTICES

BMP Name	BMP Identification Number and Name	✓ if to be used
Car Wash Facility	SC-21: Vehicle and Equipment Cleaning	
Constructed Wetlands	MP-20: Wetlands	
Control of Impervious Runoff	-N/A-	
Efficient Irrigation	-N/A-	
Energy Dissipaters	EC-10: Velocity Dissipation Devices	
Extended Detention Basins	TC-22: Extended Detention Basin	
Infiltration Basins	TC-11: Infiltration Basins	
Infiltration Trenches	TC-10: Infiltration Trenches	
Inlet Trash Racks	-N/A-	
Landscape Design	EC-2: Preservation of Existing Vegetation EC-4: Hydro seeding EC-6 & EC-8: Straw & Wood Mulching	
Linings for Urban Runoff Conveyance Channels	-N/A-	
Materials Management	SC-30: Outdoor Loading/Unloading	
Media Filtration	TC-40: Media Filter	
Motor Fuel Concrete Dispensing Areas	SC-20: Vehicle and Equipment Fueling	
Motor Fuel Dispensing Area Canopy	SC-20: Vehicle and Equipment Fueling	
Water Quality Inlets	TC-50: Water Quality Inlet	
Outdoor Storage	SC-31: Outdoor Liquid Container Storage SC-33: Outdoor Storage of Raw Materials	
Porous Pavement and/or Alternative Surfaces	-N/A-	
Protect Slopes and Channels	EC-11: Slope Drains EC-12: Streambank Stabilization	
Self-Contained Areas for Vehicle or Equipment Washing, Steam Cleaning, Maintenance, Repair, or Material Processing	SC-21: Vehicle and Equipment Cleaning SC-22: Vehicle and Equipment Repair SC-32: Outdoor Equipment Operations	
Storm Drain System Stenciling and Signage	SC-34: Waste Handling and Disposal (Signage Section)	
Trash Container Areas	SC-34: Waste Handling and Disposal	
Vegetated Swales and Strips	TC-32: Bioretention	
Wet Ponds	TC-20: Wet Ponds	
Other:	• • • • •	

Please refer to the California Storm Water Best Management Practice Handbooks for more information.

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STORMWATER TREATMENT CERTIFICATION

FORM **P2**

SITE NAME and ADDRESS

____

____

____

____

____

Plan Check #______________________________

Planning #________________________________

APPROXIMATE PROJECT CHARACTERISTICS

Roofed Area	__________ ft^2
Roadway/Parking Area (exposed)	__________ ft^2
Landscaped/Vegetation	__________ ft^2
Other Ground Level Impervious Areas (Ex: Outdoor work or storage areas)	__________ ft^2
Other: ____________________	__________ ft^2
TOTAL	__________ ft^2

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary) or see back

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

By stamping this form, I acknowledge that each treatment BMP is provided with adequate bypass or overflow so as not to contribute to localized flooding or soil instability.

*Flow rates and volumes based on the 0.75 inch, 24-hour rain event or the 85th percentile, 24-hour rain event, whichever is greater.

I certify that I am a Professional Civil Engineer registered in the State of California, and that the treatment methods and capacities herein comply with the requirements established by the California Regional Water Quality Control Board, Los Angeles Region, and the State Water Resources Control Board for Low Impact Development (LID) Plans.

Affix Registered Engineer Wet Ink Stamp Here:

__________________ __________________ __________

Print Name **Signature** **Date**

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary)

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

Insert City Seal

OWNER'S CERTIFICATION

MINIMUM BMPs FOR ALL CONSTRUCTION SITES

FORM OC1

PLAN CHECK #______________________

Project Name ______________________ Project Location ______________________	BUILDING/GRADING PERMIT NUMBER
Owner Name ______________________ Address ______________________ Phone ______________________ FAX/Email ______________________	Contractor Name ______________________ Address ______________________ Phone ______________________ FAX/Email ______________________

The National Pollutant Discharge Elimination System (NPDES) is the portion of the Clean Water Act that applies to the protection of receiving waters. Under permits from the Los Angeles Regional Water Quality Control Board (RWQCB), certain activities are subject to RWQCB enforcement. To meet the requirements of the Los Angeles County Municipal Stormwater Permit (CAS004001), minimum requirements for sediment control, erosion control and construction activities must be implemented on each project site. Minimum requirements include:

- **EROSION CONTROL:** Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs, such as the limiting of grading activities during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.
- **SEDIMENT CONTROL:** Eroded sediments from areas disturbed by construction and from stockpiles of soil shall be retained on site to minimize sediment transport from the site to streets, drainage facilities and/or adjacent properties via runoff, vehicle tracking or wind.
- **NON-STORMWATER MANAGEMENT:** Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site.
- **WASTE MANAGEMENT:** Construction related materials, wastes, spills or residues shall be retained on site to minimize transport from the site to streets, drainage facilities or adjoining properties by wind or runoff. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to remove sediment and pollutants.

Examples of Minimum BMPs include: (1) Soil piles must be covered with tarps or plastic, (2) leaking equipment must be repaired immediately, (3) refueling must be conducted away from catch basins, (4) catch basins must be protected when working nearby, (5) vacuum all concrete saw cutting, (6) never wash concrete waste into the street, (7) keep the site clean, sweep the gutters at the end of each working day and keep a trash receptacle on site.

As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on stormwater quality. The project owner and contractor are aware that the selected BMPs shall be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity.

______________________ Architect/Engineer of Record Name

______________________ Architect/Engineer of Record Signature

______________________ Title

______________________ Date

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law.

______________________ Landowner or Landowner's Agent Name

______________________ Landowner or Landowner's Agent Signature

______________________ Title

______________________ Date

Insert City Seal

Erosion and Sediment Control Plan (ESCP) Review Checklist

These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an ESCP prior to the disturbance of land.

Contact Name:	Tracking #:
Contact Title:	Site Name:
Company Name:	Site Address:
Mailing Address:	Type of Facility:
City, State, Zip:	Submittal Date:
Phone Number:	Plan Return Date:
Fax Number:	Disturbed Area:

First Review
ESCP Received on:

Review Completed on:

Second Review
ESCP Received on:

Review Completed on:

Third Review
ESCP Received on:

Review Completed on:

Fourth Review
ESCP Received on:

Review Completed on:

Fifth Review
ESCP Received on:

Review Completed on:

Sixth Review
ESCP Received on:

Review Completed on:

ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
General Information				
Contact information (e.g., name, address, phone, email, etc.) provided for the owner and contractor.	☐	☐	☐	
Basic site information including location, status, size of the project and area of disturbance is provided.	☐	☐	☐	
Proof of existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.	☐	☐	☐	
Meets the minimum requirements of the jurisdictional erosion and sediment control ordinance.	☐	☐	☐	
Includes the elements of a Storm Water Pollution Prevention Plan (SWPPP) prepared in accordance with the requirements of the Construction General Permit.	☐	☐	☐	
Developed and certified by a Qualified SWPPP Developer (QSD).	☐	☐	☐	
Identifies the proximity all water bodies, water bodies listed as impaired by sediment-related pollutants, and water bodies for which a sediment-related TMDL has been adopted and approved by the USEPA.	☐	☐	☐	
Identifies any significant threat to water quality status, based on consideration of factors listed in Appendix 1 to the Construction General Permit.	☐	☐	☐	
The project start date and anticipated completion date is provided.	☐	☐	☐	
Includes Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.	☐	☐	☐	
Contains a language signed by the landowner or the landowner's agent stating as follows: *"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."*	☐	☐	☐	

ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
Best Management Practices				
All structural BMPs are designed by a licensed California Engineer.	☐	☐	☐	
Includes Sediment/Erosion Control.	☐	☐	☐	
Includes controls to prevent tracking on and off the site.	☐	☐	☐	
Includes non-stormwater controls (e.g., vehicle washing, dewatering, etc.).	☐	☐	☐	
Includes Materials Management (delivery and storage).	☐	☐	☐	
Includes Spill Prevention and Control.	☐	☐	☐	
Includes Waste Management (e.g., concrete washout/waste management; sanitary waste management).	☐	☐	☐	
Includes methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.	☐	☐	☐	
Includes methods used to protect native vegetation and trees.	☐	☐	☐	
Includes the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.	☐	☐	☐	
Post-Construction Structural BMPs subject to Operation and Maintenance Requirements are identified.	☐	☐	☐	
Site Plan				
Full sized plans showing the site with all proposed BMPs and water quality notes have been signed and stamped with wet ink application by the appropriate individual.	☐	☐	☐	
Plan includes a title block containing at least the project name, address, and owner.	☐	☐	☐	
All figures, maps, plot plans, etc. have a legend, including a North arrow and scale.	☐	☐	☐	
All facilities are labeled for the intended function.	☐	☐	☐	
All areas of outdoor activity are labeled.	☐	☐	☐	
All structural BMPs are indicated.	☐	☐	☐	
Drainage flow information depicted.	☐	☐	☐	
Project location shown.	☐	☐	☐	
Site boundary indicated.	☐	☐	☐	

Agency Standard Operating Procedures

Each agency will use the suggested language below to develop, implement, and revise as necessary agency-specific Standard Operating Procedures (SOPs) that identify the procedures each agency will follow.

CGP Coverage Verification

- Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance, a Notice of Intent (NOI), a Storm Water Pollution Prevention Plan (SWPPP), and all other Permit Registration Documents (PRDs) must be filed with the Regional Water Resources Control Board (Regional Board) through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website and a Waste Discharge ID (WDID) number must be obtained from the Regional Board. This requirement will be included as a condition of approval. In cases where construction activities have commenced on a qualifying site and the project has not yet filed all PRDs (along with an explanation for filing late) with the Regional Board, a Notice of Violation (NOV) will be sent to the responsible person. Any work orders released will be stopped and fines may be enforced. The Regional Board will be notified of the discharger's non-compliance. Work will not be allowed to commence until the NOI has been accepted by the Regional Board and WDID number issued.

ESCP Review

- Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions.

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an Erosion and Sediment Control Plan (ESCP) prior to the disturbance of land. The ESCP Requirement Checklist will be used to ensure required information is submitted by the responsible person. These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

BMP Assessment

- Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance a Qualified SWPPP Practitioner (QSP) must be identified by the developer. Prior to beginning any construction activities, the QSP must review the ESCP and determine if the following requirements are being met:

1. Erosion and sediment controls are incorporated to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the site.

2. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.
3. Non-stormwater control BMPs are selected to control sediment on the construction site.
4. Materials and waste management pollution control BMPs are incorporated to minimize stormwater contact with construction materials, wastes and service areas; and to prevent materials and wastes from being discharged off-site.

If the QSP identifies potential problematic areas of the ESCP, a revision to the ESCP must be submitted for review and approval.

Once the BMPs are installed, inspections must be conducted at the frequency identified in the Watershed Management Program (WMP). All BMPs not functioning as intended must be repaired, replaced, or changed to a more effective BMP. Inspection and maintenance procedures must be in accordance with the CASQA handbook.

Discharge Reporting

- Visual observation and record keeping of non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.

Any non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff will be tracked and kept on record.

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s within this jurisdiction will be conducted. Multiple modes of communication are in place to allow for complaints and spill reporting. When a complaint is received it will be documented and tracked to ensure that all complaints are adequately addressed.

A Spill Response Plan will be implemented for all sewage and other spills that may discharge into the MS4 within this jurisdiction. Coordination with spill response teams will be observed throughout all appropriate departments, programs, and agencies so that maximum water quality protection is provided. All spill complaints will be investigated within one business day of receiving the complaint and a response to spills for containment will be conducted within 4 hours of becoming aware of the spill, except where such spills occur on private property, in which case the response should be within 2 hours of gaining legal access to the property. Spills that may endanger health or the environment will be reported to appropriate public health agencies and the Office of Emergency Services (OES).

A training program regarding the identification of illicit connections/illicit discharges (IC/IDs) for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4 will be provided.

Construction Inspection Reporting and Tracking

- Development of a written or electronic inspection report generated from an inspection checklist used in the field.
- Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required.

Inspections will be conducted at a frequency listed in the Watershed Management Program (WMP). Inspection checklists and/or reports will be utilized to determine and keep record of whether or not all

BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions. These checklists/reports will be retained for at least three (3) years following NOT approval.

Insert City Seal

(CITY NAME) STORMWATER INSPECTION REPORT FOR CONSTRUCTION SITES

SITES ONE ACRE OR GREATER

Project Name:	Address:	
Area disturbed:	WDID:	SWPPP on-site: ☐ Yes ☐ No
Risk level: ☐ Low (Risk 1) ☐ Medium (Risk 2) ☐ High (Risk 3)	Erosion & Sediment Control Plan (ESCP) on-site: ☐ Yes ☐ No	
Phase: ☐ Prior to Land Disturbance ☐ Active construction ☐ Site stabilization		
Developer/Contractor:	Phone number:	
Contact:	Title:	
Inspector:	Date:	
Inspection: ☐ Routine (monthly and for each phase of construction) ☐ Follow-up ☐ Response to complaint	*For sites discharging to a waterbody impaired for sediment/turbidity*[i] ☐ *Routine biweekly* ☐ *Predicted rainfall* ☐ *Recent rainfall*	

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

PHASE 1 AND 2: PRIOR TO LAND DISTURBANCE AND DURING ACTIVE CONSTRUCTION

	Comment	Yes	No	N/A
Erosion Control	1. Erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	2. Erosion observed	☐	☐	☐
Sediment Control	3. Sediment controls are implemented in accordance with the ESCP	☐	☐	☐
	4. Sediment discharge observed	☐	☐	☐
Additional Controls	5. Tracking controls (tire washout, stabilized entrances, exits and roadways) are implemented in accordance with the ESCP	☐	☐	☐
	6. Sediment in roads observed	☐	☐	☐
	7. Wind erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	8. Wind erosion observed	☐	☐	☐

	Comment	Yes	No	N/A
Waste Management	9. Effective material delivery and storage practices are implemented	☐	☐	☐
	10. Spill prevention and control practices are implemented	☐	☐	☐
	11. Stockpile controls are implemented in accordance with the ESCP	☐	☐	☐
	12. Solid waste controls are implemented in accordance with the ESCP	☐	☐	☐
Nonstormwater Management	13. Vehicle and equipment washing, fueling and maintenance controls are implemented in accordance with the ESCP	☐	☐	☐
	14. Nonstormwater discharges observed	☐	☐	☐
	15. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
	16. Water conservation practices are implemented	☐	☐	☐

PHASE 3: FINAL LANDSCAPING/SITE STABILIZATION

Comment	Yes	No	N/A
1. Graded areas have reached final stabilization	☐	☐	☐
2. Trash, debris and construction materials are removed	☐	☐	☐
3. Temporary erosion and sediment BMPs are removed	☐	☐	☐
4. Post-construction BMPs are installed	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

Site Representative Signature	Printed Name	Date

[i] For sites discharging to a tributary listed by the state as an impaired waterbody for sediment or turbidity under CWA § 303(d), or determined to be a threat to water quality, inspections must be conducted (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA and (2) within 48 hours of a ½-inch rain event and (3) at least once every two weeks.

Insert City Seal

CITY STORMWATER QUALITY PROGRAM
CONSTRUCTION SITE INSPECTION REPORT

FOR SITES LESS THAN ONE ACRE

Project:	Address:
Contact:	Title:
Contractor:	Phone:
Inspector:	Date:

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	Question	Yes	No	N/A		Question	Yes	No	N/A
Erosion Control	1. Effective erosion controls implemented.	☐	☐	☐	Non-Stormwater Management	5. Water conservation practices are implemented.	☐	☐	☐
Erosion Control	2. Erosion observed.	☐	☐	☐	Non-Stormwater Management	6. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
Sediment Control	3. Effective sediment controls implemented.	☐	☐	☐	Waste Management	7. Effective material delivery/storage practices and spill prevention/control practices are implemented.	☐	☐	☐
Sediment Control	4. Sediment discharge observed.	☐	☐	☐	Waste Management	8. Effective waste management controls are implemented.	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

Site Representative Signature	Printed Name	Date

Example Lease Language for Fixed Facilities

The following is example language that can be inserted into municipal leases:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Activities performed at the facility leased under this agreement shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The holder of this agreement shall fully understand the Maintenance Procedures applicable to activities conducted at the facility leased under this agreement prior to conducting them and maintain copies of the Maintenance Procedures at the leased facility throughout the agreement duration. The applicable Maintenance Procedures are included as Exhibit ___ of this agreement.

Evaluation of activities subject to WMP requirements performed at the facility leased under this agreement will be conducted by the city to verify compliance with Maintenance Procedures, and may be required through lessor self-evaluation as determined by the city.

Example Contract Language for Field Programs

The following is example language that can be inserted into municipal field program contracts:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Work performed under this CONTRACT shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The CONTRACTOR shall fully understand the Maintenance Procedures applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the Maintenance Procedures throughout the CONTRACT duration. The applicable Model Maintenance Procedures are included as Exhibit ___ of this CONTRACT.

Evaluation of activities subject to WMP requirements performed under this CONTRACT will be conducted to verify compliance with the Maintenance Procedures, and may be required through CONTRACTOR self-evaluation as determined by the city.

COUNTY OF LOS ANGELES

Significant Ecological Areas

December 2009

LEGEND:

- Freeway
- Significant Ecological Area (SEA)
- National Forest Boundary
- Unincorporated Area
- Incorporated City

Significant Ecological Areas

SEA-1 Malibu Coastline
SEA-2 Point Dume
SEA-3 Zuma Canyon
SEA-4 Upper La Sierra Canyon
SEA-5 Malibu Canyon and Lagoon
SEA-6 Las Virgenes
SEA-7 Hepatic Gulch
SEA-8 Malibu Creek State Park Buffer Area
SEA-9 Cold Creek
SEA-10 Tuna Canyon
SEA-11 Temescal-Rustic-Sullivan Canyons
SEA-12 Palo Comado Canyon
SEA-13 Chatsworth Reservoir
SEA-14 Simi Hills
SEA-15 Tonner Canyon Chino Hills
SEA-16 Buzzard Peak-San Jose Hills
SEA-17 Powder Canyon-Puente Hills
SEA-18 Way Hill
SEA-19 San Francisquito Canyon
SEA-20 Santa Susana Mountains
SEA-21 Santa Susana Pass
SEA-22 Santa Fe Dam Floodplain
SEA-23 Santa Clara River
SEA-24 Tujunga Valley-Hansen Dam
SEA-25 San Dimas Canyon
SEA-26 San Antonio Canyon Mouth
SEA-27 Portuguese Bend Landslide
SEA-28 El Segundo Dunes
SEA-29 Ballona Creek
SEA-30 Alamitos Bay
SEA-31 Rolling Hills Canyons
SEA-32 Agua Amarga Canyon
SEA-33 Terminal Island
SEA-34 Palos Verdes Coastline
SEA-35 Harbor Lake Regional Park
SEA-36 Madrona Marsh
SEA-37 Griffith Park
SEA-39 Encino Reservoir
SEA-40 Verdugo Mountains
SEA-42 Whittier Narrows Dam County Recreation Area
SEA-43 Rio Hondo College Wildlife Sanctuary
SEA-44 Sycamore & Turnbull Canyons
SEA-45 Dudleya Densiflora Population
SEA-47 Edwards Air Force Base
SEA-48 Big Rock Wash
SEA-49 Little Rock Wash
SEA-50 Rosamond Lake
SEA-51 Saddleback Butte State Park
SEA-52 Alpine Butte
SEA-53 Lovejoy Butte
SEA-54 Piute Butte
SEA-55 Desert Montane Transect
SEA-56 Ritter Ridge
SEA-57 Fairmont & Antelope Buttes
SEA-58 Portal Ridge-Liebre Mountain
SEA-59 Tehachapi Foothills
SEA-60 Joshua Tree Woodland Habitat
SEA-61 Kentucky Springs
SEA-62 Galium Grande Population
SEA-63 Lyon Canyon
SEA-64 Valley Oaks Savannah, Newhall

NOTE:

2014

Integrated Pest Management Program

Developed for the City of

____

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INTEGRATED PEST MANAGEMENT (IPM) PROGRAM IMPLEMENTATION GUIDELINES[1] FOR THE CITY OF ______________

General IPM Policy

For the past few decades, the trend in pest management has been to increasingly rely on synthetic chemical pesticides. This management strategy results in the increased use of dangerous chemicals, an increase in the number of pests that can become resistant to the pesticides, as well as lead to new organisms becoming pests. Additionally, some pesticides used for terrestrial pest management have been found in waterways causing problems in the aquatic environment.

Pest control managers are now moving away from their reliance on pesticides and toward an integrated approach that combines limited pesticide use with more environmentally friendly pest control techniques. This system is known as integrated pest management (IPM), a strategy that focuses on the long-term prevention of pests through a combination of techniques, including preventative, cultural, mechanical, environmental, biological, and chemical control tactics (**Figure 1**). Multiple IPM techniques can be utilized simultaneously to control pest populations in the most effective manner possible.

A comprehensive IPM Program and Approach allows for primary focus on pollution prevention by monitoring and preventing pests as well as minimizing heavy pest infestations, which reduces the need for chemicals and/or multiple applications. The goal of the IPM Program is not to eliminate all pests, but to keep their populations at tolerable levels. In an IPM program, pesticides should be applied only when it is determined that pests are approaching damaging levels. Because this requires early detection of the pests, IPM programs utilize monitoring techniques and economic thresholds to determine when to implement control strategies. If possible, a person should be trained and assigned to scout the sites on a regular basis. Pesticides may be part of an IPM program, but they should preferably be used only after pests exceed established thresholds and applied only to the affected area (in the case of disease prevention, some modifications may be allowed). In general, all pest control strategies should be those that are least disruptive to biological control organisms (natural enemies), least hazardous to humans and the environment (including non-target organisms), and have the best likelihood of long-term effectiveness.

[1]Adapted from the Orange County Drainage Area Management Plan Integrated Pest Management Policy Developed by the University of California, Division of Agriculture and Natural Resources

IPM practices are encouraged over the sole use of pesticides as the primary means of pest management (**Table 1**). As a part of their Municipal Activities Program, public agencies and their contractors evaluate the ability to use non-chemical IPM techniques before intensive use of pesticides. This IPM Program template outlines baseline IPM procedures that are required by the Los Angeles County Municipal Separate Storm System Permit (MS4 Permit)[2] along with additional optional IPM techniques that can be employed to implement an effective IPM program.

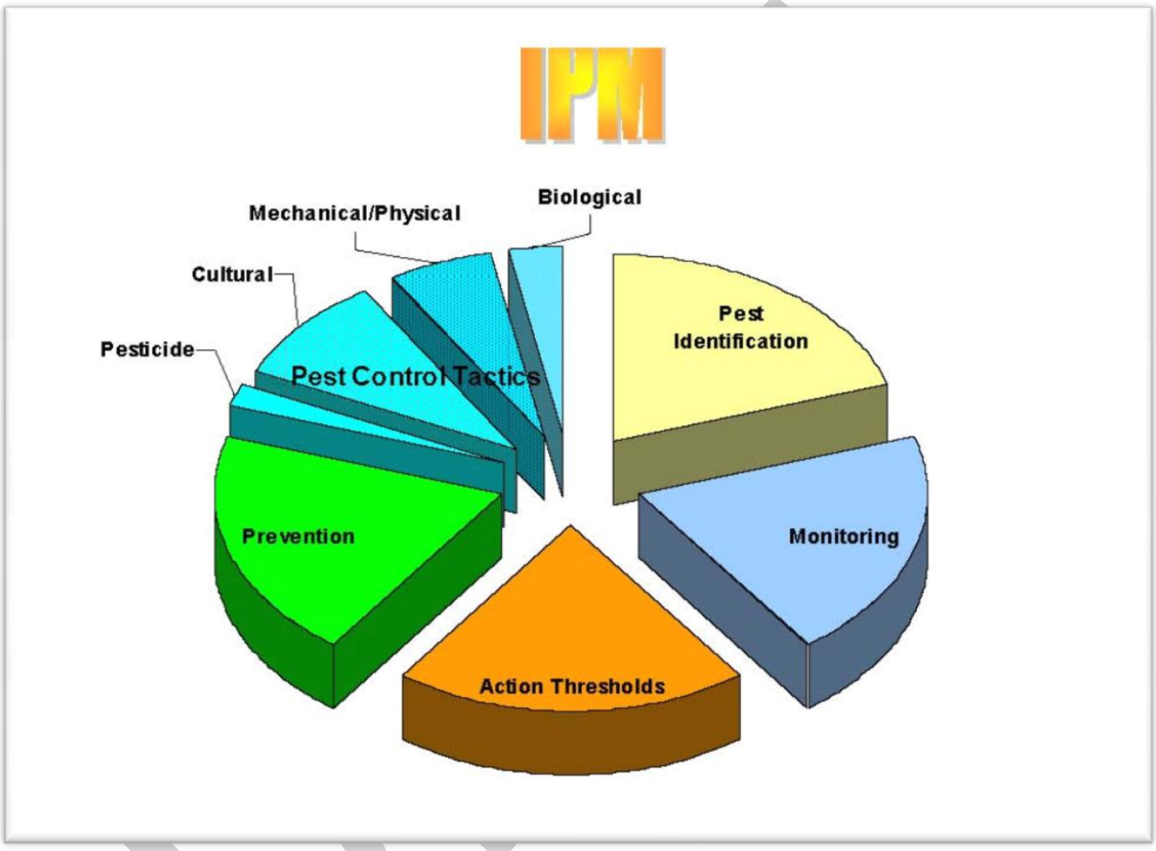

Figure 1 Components of an Integrated Pest Management Program

[2]California Regional Water Quality Control Board Los Angeles Region. 2012. Order No. R4-2012-0175 NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4.

Table 1 Advantages and Disadvantages of a Pesticide-Based Program Versus An IPM-Based Pest Control Program

Pesticide Based Pest Control		IPM Based Pest Control	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Quick suppression of pests	Not long-term	Long-term control	It may take longer to see results
	Pest control is reactive	Can be proactive in pest control actions.	Must establish thresholds
	Loss of natural controls. Often get outbreaks of other pests	Reduces disruption of natural enemies	
		Pesticides can be used (only used as a last resort)	Must have knowledge of pesticides and their effects on other organisms.
Labor is only for spraying	Extra work in cleanup	Staff becomes more knowledgeable of pests and injury symptoms	Labor is required for monitoring and regular scouting Training is required to identify pests and natural enemies
Not much preparation or follow-up needed	Need a PCA recommendation	Pest management is more organized	Must maintain a record-keeping system.
	Pesticide safety issues for applicators, public, animals More pesticides in environment Contamination of water bodies from runoff	Less exposure to pesticides Safer to the environment Reduces contamination from runoff	

Implementation Guidelines

Enter Designated IPM Coordinator or IPM Contact Information in Box Below:

IPM Coordinator: Contact Info:

Personnel responsible for the care and maintenance of facilities under the City of ______ agree to implement a suite of basic integrated pest management procedures to meet MS4 Permit requirements[3]. The fundamental basis for the IPM program must include the following as outlined in Permit Part VI.D.9.g:

1. **Pesticides are to be used if monitoring indicates they are needed, and pesticides are applied according to applicable permits and established guidelines.**
2. **Treatments are made with the goal of removing only the target organism.**
3. **Pest controls are selected and applied in a manner that minimizes risks to human health, beneficial non-target organisms, and the environment.**
4. **The use of pesticides, including Organophosphates and Pyrethroids, does not threaten water quality.**
5. **Partnerships with other agencies and organizations are established to encourage the use of IPM.**
6. **A standardized protocol is to be used for the routine and non-routine application of pesticides (including pre-emergents), and fertilizers.**
7. **There is to be no application of pesticides or fertilizers (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA34, (2) within 48 hours of a ½-inch rain event, or (3) when water is flowing off the area where the application is to occur. This requirement does not apply to the application of aquatic pesticides or pesticides which require water for activation.**
8. **No banned or unregistered pesticides are stored or applied.**
9. **All staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.**
10. **Procedures to encourage the retention and planting of native vegetation to**

[3] In addition to MS4 Permit compliance, there are extensive federal and state laws and regulations that all public agencies must be in compliance with at all times, including the California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3CCR).

reduce water, pesticide and fertilizer needs are implemented; and

11. **Pesticides and fertilizers are stored indoors or under cover on paved surfaces, or use secondary containment.**
    a. **The use, storage, and handling of hazardous materials are reduced to decrease the potential for spills.**
    b. **Storage areas are regularly inspected.**

In order to implement the above required minimum practices, the following section describes components of an effective IPM Program that can be employed:

- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

A number of useful IPM techniques are outlined under each component and further described in Appendix A. These techniques are known to be effective and methods can be selected from each component as necessary to achieve the IPM goals and meet MS4 Permit requirements.

Additional information on the latest IPM techniques including management of new pests in the landscape can be obtained from local UC Cooperative Extension Advisors, UC IPM Regional Advisor, or the Statewide UC IPM Web Site at www.ipm.ucdavis.edu.

Components of an Effective IPM Program

An IPM program is a long-term, multi-faceted system to manage pests (**Figure 1**). Use of pesticides is a short-term solution to pest problems, and should be used only when the other components fail to maintain the pests or their damage below an acceptable level. Successful IPM practitioners are knowledgeable about the biology of the plants and pests, and successful IPM programs primarily use combinations of cultural practices as well as a combination of physical, mechanical and biological controls.

Pest Identification

It is important to learn to identify all stages of common pests at each site. For example, if you can identify weed seedlings, you can control them before they become larger and more difficult to control and before they flower, disseminating seeds throughout the site. It is also important to be sure that a pest is actually causing the problem. Often damage such as wilting is attributed to root disease but may actually be caused by under watering or wind damage. Appendix A lists specific techniques that can be employed to identify pests.

Prevention

Good pest prevention practices are critical to any IPM program, and can be very effective in reducing pest incidence. Numerous practices can be used to prevent pest incidence and reduce pest population buildup such as the use of resistant varieties, good sanitary practices and proper plant culture. Examples of prevention include choosing an appropriate location for planting, making sure the root system is able to grow adequately and selecting plants that are compatible with the site's environment. Appendix A lists specific techniques that can be employed to achieve pest prevention.

Monitoring

The basis of an effective IPM Program is the development and use of a regular monitoring or scouting program. Monitoring involves examining plants and surrounding areas for pests, examining tools such as sticky traps for insect pests and quantitatively or qualitatively measuring the pest population size or injury. This information can be used to determine if pest populations are increasing, decreasing, or staying the same and to determine when to use a control tactic. Weather and other environmental conditions may also play a factor in whether a pest outbreak may occur so it is important to monitor temperature and soil moisture as well.

It is important to use a systematic approach when monitoring, for example you should examine leaves of a similar age each time you check for pests, rather than looking at the older leaves on some plants and younger ones on others. Randomly looking at a plant and its leaves does not allow you to track changes in pest population or damage over time.

It is important to establish and maintain a record-keeping system to evaluate and improve your IPM program. Records should include information such as date of examination, pests found, size and extent of the infestation, location of the infestation, control options utilized, effectiveness of the control options, labor and material costs. Appendix A lists specific techniques that can be employed to in the monitoring of pests.

Injury Levels and Action Thresholds

In order to have a way to determine when a control measure should be taken, injury levels and action thresholds must be set for each pest. An injury level is the level of unacceptable damage. For example, the injury level for a leaf-feeding beetle may be set at 30% of the leaves being damaged. Action thresholds are the set of conditions required to trigger a control action. An example of this would be finding an average of 5 or more beetles on 10 shrubs in a location. Action thresholds are set from previous experience or published recommendations and based on expected injury levels. Injury levels are often set by the public's comments. Appendix A lists specific techniques that can be employed to determine injury levels and action thresholds.

Pest Control Tactics

Integrated pest management programs use a variety of pest control tactics in a compatible manner that minimizes adverse effects to the environment. A combination of several control tactics is usually more effective in minimizing pest damage than any single control method. The type of control that an agency selects will likely vary on a case-by-case basis due to the varying site conditions.

The primary pest control tactics to choose from include:

- Cultural
- Mechanical/Physical
- Biological
- Pesticide

Appendix A lists specific pest control techniques that can be employed.

Cultural Controls

Cultural controls are modifications of normal plant care activities that reduce or prevent pests. In addition to those methods used in the pest preventions, other cultural control methods include adjusting the frequency and amount of irrigation, fertilization, and mowing height. For example, spider mite infestations are worse on water-stressed plants, over-fertilization may cause succulent growth which then encourages aphids, too low of a mowing height may thin turf and allow weeds to become established.

Mechanical/Physical Controls

Mechanical control tactics involve the use of manual labor and machinery to reduce or eliminate pest problems using methods such as handpicking, physical barriers, or machinery to reduce pest abundance indirectly. Examples include hand-pulling or hoeing and applying mulch to control weeds, using trap boards for snails and slugs, and use of traps for gophers.

The use of physical manipulations that indirectly control or prevent pests by altering temperature, light, and humidity can be effective in controlling pests. Although in outdoor situations these tactics are difficult to use for most pests, they can be effective in controlling birds and mammals if their habitat can be modified such that they do not choose to live or roost in the area. Examples include removing garbage in a timely manner and using netting or wire to prevent bird from roosting.

Biological Controls

Biological control practices use living organisms to reduce pest populations. These organisms are often also referred to as beneficials, natural enemies or biocontrols. They act to keep pest populations low enough to prevent significant economic damage. Biocontrols include pathogens, parasites, predators, competitive species, and antagonistic organisms. Beneficial organisms can occur naturally or can be purchased and released.

The most common organisms used for biological control in landscapes are predators, parasites, pathogens and herbivores.

- Predators are organisms that eat their prey (e.g. Ladybugs).
- Parasites spend part or all of their life cycle associated with their host. Common parasites lay their eggs in or on their host and then the eggs hatch, the larvae feed on the host, killing it (e.g. Tiny stingless wasps for aphids and whiteflies).
- Pathogens are microscopic organisms, such as bacteria, viruses, and fungi that cause diseases in pest insects, mites, nematodes, or weeds (e.g. Bacillus thuringiensis or BT).
- Herbivores are insects or animals that feed on plants. These are effective for weed control. Biocontrols for weeds eat seeds, leaves, or tunnel into plant stems (e.g. goats and some seed and stem borers).

In order to conserve naturally occurring beneficials, broad-spectrum pesticides should be avoided since the use of these types of pesticides may result in secondary pest outbreak due to the mortality of natural enemies that may be keeping other pests under control (Figure 2).

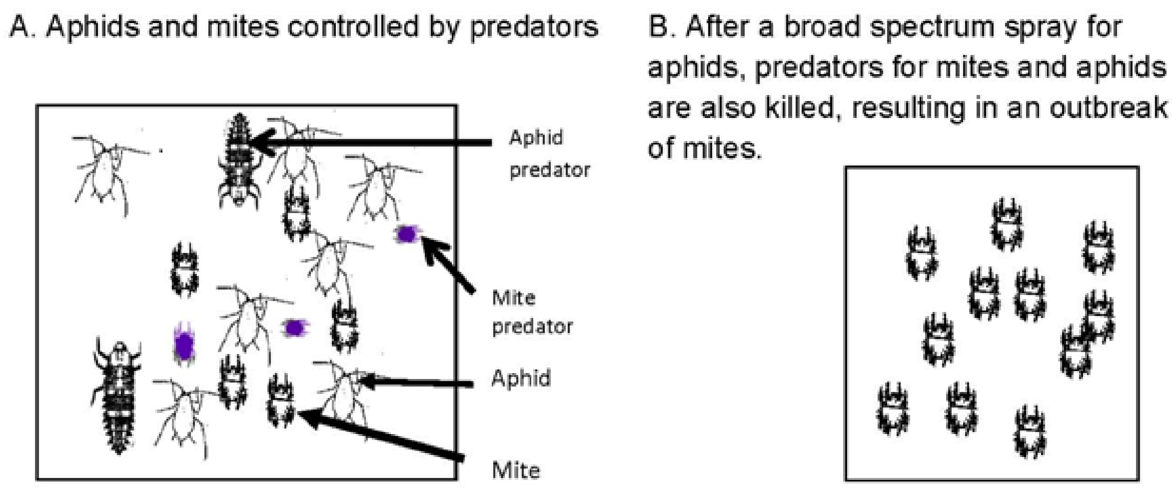

Figure 2 Example of Secondary Pest Outbreak Caused By Use of a Broad Spectrum Insecticide

Pesticide Controls

Any substance used for defoliating plants, regulating plant growth or preventing, destroying, repelling or mitigating any pest, is a pesticide. Insecticides, miticides, herbicides, fungicides, rodenticides and molluscides are all pesticides. Anything with an EPA or DPR registration number on the label is a non-exempt pesticide.

Pesticides should only be used when other methods fail to provide adequate control of pests and just before pest populations cause unacceptable damage. The overuse of pesticides can cause beneficial organisms to be killed and pest resistance to develop. When pesticides must be used, considerations should be made for how to use them most successfully. Avoid pesticides that are broad-spectrum and relatively persistent since these are the ones that can cause the most environmental damage and increase the likelihood of pesticide resistance. Always choose the most specific but least toxic to non-target organisms method.

In addition, considerations should be given to the proximity to water bodies, irrigation schedules, weather (rain or wind), etc. that are secondary factors that may result in the pesticide being moved off-site into the environment. Consideration should be made of the temporary loss of use of an area (application in a park may result in the area being sectioned off).

Appendix A: Optional IPM Techniques to Integrate into IPM Program

The following practices are generally accepted to be effective IPM techniques. These procedures increase the long-term prevention and suppression of pest problems (insects, weeds, diseases, and vertebrates) with the minimum impact on human health, the environment, and non-target organisms. Emphasis is placed on improving cultural practices to prevent problems and utilize alternative control measures instead of broad spectrum pesticides. The following IPM techniques are divided into the following categories:

- General Pesticide Management Practices
- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

GENERAL PESTICIDE MANAGEMENT PRACTICES

- Maintain a complete inventory of all pesticides used and the use sites. This inventory should be updated annually.
- If pesticides are necessary, CAUTION-labeled pesticides should be considered before more toxic alternatives.
- Ensure that no banned or unregulated pesticides are stored or applied.
- Restricted use pesticides should only be used when no other alternatives are practical.
- Only small quantities of pesticides should be purchased eliminating the need for stockpiling.
- MSDSs should be regularly updated to reflect new pesticides or label changes to pesticides in storage.
- Pesticides should be used only according to label instructions.
- Weather conditions that could affect application should be considered. For example, wind conditions affect spray drift; rain may wash pesticide off of leaves.
- Pesticides should not be applied where there is a high chance of movement into water bodies; for example, they should not be applied near wetlands, streams, lakes, ponds or storm drains unless it is for an approved maintenance activity.
- In most cases, empty pesticide containers should be triple-rinsed before disposal. Particular information on the proper disposal of the pesticide and its container can be found on the label.

- Pesticide equipment and containers should not be cleaned or rinsed in the vicinity of storm drains or other open water areas.
- Pesticides should be stored in covered areas with cement floors and in areas insulated from temperature extremes.
- Chemicals and equipment should be secured during transportation to prevent tipping or excess jarring.
- Pesticides should be transported completely isolated from people, food and clothing, for example, in the bed of the truck rather than in the passenger compartment.
- Pesticide equipment, storage containers and transportation vehicles should be inspected frequently.
- A plan for dealing with pesticide spills and accidents should be developed.
- Unless their safety is compromised, workers should immediately clean up any chemical spills according to label instructions and notify the appropriate supervisors and agencies.
- Pesticide applications on public property, which take place on school grounds, parks, or other public rights-of-way where public exposure is possible, should be posted with warning signs. The specific criteria for the signage can be found in FAC, section 12978. Pesticide applications by the Department of Transportation on public highway rights-of-way are exempt.

PEST AND SYMPTOM IDENTIFICATION

Insects, Mites, and Snails and Slugs

- Field personnel should be trained to recognize basic pests found in the landscape in the following groups: insects, mites, and mollusks.
- A licensed Pest Control Adviser can be on staff or hired to properly identify a pest and the symptoms caused by the pest.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to distinguish between beneficial insects and actual pests found in the landscape (e.g. parasitizing wasps).
- Unknown samples can be submitted to the Orange County Agricultural Commissioner for identification by the county entomologist or plant pathologist.
- Abiotic or nonliving factors (wind, sunburn, air pollution, etc…) should be considered as possible causes of observed symptoms as well as biotic (living) factors.

Weeds

- Field personnel can be trained to identify common weeds in the landscape.
- Field personnel can be trained to utilize weed life cycles to properly control

weeds such as controlling crabgrass utilizing a pre-emergent herbicide applied in mid-January.

- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.

Diseases

- Field personnel can be trained to recognize common diseases or their signs/symptoms in the landscape.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to recognize the difference between biotic and abiotic problems.
- Field personnel can be trained to understand how common diseases are spread throughout the landscape.
- Disease signs and symptoms can be sampled and submitted to the Orange County Agricultural Commissioner for identification by the county plant pathologist.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.
- Photographs of disease signs and symptoms can be taken and compared to reference guides such as UC IPM's *Pests of Landscape Trees and Shrubs*.

Vertebrates

- Field personnel can be trained to recognize vertebrate pests and the damage they cause in the landscape.
- Field personnel can be trained to utilize vertebrate behavior to properly control the pest most effectively.
- Field personnel can be trained in vertebrate baiting and trapping.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify vertebrate pest.

PREVENTION

Landscape Design Procedures

- Drainage, soil characteristics, water quality and availability should be considered during plant selection.
- Sun exposure, heat, and high temperature conditions should be considered during plant selection.
- Plant material should be selected based on adaptability to local climate conditions, such as those conditions common to a Mediterranean climate.
- Adequate space should be allowed for root growth, especially trees.

- Nursery stock should be inspected and rejected if not healthy (injuries, diseased, circling roots/potbound, poor staking and/or pruning).
- Pest resistant species and cultivars should be selected.
- Plants with similar growth characteristics and irrigation requirements should be grouped together.
- Landscape design should match available irrigation technology to avoid excess water use and to minimize surface runoff.

Site Preparation and Planting Procedures

- Soil drainage properties can be assessed and compacted soils improved prior to planting.
- A soil analysis can be conducted to determine the chemical and physical properties of the existing soil and then appropriate amendments such as organic matter can be added.
- Irrigation should be installed as designed in order to avoid poor uniformity once plants are in place.
- Proper planting procedures should be followed for particular plant species to avoid planting too deeply or too shallow.
- Nursery tree stakes can be removed at planting and replaced with staking that allows trunk to flex; removing these stakes after 1 to 1.5 years.
- A soil probe or other soil moisture measurement device can be utilized to monitor soil moisture levels in existing root ball and surrounding soil during establishment period.

Water Management

- Plants should be examined weekly for symptoms of water stress and to assist in determining irrigation scheduling.
- Soil moisture can be monitored with a soil probe or soil moisture sensors to assist in scheduling irrigation.
- Evapotranspiration (ET) data or 'smart' clock technology can be utilized to schedule irrigation.
- Cyclic irrigation (short-multiple run times) can be employed to minimize surface runoff.
- Low precipitation sprinklers or low-volume systems can be utilized to reduce surface runoff.
- Systems should be inspected monthly to check for leaks, broken pipes, and clogged or broken sprinkler heads.
- Adjust sprinklers to avoid application of water directly to the trunk of trees (can promote disease) or on to concrete surfaces where it can enter storm drains.
- A hotline, email, or other dedicated method can be established for citizens to

report leaks and broken sprinkler heads

Fertilizing Procedures

- To avoid nutrient losses below the root zone, fertilize only when plants are actively growing.
- Fertilizer should not be applied within 48 hours of a rain event to avoid losses below the root zone and in surface runoff.
- Soil analyses can be conducted in order to determine existing nutrient levels in the soil prior to fertilizing.
- Turf grass fertilizer maintenance schedules can be based on UC recommendations found online at UC Guide for Healthy Lawns: http://www.ipm.ucdavis.edu/TOOLS/TURF/MAINTAIN/fertilize.html
- Sports turf grass fertilizer maintenance guidelines can be based on UC recommendations found in *Establishing and Maintaining the Natural Turf Athletic Field (UCR ANR Publication Number: 21617)*.
- Overfertilization, especially of trees and shrubs, should be avoided to ensure plant growth is not excessively succulent making it more susceptible to pest infestations.
- Off-target fertilizer applications or spills should be cleaned up immediately by sweeping up and applying to landscape or turf or replacing in spreader or bag to ensure material does not enter storm drains.

Pruning Procedures

- Damaged or diseased wood should be regularly pruned from landscape plants.
- Trees should be pruned according to standards set forth by a professional tree care organization such as the International Society of Arboriculture.
- Plants too large for a space should be replaced instead of pruning them severely.
- Unnecessary pruning should be avoided as wounds are entry sites for decay and disease organisms.
- The age and species of the plant should be taken into account when determining the time of year to prune. For example, eucalyptus should be pruned in December and January when long-horned beetles are not active.
- Tree height reduction should be discouraged. When deemed necessary by a licensed arborist, the crown reduction method approved by a professional tree care organization should be utilized. Topping should not be done to reduce tree size.

MONITORING FOR PESTS AND PROBLEMS

Insect/Mollusk Monitoring Procedures

- Monthly visual inspections of plants for insects, mites, snail and slug damage, and recording results is an effective method for tracking changes and easy recall of data.

- Yellow sticky traps can be utilized to assess populations of insects.
- Insects can be dislodged from plants by shaking over a collection surface usually consisting of a clipboard with a white sheet of paper.
- If available for a particular insect, pheromone-baited traps can be utilized.
- Soil-dwelling turf insects can be brought to the surface for monitoring by flushing a specific area of soil (i.e. 2′ x 2′ grid) with plain water or a soapy water mixture.
- The amount of honeydew (aphids) and frass (caterpillars) present can be utilized as an indicator of population levels.

Weed Monitoring Procedures

- Landscapes can be inspected at least 4 times a year (early winter, early spring, summer and early fall) for weeds in order to determine if and when a weed problem exists.
- Site surveys can be utilized to record the location, date, and severity of weed problem for an effective method of tracking changes and easy recall of data.
    - The number of weeds encountered at periodic intervals (e.g. every 1 to 2 feet) can be counted and recorded along a straight line transecting a landscaped, area or within a selected area, for example 4 sq. ft. samples done in random places in a bed or turf area.

Disease Monitoring Procedures

- Landscapes should be regularly checked for conditions, such as overwatering and injuries, which promote disease.
- Landscapes should checked monthly for disease symptoms and signs. Disease prone plants should be checked more frequently.
- Landscape inspections should note date when disease signs and symptoms were first noticed and the current environmental conditions and soil moisture levels as an effective method of tracking changes and easy recall of data.

Vertebrate Monitoring Procedures

- Landscapes can be regularly inspected for vertebrate presence either by damage caused by animal, actual animal sightings, and/or droppings.
- Records can be kept of the absence or presence of actual vertebrates, the damage caused, and/or the presence or absence of droppings.
- Maps can be created and updated at least twice a year, recording areas of high vertebrate damage or signs (such as gopher mounds).

INJURY LEVELS AND ACTION THRESHOLDS

Insect/Mollusk Thresholds and Guidelines

- Insect tolerance levels can be established based on the public's acceptance of damage to the landscape or a certain level of nuisance pests (i.e. ants), the actual plant species in the landscape, and long-term monitoring and knowledge of pests causing the damage.
- Thresholds can be based on levels where reasonable control of the pest can be achieved with minimum impact on the environment.
- Insect monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of aphids on a rose garden at City Hall is low, while in a native shrub border it might be considerably higher.

Weed Thresholds and Guidelines

- Weed tolerance levels can be established based on public safety or the public's acceptance and the resources available to manage the landscape at that level.
- Weed monitoring records can be utilized to rank the percentage of the landscape area infested (none, light, moderate, heavy, or very heavy) with weeds.
- Public areas can be ranked according to high, medium, or low level of weed control and management conducted according to levels set for each rank (see Appendix B)

Disease Thresholds and Guidelines

- Disease tolerance levels can be established based on the public's acceptance and the resources available to manage the landscape at the level required.
- Disease monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of powdery mildew on roses at City Hall is much lower than the threshold for its presence on Euonymus in a parking lot at a city sports park.

Vertebrate Thresholds and Guidelines

- Vertebrate tolerance levels can be established based on public safety, the public's acceptance and the resources available to manage the landscape at the level required.
- Vertebrate monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of gopher mounds in a sport field is zero, while in a native shrub border it might be two before a trapping strategy is implemented.

PEST CONTROL TACTICS

Insect/Mollusk Management Methods

Cultural/Mechanical/Physical Control Methods

- Sticky barriers can be applied to trunks of trees and large shrubs to prevent ants and other wingless invertebrates from plant canopies.
- Small insect infestations can be removed by pruning infested plant parts.
- Copper bands can be installed around base of trees or planting areas where snail and slug infestations are prevalent.
- Plant canopies can be thinned to increase light penetration to expose certain soft-bodied insects (soft-scale) as well as snails and slugs to heat.
- Strong streams of water can be used to dislodge insects such as aphids and whiteflies, from leaves.
- The use of plants that snails and slugs use for shelter should be avoided.
- Avoid irrigating between 5pm and 5am when moisture remains on plant material for several hours.

Biological Control Methods

- Persistent broad-spectrum pesticides should be avoided, especially if biological control of an insect has been established by UC researchers. Examples include parasitoid wasps controlling Eugenia Psyllids, Giant Whitefly, and Ash Whitefly.
- Natural predators (beneficial insects) can be augmented with purchases of additional predators from commercially available resources.

Pesticide Control Methods

- The most selective, rather than broad-spectrum, pesticide should be used.
- If available for controlling a particular insect, biological and botanical pesticides should be selected.
- Insecticidal soaps can be utilized to control infestations of soft-bodied insects such as aphids, thrips, and immature scales.
- Horticultural oils (neem oil and narrow-range refined oils) can be utilized to control infestations of soft-bodied immature and adult insects such as aphids, scales, and whiteflies.
- Pesticides should only utilized when the potential for impacts to the environment, especially water quality, are minimized.
- Equipment should be calibrated prior to the application of the insecticide to avoid excess material being applied to the landscape environment.
- Applicators should be trained to not apply pesticides to hard surfaces and to not allow any pesticide to enter the storm drain system.
- Spot treatments should be utilized rather than broadcast methods.
- Insecticide/fertilizer combinations should only used if it is appropriate timing for BOTH the insecticide application and the fertilizer application.

Weed Management Methods

Cultural, Mechanical, and Physical Control Methods

- Timers can be set to avoid overwatering as weeds establish in areas where soil moisture is excessive.
- Drainage can be managed to avoid wet areas.
- Weeds can be removed from a site prior to planting.
- Mower height can be adjusted to turf species and time of year.
- Mower should be washed after mowing a weedy site.
- Hand-pulling, mowing, trimmers/brushcutters, flaming, hoeing, and rototilling around landscape plants should be the main methods utilized to control annual weeds and young perennial weeds.
- Soil solarization can be utilized to control some annual and perennial weed species.
- Bare soil areas can be covered with a thick layer of mulch to suppress weeds and conserve soil moisture.
- Soil, mulch, and plant material should be weed-free before it is introduced into the landscape.

Pesticide Control Methods

- Spot treatments can be utilized rather than broadcast methods.
- Herbicide/fertilizer combinations should only used if it is appropriate timing for BOTH the herbicide application and the fertilizer application.
- Herbicides should be utilized according to established thresholds (see Appendix B).
- Organically acceptable herbicides (shown to be effective through science-based research) should be used where appropriate.
- Herbicides can be applied to the stage of weed growth most susceptible to the chemical.
- Equipment should be calibrated prior to the application of the herbicide to avoid excess material being applied to the landscape environment.

Disease Management Methods

Cultural, Mechanical, and Physical Control Methods

- Localized areas of diseased plants should be pruned out and disposed of.
- Pathogen-infested plant parts can be removed from the soil surface area to reduce certain pathogens (e.g. Camellia Petal Blight).
- Pruning tools can be sterilized (e.g. a diluted bleach solution) between plants to prevent the spread of pathogen to other plants.
- Proper irrigation and fertilization can be maintained to prevent plant stress, waterlogging, and subsequent susceptibility to disease.
- Soil solarization can be utilized to control soil pathogens in annual beds where it

is most effective.

- Mulch can be kept at least 6” from base of plants to avoid excessive moisture around crown possibly resulting in crown rots and is no deeper than 4”
- Disease-prone plants can be replaced with non-susceptible species.

Pesticide Control Methods

- Preventative fungicides and bactericides should only used where diseases can be predicted from environmental conditions and applied prior to infection or the appearance of symptoms.
- Synthetic fungicides should be used sparingly in the landscape and only in high visibility areas in order to minimize development of resistance.
- Organic fungicides and bactericides should be utilized in combination with cultural, mechanical, and physical control methods in order to improve their effectiveness.
- Copper-based fungicides should only be utilized in situations where its entry into surface runoff and storm drains is virtually impossible and after consultation with PCA and IPM coordinator.
- Mycopesticides, commercially available beneficial microorganisms, should be used where appropriate.
- Fungicides classes can be rotated to avoid resistance.

Vertebrate Management Methods

Cultural and Physical Control Methods

- Groundcovers can be maintained such that they do not harbor rats.
  - Shrubs pruned at least 1 foot from the ground (rats).
  - Sources of drinking water removed (leaky faucets, puddles).
  - Trash cans have lids and are emptied daily (rats).
  - Screens or other barriers installed under structures that have a space between soil and floor (rabbits).
- Habitat modification, based on pest biology can be used to reduce shelter. Trapping can be used for gophers when safe and practical.
- Kill traps used for ground squirrels and rabbits, should be checked daily, and put in places not accessible by children or non-target animals.
- Gas cartridges can be used for ground squirrels according to UC recommendations.

Pesticide Control Methods

- Anti-coagulant baits can be used and applied according to label and UC recommendations.
- Bait should be applied in a manner that non-target animals do not have access to

it.

- Restricted use pesticides should only be applied by or under the direct supervision of an individual with a qualified applicators certificate (QAC). To receive a QAC, a person must take a test administered by Department of Pesticide Regulation (DPR). To obtain test materials, test schedules, and an application, see http://www.cdpr.ca.gov/docs/license/liccert.htm.

Appendix B

Ranking public areas for weeds (or other pest) management:

Areas ranked as **HIGH** may include areas that the public sees and expects to be well-maintained. Examples are entrances to public buildings such as city hall and libraries.

These areas are allowed to use pesticides based on established thresholds.

Areas ranked as **MEDIUM** may include areas the public sees but does not expect a high level of maintenance. Examples are landscaped areas away from the entrance, recreational and picnic areas. These areas can tolerate a higher lever of weeds.

These areas are allowed to use pesticides but the threshold is much higher and pesticides are used infrequently and only after consultation with IPM coordinator.

Areas ranked as **LOW** may include areas the public rarely sees or does not expect a high level of maintenance. Examples are medians, landscaped areas in parking lots, wildlands. These areas can tolerate a higher lever of weeds.

These areas are not allowed to use pesticides except in extreme cases and only after consultation with IPM coordinator.

Insert City Seal

Example Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
Notes:			

Example of Completed Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
7/1/13	Street #1	20	55 cu. ft.
	Intersection #1	10	
	Street #2	5	
Notes:			

Drainage Inlet/Catch Basin Information		
Location		
Street:	Cross Street:	Side (N,S,E,W)
Distance:	Direction (N,S,E,W):	Inlet #:
Map #:	Grid:	
Condition		
Length of Opening:	Height of Opening:	Stencil Legible (Y/N):
Bicycle Bars (Y/N):	Grate Size:	Inlet Protection Bar (Y/N):
Treatment Control BMP (Y/N):	Type of BMP:	
Repairs Required:		

Illicit Connection Investigations Guidance

Field Screening Techniques

If evidence of an illicit discharge is detected, as described in Section 2, and the source does not appear to be evident or above ground, investigations will be conducted to determine if the discharge is being conveyed through an illicit connection. A good source of information includes *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems* (EPA/600/R-92/238.1993, Pitt et al). General guidance follows below. These techniques can also be used if a Permittee elects to survey sections of their system for illicit connections.

Document Research

Maps of drainage facilities can be reviewed to locate upstream connections and drainage basins as an initial step to locate potential illicit connections. Other records, such as connection permits and discharge permits, can also be reviewed to determine if legal connections may be the source.

Physical Inspections

Catch basins, manholes and other facilities that can be safely investigated from the surface should be physically checked for evidence of connections. This may be a hard pipe connection, or could be a hose or other conveyance that directs a discharge into the storm drain facility. Identification of connections that exhibit evidence of suspected illicit discharges during routine site inspection (e.g., industrial, commercial or construction). Investigation is conducted to determine if the discharge is being conveyed through an illicit connection when evidence of illicit discharge is detected, and the source does not appear to be evident or above ground.

Facilities that are large enough for personnel to enter can also be physically inspected, however, entry into facilities requires strict adherence to health and safety procedures, including confined space entry procedures. In general, a space is “confined” if it is not intended for human occupancy, has limited openings for entry or exit, and has insufficient natural or mechanical ventilation. Information on safety procedures can be found in many documents, including the *Occupational Safety and Health Guidance Manual*, National Institute for Occupational Safety and Health; *OSHA Safety and Health Standards 29 CFR 1910 (General Industry)*, US Department of Labor, and *Title 8 of the California Code of Regulations, General Industry Safety Order*.

Dye Tests

Dye tests can reveal illicit connections in areas where storm drain flows are unexplained and the Permittee has access to suspect facilities. Typical dye tests consist of the addition of fluorescent dye to a floor drain or waste line from a domestic, commercial or industrial process, followed by monitoring for the dye in downstream storm drains. Permittees should conduct dye testing facility by facility (in each area where unexplained flow exists) until all facilities in the area are tested.

Smoke Tests

Smoke tests can reveal if illicit connections exist, and can reveal their source. Storm drains are sealed via sandbags or other sealing devices (plugs, etc.) and smoking incendiary devices are ignited upstream of the seal. Simultaneous inspections inside area facilities should reveal illicit connections even in the absence of flow. As illicit discharges are intermittent, smoke tests offer real advantages over other types of illicit discharge source identification methods. However, as many legitimate connections to a storm drain may exist (roof drains, street drains, etc.) smoke may be observed extensively. This may cause some illicit connections to be missed, and create a problem with area businesses and residents as excessive smoke begins to enter private property.

T.V. Inspections

T.V. inspections can reveal if illicit connections exist, but cannot be used to view up the connection to determine the source. Robotized or otherwise mobile television cameras allow visual inspection of storm drains (pipes) too small or dangerous for personnel to enter. Although an excellent method of identifying and documenting illicit connections, T.V. inspections have high costs unless the equipment is already owned or can be borrowed from neighboring agencies.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

Illicit Discharge Investigation and Elimination Guidance

Introduction

Once illicit discharges/disposal are detected and identified, they must be eliminated. Sometimes the source of the spill or discharge/disposal is apparent. The incident can be removed through voluntary cleanup/termination or enforcement procedures, and steps can be taken to prevent its recurrence. These prevention methods can include education and outreach materials for residents and businesses, preventive maintenance practices for infrastructure, vehicles and equipment or additional enforcement.

When the source of the discharge is not apparent, further investigation will be necessary to eliminate it and prevent it from recurring. The following discusses methods that can be used to document the incident, determine the nature of the material, and investigate the source.

Advance Planning

An effective investigation program requires good advance planning. Sufficient staff should be trained to conduct investigations so that qualified staff are available whenever investigations are necessary. Staff should become familiar with illicit discharge investigation and sampling procedures. General guidance follows below to assist with overall planning, but should not be considered complete for proper sampling quality assurance purposes.

Equipment

Appropriate equipment for field investigations may include:

Table 1: Typical Equipment for Investigations

Equipment Type	Equipment
General	Inspection checklist
	Field data log book
	Camera
	Tape measure
	Storm drain system map
	Flashlight
Flow measurement	Ping pong ball or other light floatable
	Stopwatch
Laboratory	Graduated container
	Temperature/pH/conductivity (EC) probe
	Field test kits (e.g., Lamotte test kit)
	12 1-liter amber glass sample bottles
	12 1-liter HDPE sample bottles
	Cooler with ice for sample preservation
	Gloves
	Splash goggles/safety glasses
	Deionized water in wash bottle
First Aid	First aid kit

Data Collection

Before entering the field, the inspection crew should locate information such as the following on a storm drain/street map for areas that will be investigated:

- All known or suspected pollutant generating activities
- Locations of NPDES dischargers
- All locations where storm drains enter open channels
- Catch basins and storm drain manholes

Visual Observation

Visual observation of the storm drain system and/or of activities on the surface can provide information on the source of illicit discharges. It is the simplest method to begin with and the least costly. Evidence of illicit discharges may only consist of visual observations because most illicit discharges are intermittent and will probably not be flowing when inspected. A field inspection crew should investigate the surface drainage system in the vicinity of suspected illicit discharges. This may include accessible areas in the public right-of-way adjacent to residences and businesses, catch basins, open channels near known points of discharge, and upstream manholes.

Photos of visual observations should be taken to aid subsequent data analysis and follow up planning. The following types of visual observations should be recorded on an investigation checklist, such as the one attached:

- Location
- General site description
- Amount, appearance of discharge/disposal
- Stains
- Structural cracking and corrosion
- Vegetative growth
- Nearby facilities with poor outside housekeeping practices
- Pipes/hoses connected to/directed toward drainage system

If the source of the discharge is determined, appropriate methods should be used to eliminate it through voluntary cleanup/termination or enforcement procedures, and steps should be taken to prevent its recurrence.

Sampling and Testing

If flow is observed, and the source of the discharge is not apparent, the crew should collect a sample and measure flow. Several tests should be conducted to determine the nature of the material. This can be compared to records of local facilities and possible pollutant generating activities as an aid in determining the possible sources of the flow.

The sample should be measured for pH, temperature and conductivity (EC). If any of these parameters are abnormal, or strong odors or flow discoloration are detected, the sample should be analyzed. This can be done with a field test kit, which will detect the presence of copper, phenols, detergents, and chlorine. Findings should be recorded on the inspection checklist.

If visual observations are abnormal and/or the field tests detect high concentrations of any constituent, the crew should consider collecting samples for laboratory analysis. The laboratory can usually supply properly cleaned sample bottles and specify either amber glass or plastic (HDPE) bottles depending on the analyses required. If there is enough flow, the field crew should fill several of each type of bottle to obtain enough sample volume for a range of analyses. If there is a limited quantity or sampling is difficult, the field crew should collect as much sample as possible so that the laboratory can run a limited set of analyses. The samples should be placed in a cooler filled with ice and transported to the lab(s) on the same day. Arrangements should be made prior to the field inspection with an analytical laboratory capable of performing the required analyses.

The laboratory analyses run on each sample should be carefully considered. Given the potential high cost for laboratory work, it is prudent to limit the number of analytical parameters (or analytes) tested for each sample. Tests may be selected based on the findings of indicator analyses, visual observations, field tests, and information collected about the types of materials processed, stored and/or spilled within each drainage area.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

Insert City Seal

ILLICIT CONNECTION/ ILLICIT DISCHARGE INVESTIGATION REPORT

Response Time:
☐ 1-6 hrs. ☐ 13 hrs. ☐ 24 hrs. ☐ 48 hrs.

RESPONSE

Date:	Time:	Inspector:

INVESTIGATION

Location/ Address:

Reason for Investigation: ☐ Complaint ☐ Discharge/Spill Response ☐ Visual Monitoring
☐ Other: ___________________________________

Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Soil/ Sediment ☐ Trash ☐ Sewage
☐ Fuel (Gas/Diesel) ☐ Chemicals ☐ Other _________________________

Estimated Quantity: ☐ Gallons ☐ Lbs.

Entered Storm Drain System: ☐ Yes ☐ No
Storm Drain Location: ________________________

Entered Receiving Waters: ☐ Yes ☐ No
Name of Receiving Water: ___________________________

Observations

Field Testing: ☐ Yes ☐ No
Details:

Sample Collected: ☐ Yes ☐ No
Details:

Direct/ Constructed Connections Found: ☐ Yes ☐ No
Details:

RESPONSIBLE PARTY

Name:

Address:

Phone/ email:

Repeat Violation? ☐ Yes ☐ No

OUTREACH MATERIAL

Outreach Material Distributed: ☐ None ☐ General Information ☐ BMP Brochure ☐ Other ________________

ENFORCEMENT

Enforcement: ☐ None ☐ Written Warning ☐ Notice of Violation ☐ Citation/Infraction ☐ Cease and Desist Order

Other Actions

FOLLOW-UP VISIT

Date:	Time:	Inspector:

Discharge Stopped? ☐ Yes ☐ No

Proper Clean-Up Action Taken: ☐ Yes ☐ No

Further Action Required: ☐ Yes ☐ No
Details:

Insert City Seal

ILLICIT CONNECTION/ ILLICIT DISCHARGE REPORTING & RESPONSE

Received by:	
Date:	Time Received:

REPORTING PARTY

Name:	Anonymous: ☐ Yes ☐ No
Address:	Phone/email:

INCIDENT

Date:	Time:
Location/ Address:	
Land Use: ☐ Residential ☐ Commercial ☐ Industrial ☐ Public	
Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Sediment ☐ Trash ☐ Other ______________ ☐ Unknown	
Estimated Quantity: ☐ Gallons ☐ Lbs.	
Entered Storm Drain System/ Receiving Waters? ☐ Yes ☐ No	

Description / Details	

Agencies Contacted: ☐ Office of Emergency Services ☐ HazMat Team ☐ LA County ☐ Regional Board ☐ Other	
Source Investigation Conducted? ☐ Yes ☐ No	Source Identified? ☐ Yes ☐ No
Direct/ Constructed Connections Found? ☐ Yes ☐ No	

ALLEGED RESPONSIBLE PARTY

Name:	
Address:	Phone/ email:
Vehicle License No:	

ACTION & CLOSURE

Referred to:	Date:
Department:	Phone/ email:

Actions Taken/ Details	

Date Closed:

Spill Prevention Coordination

Procedures

This attachment discusses spill prevention coordination procedures that identify:

- Divisions or sections responsible for responding to reports of spills
- General and specific spill response procedures including responsible division or section
- Spill response training activities
- Activities conducted to improve spill response procedures and equipment

Divisions or Sections Responsible for Responding to Reports of Spills

Identify the divisions or sections responsible for responding to reports of spills and note divisions or sections that respond to specific types of spills such as hazardous materials spills or sewage spills. Also indicate the specific field staff who respond to spills and the level of support they provide to lead emergency response agencies and source of spill investigations.

General and Specific Spill Response Procedures

Describe or reference general spill response procedures involved in responding to complaints and identifying spills through inspections. Include the spill response process from the spill identification stage through clean up and report preparation. Copies of the forms and reports prepared to document spills should also be included. Specific procedures for hazardous materials spills, floods, and sewage spills should be referenced. Contractor support for spill events, if applicable, should also be noted.

Spill Response Training Activities

Provide an overview of all spill response training that is conducted within the various divisions and sections of the agencies.

Activities to Improve Spill Response Procedures and Equipment

List all activities conducted within the implementing agency to improve spill response procedures and update equipment. Explain how improvements are identified, prioritized, and implemented. Include a schedule of how often spill response procedures and equipment are evaluate.

Spill Investigation, Containment and Cleanup

Investigation

Depending on the location of the spill and the type of material, the appropriate department/ agency should be notified. This may include:

- Storm drain maintenance, if the spill reaches the storm drain system
- Street and road maintenance, if the spill is in the public right-of-ways
- Sewer system maintenance, if the material is from the sewage system
- Industrial waste inspection, if the material is from industrial facilities
- Fire Departments/”first responders,” if the material may be hazardous
- Contractors for hazardous materials, if the material is hazardous

These departments/agencies should determine the nature of the material and the extent of the spill. If any agency determines there is a chance that the spill involves hazardous materials, then the local Administering Agency will be notified. An example of spill investigation procedures is depicted in Figure D-1. Reporting procedures for hazardous substances are discussed further in Section 5 of this Illicit Connection/Illicit Discharge Elimination model program.

Containment and Cleanup

Once the nature and extent of the spill is determined, the appropriate departments and field superintendents will be notified to contain and clean up the spill. The three types of cleanup scenarios are (1) hazardous, (2) wastewater, and (3) other non-hazardous materials.

Hazardous

Handling procedures regarding releases of hazardous or potentially hazardous substances into the environment are covered in a number of federal and state regulations, including: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); Superfund Amendments and Reauthorization Act (SARA); Resource Conservation and Recovery Act (RCRA); and multiple bills codified under Division 20 of the California Health and Safety Code. These procedures are well established and are practiced by local hazardous materials response teams - generally a local Fire Department.

Material determined to be hazardous will be contained by the appropriate hazardous material response team. The team will contact an approved contractor for cleanup. Details are contained in the local *Emergency Response Procedures* manual.

Wastewater

Field crews responding to a sewage spill or overflow should contain the spill to prevent entry of the sewage into the storm drain system or natural watercourse. This will involve a coordinated effort between the sewer, street, and storm drain maintenance crews.

To the maximum extent possible, sewage should be prevented from entering the storm drain system by covering or blocking storm drain inlets and catch basins or by containing or diverting the overflow away from open channels and other storm drain fixtures (using sandbags, inflatable dams, etc.).

In the event that raw sewage enters a storm drain catch basin, where possible the sewage should be vacuumed or pumped out of the catch basin. If a sewage overflow enters a storm drain channel, where possible the downstream channel area should be blocked, flushed with potable water and the captured water pumped to a nearby sewer manhole. Any time a sewage spill enters the storm drain system and has the potential to reach coastal waterways, the local agency and L.A. County Dept. of Health Services, Bureau of Environmental Protection must be notified (323) 881-4147.

Once the spill is contained, it should be removed and the area disinfected. Every effort should be made to ensure that the disinfectant is not discharged to the storm drain system, using methods such as those described above.

Other Non-hazardous Materials

Non-hazardous materials should generally be removed by appropriate crews with knowledge of or jurisdiction over the location of the spill, as indicated in Section D.1. Because the situations and materials will vary widely, procedures will vary as well.

All materials should be prevented from entering waterways to the maximum extent possible. Many materials in sufficient quantities can deplete the oxygen level in receiving waters, or smother benthic communities. Typical examples of these materials include landscape waste, milk, flour, and many other organic liquids and solids or fine powders. These materials should generally be removed by first collecting and/or sweeping up all solids and disposing them in a landfill or other approved location. Liquids should be diverted to an area away from waterways where they may be removed with a vacuum truck or can soak into the ground.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

ATTACHMENT F:

LEGAL AUTHORITY CERTIFICATIONS

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December 6, 2013

Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Bellflower (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, it is my considered legal opinion the City has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the Bellflower Municipal Code ("BMC") for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities, 13.20.100 Control of Pollutants from Industrial Activities, 13.20.110 Control of Pollutants from Construction Activities Requiring General Construction Activity Stormwater Permit, and 13.20.120 Control of Pollutants from Other Construction Activities

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.070 Illicit Connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

BMC Section: 13.20.060 Illegal Disposal/Dumping

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters.*

This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;

BMC Section: 13.20.140 Violation, Inspection, Enforcement

x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities and 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xi. Require that structural BMPs are properly operated and maintained;

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in BMC Section 13.20.140 Violation, Inspection, Enforcement. Here is the relevant text of that provision:

13.20.140 Violation, Inspection, Enforcement.

A. Violation of any provision of this chapter, any stormwater pollution prevention plan or any permit issued pursuant to this chapter shall be a violation per Chapter 1.08.

B. The Director of Community Development, or the Director's designees, may issue notices of violation and administrative orders to achieve compliance with the provisions of this chapter. Failure to comply with the terms and conditions of such a notice of violation or an administrative order shall constitute a violation of this chapter.

C. The violation of any provision of this chapter is hereby declared to be a nuisance, and may be abated by the City in accordance with its authority to abate nuisances.

D. The remedies listed in this chapter are not exclusive of any other remedies available to the City under any applicable Federal, State or local law and it is within the discretion of the City to seek cumulative remedies.

[...]

F. The Director of Community Development, or the Director's designees, may issue notice of violation and administrative orders to any other person who has failed to comply with either a notice of violation or other administrative order an invoice for costs (invoice of cost) for reimbursement of the City's actual costs incurred in issuing and enforcement of any provision of this chapter.

G. The Director of Community Development, or the Director's designees, may require that any person engaged in any activity and/or owning or operating any facility which may cause or contribute to stormwater pollution or contamination, illicit discharges and/or discharge of nonstormwater to the stormwater system, undertake such monitoring activities and/or analysis and furnish such reports as the officer may specify. The burden, including costs, of these activities, analysis and reports shall bear a reasonable relationship to the need for the monitoring, analysis and the benefits to be obtained.

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Joseph W. Pannone
City Attorney for the City of Bellflower

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December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Cerritos (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

Municipal Code Sections: 6.32.050 Construction sites requiring building permit and/or grading plan and 6.32.060 Industrial activity sites

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

Municipal Code Section: 6.32.030 Illicit discharges and connections

//0.0

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Section: 6.32.030 Illicit discharges and connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 6.32.030 Illicit discharges and connections and 6.32.040 Illicit disposal

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Sections: 6.32.010 Purpose and 6.32.080 Violation—Penalty

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 6.32.080 Violation—Penalty

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;*

Municipal Code Section: 6.32.080 Violation—Penalty, subsection (D)

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

xi. *Require that structural BMPs are properly operated and maintained;*

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 6.32.080 Violation—Penalty. Here is the relevant text of that provision:

6.32.080 Violation—Penalty.

(A) The violation of any provision of this chapter, or failure to comply with any of the requirements of this chapter, shall constitute a misdemeanor; except that notwithstanding any other provision of this chapter, any such violation constituting a misdemeanor under this chapter may, at the sole discretion of the authorized enforcement officer, by charged and prosecuted as an infraction.

(B) In addition to the penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this chapter is a threat to the public health, safety and welfare, is declared and deemed a nuisance, may be summarily abated and/or restored by the authorized enforcement officer, and/or civil action to abate, enjoin or otherwise compel the cessation of such nuisance.

(1) The cost of such abatement and restoration shall be borne by the owner of the property and the cost thereof shall be invoiced to the owner of the property. If the invoice is not paid with sixty days, a lien shall be placed upon and against the property. If the lien is not satisfied within three months, the property may be sold in satisfaction thereof in a like manner as other real property is sold under execution.

(2) If any violation of this chapter constitutes a seasonal recurrent nuisance, the authorized enforcement officer shall so declare. Thereafter such seasonal and recurrent nuisance shall be abated every year without the necessity of any further hearing.

(3) In any administrative or civil proceeding under this chapter in which the city prevails, the city shall be awarded all costs of investigation, administrative overhead, out-of-pocket expenses, costs of suit and reasonable attorney fees.

(C) Penalties for Failure to Comply with BMPs. The authorized enforcement officer shall enforce this chapter as follows:

(1) For the first failure to comply with any provision of this chapter, the authorized enforcement officer shall issue to the affected person or business a written notice which includes the following information:

(a) A statement specifying the violation committed;

(b) A specified time period within which the affected person or business must correct the failure or file a written notice disputing the notice of failure to comply;

(c) A statement of the penalty for continued noncompliance.

(2) For each subsequent failure to comply with any provision of this chapter, following written notice issued pursuant to subsection (C)(1) of this section, the authorized enforcement officer may levy a penalty of one hundred dollars each day during which a person or business fails to comply with the provisions of this chapter. Each day following written notice shall constitute a separate offense. Said penalty shall be set by the city council resolution.

[...]

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Mark W. Steres
City Attorney for the City of Cerritos

//0.0

City of Downey

FUTURE UNLIMITED

YVETTE M. ABICH GARCIA
City Attorney

December 12, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013-1105

RE: Legal Authority Certification for the City of Downey

Dear Mr. Unger:

As the City Attorney for the City of Downey, I have reviewed the City's existing ordinances, applicable statutes, and/or applicable contracts and have determined that as of the date of this letter, the City can operate pursuant to the legal authority required in 40 CFR 122.26(d)(2)(i)(A)-(F) and Part VI.A.2 of Order No. R4-2012-0175, issued by the Regional Water Quality Control Board – Los Angeles Region ("RWQCB"), adopted on December 28, 2012 and entitled "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach (MS4)" [NPDES No. CAS004001] (the "2012 NPDES Permit"). Enforcement of the City's storm water ordinances can be completed administratively or, if necessary, through the judicial system.

This letter is limited to the matters contained herein, and should not be read as expressing any opinion on any other matter except on the matters expressly set forth herein.

Please call the undersigned if you have any questions.

Sincerely,

CITY OF DOWNEY

Yvette M. Abich Garcia
City Attorney

cc: John L. Hunter & Associates

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December 9, 2013

Lisa Rapp, Director of Public Works
City of Lakewood
5050 Clark Avenue
Lakewood, CA 90712

Re: Order No. R4-2012-0175
NPDES No. CAS004001

Dear Ms. Rapp:

In my capacity as City Attorney for the City of Lakewood (the "City"), I hereby confirm that the City has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR @ 122.26(d)(2)(i)(A-F) and the Order referenced above. Such legal authority is derived from Article 11, Section 7 of the California Constitution, Section 13002 of the California Water Code, and Section 5801 of the Lakewood Municipal Code, which incorporates by reference the pertinent provisions of the Los Angeles County Code.

The City is authorized to take enforcement action by administrative proceedings or in the judicial system.

Very truly yours,

Steven N. Skolnik

Long Beach Legal Authority

The legal authority certifications of the cities of the LCC are included in this section. The City of Long Beach's MS4 permit is on a separate timeline (effective date 15 months after the Los Angeles County-Wide MS4 Permit) and a legal authority letter will be submitted separately. A status report will be included in the Long Beach separate area WMP when submitted on or before March 28, 2015.

STATEMENT OF LEGAL AUTHORITY

Pursuant to Part VI.A.2.b. of Order No. R4-2012-0175, the City of Paramount has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013. This is made evident by municipal code citation to each of the following requirements found in Part VI.A.2.a:

1. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial or commercial activity and control the quality of storm water discharged from industrial and commercial sites. This requirement applies both to industrial and commercial sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.
   Municipal Code Section: Sec. 48-3.5. Prohibited discharges from industrial or commercial activity
2. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
3. Prohibit and eliminate illicit discharges and illicit connections to the MS4.
   Municipal Code Section: Sec. 48-3. Illicit discharges prohibited and Sec. 48-3.1. Installation or use of illicit connections prohibited
4. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
5. Require compliance with applicable Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
   Municipal Code Section: Sec. 48-3.8. Notification of uncontrolled discharges required.
6. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.
   Municipal Code Section: Sec. 48-5. Enforcement - Director's powers and duties
7. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.
8. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.

9. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;
   Municipal Code Section: Sec. 48-5.3. Inspection to ascertain compliance - Access
10. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;
   Municipal Code Section: Sec. 48-5.4. Notice to correct violations - Director may take action
11. Require that structural BMPs are properly operated and maintained.
   Municipal Code Section: Sec. 48-4.1. Best management practices for construction activity, 48-42, best managerial practices for industrial and commercial facilities.
12. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.
   Municipal Code Section: Sec. 48-4.3. Installation of structural BMPs

The City of Paramount legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Section *Sec. 48-5. Enforcement - Director's powers and duties*. Violations of this section are deemed a "Public Nuisance" in section 48-5.5, where any discharge in violation of this chapter, any illicit connection, and/or any violation of runoff management requirements shall constitute a threat to public health and safety.

Signature: John E. Cavanaugh
John E. Cavanaugh, City Attorney

Date: 12-3-13

ALESHIRE & WYNDER LLP
ATTORNEYS AT LAW

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December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Legal Authority Statement

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Signal Hill (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.100 Compliance with state and federal discharge requirements, and 12.16.112 Construction pollutant reduction

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

Municipal Code Section: 12.16.060 Illicit discharges

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Sections: 12.16.050 Illicit connections prohibited and 12.16.060 Illicit discharges

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 12.16.060 Illicit discharges and 12.16.080 Littering

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Section: 12.16.120 Inspection and enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 12.16.120 Inspection and enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take* *measurements, review and copy records, and require regular reports from entities discharging into its MS4;*

Municipal Code Section: 12.16.120 Inspection and enforcement

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.114 New development/redevelopment pollutant reduction, and 12.16.116 Small site new development/ redevelopment pollutant reduction

xi. *Require that structural BMPs are properly operated and maintained;*

Municipal Code Sections: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

Municipal Code Section: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 12.16.120 Inspection and enforcement. Here is the relevant text of that provision:

"12.16.120 Inspection and enforcement.

[…]

B. Enforcement.

1. Any violation of this chapter is a misdemeanor and shall be punishable by either a fine of up to one thousand dollars or six months in the county jail, or both.

2. Any person who may otherwise be charged with a misdemeanor as a result of a violation of this chapter may be charged, at the discretion of the prosecuting attorney, with an infraction punishable by a fine of not more than one

hundred dollars for the first violation, two hundred dollars for the second violation, and two hundred fifty dollars for each additional violation thereafter.

3. As a part of any sentence or other penalty imposed or the award of any damage, the court may also order that restitution be paid to the City or any injured person, or, in the case of a violator who is a minor, by the minor's parent or lawfully designated guardian or custodian. Restitution may include the amount of any reward.

4. Any person violating the provisions of this chapter shall reimburse the City for any and all costs incurred by the City in responding to, investigating, assessing, monitoring, treating, cleaning, removing, or remediating any Illicit Discharge or Pollutant from the municipal storm drain system; rectifying any Illicit Connection; or remediating any violation of this chapter.

Such costs to be paid to the City include all administrative expenses and all legal expenses, including costs and attorneys' fees, in obtaining compliance, and in litigation including all costs and attorneys' fees on any appeal. The costs to be recovered in this Section 12.16.120 shall be recoverable from any and all persons violating this chapter.

5. In the event any violation of this chapter constitutes an imminent danger to public health, safety, or the environment, the City Manager or Director, or any authorized agent thereof, may enter upon the premises from which the violation emanates, abate the violation and danger created to the public safety or the environment, and restore any premises affected by the alleged violation, without notice to or consent from the owner or occupant of the premises. An imminent danger shall include but is not limited to exigent circumstances created by the Discharge of Pollutants, where such Discharge presents a significant and immediate threat to the public health or safety, or the environment.

6. Violations of this chapter may further be deemed to be a public nuisance which may be abated by administrative or civil or criminal action in accordance with the terms and provisions of this code and state law.

7. All costs and fees incurred by the City as a result of any violation of this chapter which constitute a nuisance, including all administrative fees and expenses and legal fees and expenses, shall become a lien against the subject premises from which the nuisance emanated and a personal obligation against the owner, in accordance with Government Code Sections 38773.1 and 38773.5. The owner of record of the premises subject to any lien shall receive notice of the lien prior to recording, as required by Government Code Section 38773.1. The City Attorney is authorized to collect nuisance abatement costs or enforce a nuisance lien in an action brought for money judgment, or by delivery to the county

assessor of a special assessment against the premises in accordance with the conditions and requirements of Government Code Section 38773.5.

8. Any person acting in violation of this chapter may also be acting in violation of the Clean Water Act or the California Porter-Cologne Act (California Water Code Section 13000 et seq.) and the regulations thereunder, and other laws and regulations, and may be subject to damages, fines and penalties, including civil liability under such other laws. The City Attorney is authorized to file a citizen's suit pursuant to the Clean Water Act, seeking penalties, damages and orders compelling compliance and appropriate relief.

9. The City Attorney is authorized to file in a court of competent jurisdiction a civil action seeking an injunction against any violation or threatened or continuing violation of this chapter. Any temporary, preliminary or permanent injunction issued pursuant hereto may include an order for reimbursement to the City for all costs incurred in enforcing this chapter, including costs of inspection, investigation, monitoring, treatment, abatement, removal or remediation undertaken by or at the expense of the city, and may include all legal expenses and fees and any and all costs incurred relating to the restoration or remediation of the environment.

10. Each separate Discharge in violation of this chapter and each day a violation of this chapter exists, without correction, shall constitute a new and separate violation punishable as a separate infraction, misdemeanor and/or civil violation.

11. Whenever necessary, interagency coordination will be employed to enforce the provisions of this chapter.

12. The City may utilize any and all other remedies as otherwise provided by law."

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

David J. Aleshire
City Attorney for the City of Signal Hill

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December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For Los Angeles County Flood Control District's Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the Los Angeles County Flood Control District ("LACFCD"):

Certification Pursuant To Order Part VI(A)(2)(b)

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

LACFCD has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

Order Part VI(A)(2)(b)(i)

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code and LACFCD's Flood Control District Code ("Code") are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

LACFCD Code Chapter 21 - STORMWATER AND RUNOFF POLLUTION CONTROL including:

§21.01 Purpose and Intent

§21.03 Definitions

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.19 Conflicts With Other Code Sections

§21.21 Severability

§21.23 Violation a Public Nuisance

California Government Code §6502

California Government Code §23004

California Water Code §8100 *et. seq.*

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County of Los Angeles' ordinances, LACFCD's ordinances, and statutes relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited] LACFCD Code: §21.07 Prohibited Discharges
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited] LACFCD Code: §19.07 Interference With or Placing Obstructions, Refuse, Contaminating Substances, or Invasive Species in Facilities Prohibited §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §19.11 Violation a Public Nuisance §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.19 Conflicts With Other Code Sections §21.23 Violation a Public Nuisance
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 California Government Code §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 California Government Code §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	Los Angeles County Code: §12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
xi. Require that structural BMPs are properly operated and maintained.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.23 Violation a Public Nuisance
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

Los Angeles County Code:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

LACFCD Code:

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.23 Violation a Public Nuisance

LACFCD attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide LACFCD with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By [signature]
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj