



Santa Clara Valley  
Urban Runoff  
Pollution Prevention Program

# Watershed Monitoring and Assessment Program



## Urban Creeks Monitoring Report Part A: Low Impact Development (LID) Monitoring Status Report

*Water Year 2024 (October 2023 – September 2024)*

Submitted in compliance with provision C.8.h.iii.(3) of NPDES Permit No. CAS612008,  
Order No. R2-2022-018

**March 31, 2025**



This report is submitted by the agencies participating in the



City of Campbell  
City of Cupertino  
City of Los Altos  
Town of Los Altos Hills  
Town of Los Gatos

City of Milpitas  
City of Monte Sereno  
City of Mountain View  
City of Palo Alto  
City of San José

City of Santa Clara  
City of Saratoga  
City of Sunnyvale  
County of Santa Clara  
Valley Water

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## LIST OF ACRONYMS

ACCWP	Alameda Countywide Clean Water Program
ACS	American Chemical Society
AMS	Applied Marine Sciences
BAMSC	Bay Area Municipal Stormwater Collaborative
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
CCCWP	Contra Costa Clean Water Program
CEDEN	California Environmental Data Exchange Network
DMA	Drainage Management Area
DNQ	Detected not quantified
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EMC	Event Mean Concentration
EO	(Regional Water Board) Executive Officer
EPA	U.S. Environmental Protection Agency
FTS	Fluorotelomer Substance
FTCA	Fluorotelomer carboxylic acid
FTSA	Fluorotelomer sulfonic acid
GSI	Green Stormwater Infrastructure
HDPE	High density polyethylene
IMR	Integrated Monitoring Report
KEI	Kinnetic Environmental, Inc.
LID	Low Impact Development
MDL	Method Detection Limit
MLML	Moss Landing Marine Laboratories
MQO	Measurement Quality Objective
MRP	Municipal Regional Permit
MS4	Municipal separate storm sewer system
ND	Non-detect
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PCBs	Polychlorinated Biphenyls
PFAS	Per- And Polyfluoroalkyl Substances

*SCVURPPP UCMR Part A: LID Monitoring (WY 2024)*

POP	Probability of precipitation
QAPP	Quality Assurance Project Plan
QAPrP	Quality Assurance Program Plan
QPF	Quantitative Precipitation Forecast
RL	Reporting Limit
ROW	Right-of-way
RPD	Relative Percent Difference
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SM	Standard Methods
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SPE	Solid Phase Extraction
SSA	Solano Stormwater Alliance
SWAMP	Surface Water Ambient Monitoring Program
TAG	Technical Advisory Group
TCM	Treatment Control Measure
TOP	Total Oxidizable Precursors
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
UCMR	Urban Creeks Monitoring Report
WY	Water Year

## 1. INTRODUCTION

This *Urban Creeks Monitoring Report (UCMR) Part A: Low Impact Development (LID) Monitoring Status Report, Water Year<sup>1</sup> (WY) 2024* was prepared by the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP or Program), on behalf of its 15 member agencies (13 cities/towns, the County of Santa Clara, and Valley Water), which are subject to the National Pollutant Discharge Elimination System (NPDES) stormwater permit for Bay Area municipalities referred to as the Municipal Regional Permit (MRP).

The MRP was first adopted by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB or Regional Water Board) on October 14, 2009 as Order R2-2009-0074 (SFBRWQCB 2009; referred to as MRP 1.0). On November 19, 2015, the Regional Water Board updated and reissued the MRP as Order R2-2015-0049 (SFBRWQCB 2015; referred to as MRP 2.0). The current, and third, version of the MRP (i.e., MRP 3.0, SFBRWQCB 2022) was issued by the Regional Water Board as Order R2-2022-0018 and became effective July 1, 2022.

This report fulfills the requirements of provision C.8.h.iii.(1) of MRP 3.0 for summarizing LID monitoring accomplishments from the preceding water year (i.e., WY 2024) conducted in compliance with provision C.8.d (LID Monitoring) of the MRP<sup>2</sup>. Consistent with the requirements of Provision C.8.d, LID monitoring activities in WY 2024 focused on sample collection. This report summarizes LID monitoring actions during WY 2024. All analytical data were submitted for upload to the California Environmental Data Exchange Network (CEDEN).

## 2. BACKGROUND

Low Impact Development (LID) is a land planning and engineering design approach with a goal of reducing stormwater runoff and mimicking a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source, or onsite (EOA 2019). Incorporation of post-construction LID measures into new development and redevelopment projects has been a key aspect of SCVURPPP stormwater management for nearly 20 years, and each iteration of provision C.3 of the MRP has prescribed progressively more specific and stringent LID design and siting criteria.

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<sup>1</sup> Most hydrologic monitoring occurs for a period defined as a Water Year, which begins on October 1 and ends on September 30 of the named year. For example, Water Year 2024 (WY 2024) began on October 1, 2023 and concluded on September 30, 2024.

<sup>2</sup> Monitoring data collected pursuant to other C.8 provisions (e.g., Pollutants of Concern Monitoring, Pesticides & Toxicity Monitoring, and Trash Monitoring) are reported in other Parts of the SCVURPPP Urban Creeks Monitoring Reporting series (UCMR) for WY 2024.

During WY 2023, the Bay Area Municipal Stormwater Collaborative (BAMSC)<sup>3</sup> formed an LID Monitoring Workgroup to assist all MRP Permittees with compliance with Provision C.8.d. In addition to SCVURPPP, other members of the Workgroup include:

- Alameda Countywide Clean Water Program (ACCWP)
- Contra Costa Clean Water Program (CCCWP)
- San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)
- Solano Stormwater Alliance (SSA)

## 2.1. LID Monitoring Requirements

MRP 3.0 is the first version of the MRP to specifically require LID effectiveness monitoring for all Permittees. Provision C.8.d directs Permittees to conduct LID monitoring during the permit term, and identifies specific parameters and monitoring frequencies that must be achieved to address the following management questions:

1. What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, at different spatial scales (e.g., single control vs watershed or catchment scale), and how do they change over time?
2. What are the minimum levels of operations and maintenance (O&M) necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?

In Santa Clara County, a minimum of 25 water quality sampling events must be conducted during the MRP 3.0 permit term, with an annual minimum of three events beginning in WY 2024. Each sampling event must consist of paired flow- (or time) weighted composite samples of the LID facility influent and effluent collected with automated samplers. Provision C.8.d.iv of the MRP specifies that all composite samples must be analyzed for total mercury, total polychlorinated biphenyls (PCBs)<sup>4</sup>, total suspended solids (TSS), per- and polyfluoroalkyl substances (PFAS), total petroleum hydrocarbons (TPH), total and dissolved copper, total hardness, and hydrogen ion concentration (pH). In addition, flow must be measured at both influent and effluent sampling locations. Through ongoing discussions with Water Board staff and Technical Advisory Group (TAG) members, additional analytes were incorporated into the monitoring design, which include dissolved mercury and dissolved and total zinc. Permittees also agreed to measure flow continuously throughout the wet season at both influent and effluent sampling locations.

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<sup>3</sup> The Bay Area Stormwater Management Agencies Association (BASMAA) recently dissolved as a formal non-profit organization, but its members continue to meet as an informal organization called the Bay Area Municipal Stormwater Collaborative (BAMSC).

<sup>4</sup> Total PCBs are calculated as the sum of the Regional Monitoring Program (RMP) 40 congeners which include: PCB-8, PCB-18, PCB-28, PCB-31, PCB-33, PCB-44, PCB-49, PCB-52, PCB-56, PCB-60, PCB-66, PCB-70, PCB-74, PCB-87, PCB-95, PCB-97, PCB-99, PCB-101, PCB-105, PCB-110, PCB-118, PCB-128, PCB-132, PCB-138, PCB-141, PCB-149, PCB-151, PCB-153, PCB-156, PCB-158, PCB-170, PCB-174, PCB-177, PCB-180, PCB-183, PCB-187, PCB-194, PCB-195, PCB-201, PCB-203.

Permittees were required to develop LID Monitoring Plans at the regional or countywide level that demonstrate how the requirements in provision C.8.d.iii-iv will be met. Permittees were required to submit their Monitoring Plans to the Water Board Executive Officer (EO) for approval by May 1, 2023, and begin implementation of their approved or conditionally approved Monitoring Plans by October 1, 2023 (WY 2024).

## **2.2. Technical Advisory Group**

To assist development and implementation of scientifically-sound LID Monitoring Plans, to facilitate regional consistency with respect to sampling and analytical methodology, and to make recommendations about allocation of samples between and within different sites, provision C.8.d.ii required Permittees to form and convene a Technical Advisory Group (TAG). The TAG includes impartial science advisors and Water Board staff. The TAG must meet biannually prior to approval or conditional approval of the LID Monitoring Plans, and annually thereafter.

During WY 2023, the BAMSC LID Monitoring Workgroup formed and convened a TAG, which included the following science advisors and Water Board staff:

- Keith Lichten, Division Chief at the San Francisco Bay Regional Water Board.
- Alicia Gilbreath, Environmental Scientist at the San Francisco Estuary Institute (SFEI).
- Dipen Patel, Research Engineer at the Office of Water Programs at Sacramento State.
- Eric Strecker, Professional Engineer in California and Oregon and principal investigator of the International BMP Database for over 20 years.
- Michael K. Stenstrom, Distinguished Professor at UCLA Civil and Environmental Engineering Department.

During WY 2024, the LID TAG met once, on April 19, 2024. The focus of that meeting was discussion related to revisions of LID Monitoring Plans, as described in Section 2.3.2 below.

## **2.3. LID Monitoring Plans**

The LID Monitoring Plans must explain how the monitoring will address the management questions, describe the LID facilities that will be monitored, list monitoring parameters and analytical methods, describe monitoring equipment and methods, establish a monitoring schedule, describe data evaluation methods, include a Quality Assurance Project Plan (QAPP), provide annual cost estimates for implementation of the plan, and explain how sampling and analytical methods will be regionally consistent.

### **2.3.1. LID Monitoring Plan Submitted During WY 2023**

SCVURPPP Co-permittees submitted their LID Monitoring Plan to the Water Board on May 1, 2023. Near the end of WY 2023, the Water Board conditionally approved all of the LID Monitoring Plans submitted by MRP Permittees in a letter sent to the BAMSC stormwater programs on August 23, 2023. The Conditional Approval added several new and potentially significant monitoring requirements and required development and submittal of a revised monitoring plan and QAPP to provide expanded discussion and/or clarification of selected topics. However, Water Board staff agreed that monitoring in WY 2024 could follow the

approaches described in the May 1, 2023 LID Monitoring Plan and QAPP (i.e., SCVURPPP 2023 and AMS 2023).

### **2.3.2. LID Monitoring Plan Revisions During WY 2024**

In the conditional approval of the LID Monitoring Plans submitted in WY 2023, Water Board staff requested additional meetings with the BAMSC programs to discuss and resolve all remaining issues. The BAMSC LID Monitoring workgroup held a series of meetings with Water Board staff beginning in September 2023 to propose responses to Water Board comments and find resolution prior to developing and submitting revised LID Monitoring Plans. These discussions continued throughout the fall season and were able to resolve a number of the issues raised in the Conditional Approval letter. However, there were several remaining issues that required TAG input. Discussion of these remaining issues was the primary focus of the LID TAG meeting that was held on April 19, 2024. Some of the issues that were discussed with the TAG included the addition of continuous turbidity monitoring, analysis of dissolved mercury, field filtering (vs. lab filtering) for dissolved parameters, addition of influent/effluent sample tubing field blanks at the end of each wet season, and refinement of storm criteria. Following the April TAG meeting, the BAMSC LID Monitoring Workgroup summarized the TAG and Water Board comments and proposed revisions to the LID Monitoring Plans to address all remaining issues and reflect improved understanding gained during the initial year of monitoring implementation. In August 2024, a final meeting with Water Board staff was held to discuss the proposed LID Monitoring Plan updates and revisions.

Working in collaboration with BAMSC LID Monitoring Workgroup, the SCVURPPP LID Monitoring Plan was revised to reflect better understanding of facility functioning and issues faced during WY 2024 monitoring, and to address all Water Board comments on the plans submitted in May 2023. Per agreement with Water Board staff, a revised LID Monitoring Plan was submitted to the Water Board on October 31, 2024 (SCVURPPP 2024). All new elements in the revised LID Monitoring Plan will be implemented starting in Water Year 2025, or as described in the Final Revised SCVURPPP Monitoring Plan (SCVURPPP 2024). The new or revised monitoring methods that are different from the methods presented in Section 3.0 that were implemented in WY 2024 and are described in Section 7.0 (Planned Monitoring during WY 2025).

## **2.4. Reporting Requirements**

Permittees are required to submit annual LID Monitoring Status Reports no later than March 31 with each Urban Creeks Monitoring Report, reporting on all data collected during the foregoing water year. Provision C.8.h.iii.(1) requires that LID Monitoring Status Reports include the information listed below.

- (a) A summary of the LID Monitoring Methods and study designs used in the preceding water year, at each sampled LID component, facility or system.
- (b) A summary table that lists monitoring samples collected during the preceding water year during the Permit term, including at a minimum, the following information for each sample location: Site ID; the name or ID of the LID component, facility or system name; latitude and longitude of the LID component, facility or system; type of LID component, facility or system (e.g., bioretention); characteristics and land use of the tributary drainage area of the LID component, facility or system; other management actions and

controls present in the tributary drainage area of the LID component, facility or system; sample dates; and concentrations of parameters measured.

- (c) A summary of lessons learned, progress made, and interim conclusions, for all samples collected during the previous water year.
- (d) For all data generated during the preceding water year, a statement of data quality.
- (e) The raw data generated by the preceding water year, made available to the Water Board and third parties.
- (f) An outline of steps (including but not limited to study designs, methods and sites) for the upcoming water year.
- (g) An analysis of the data, including the following:
  - a. Identification and analysis of any trends in stormwater or receiving water quality.
  - b. A discussion of the data for each monitoring program component, which includes:
    - i. Monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, the California Toxics Rule, and other applicable water quality control plans;
    - ii. Where appropriate, hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;
    - iii. Identification and prioritization of water quality problems;
    - iv. Identification of potential sources of water quality problems;
    - v. Description of follow-up actions;
    - vi. Evaluation of the effectiveness of existing control measures; and
    - vii. Identification of management actions needed to address water quality problems.

The remainder of this report presents the required reporting information for WY 2024 LID Monitoring conducted by SCVURPPP on behalf of all SCVURPPP Co-permittees.

### 3. WY 2024 STUDY DESIGN AND METHODS

The study design and monitoring methods used during WY 2024 were based on the conditionally approved LID Monitoring Plan that was submitted to the Water Board in May 2023 (SCVURPPP 2023). The monitoring approach, methods used and sampling locations are summarized in this section. For SCVURPPP, the Project Team consisted of Program Staff and the monitoring contractor hired to conduct all LID monitoring (Kinnetic Environmental Inc., KEI).

#### 3.1. Overall Monitoring Approach

The Project Team identified two main monitoring tasks to address the management questions identified in Section 2.1.

- Task 1. Stormwater sampling - Stormwater sampling of paired influent and effluent water quality and flow volume will be conducted at two LID facilities during multiple storm events throughout the permit term. Stormwater sampling will provide data on individual bioretention facilities treating defined drainage areas to evaluate the pollutant removal and hydrologic benefits of these facilities and changes over time (Management Question 1). Flow-weighted composite samples will be used to estimate pollutant treatment effectiveness by comparing influent vs. effluent water quality at each monitoring location. Hydrology will be evaluated by identifying sources and sinks of water flow into and out of each facility and directly measuring each where possible. Specific monitoring questions that can be addressed by the water quality and hydrologic monitoring described here include:
  1. Are there significant differences between influent water quality and effluent water quality for individual analytes?
  2. How does pollutant treatment effectiveness for sediment-associated pollutants (i.e., TSS) compare with those that are not sediment-associated (i.e., dissolved copper)?
  3. Does the facility effluent achieve water quality goals?
  4. How much does the treatment facility reduce runoff volumes?
  5. How does the combined effect of treatment (i.e., pollutant concentration reduction/enhancement and runoff volume reduction) affect loads to receiving waters?
  6. How much runoff is treated vs. bypasses the facility?
  7. How much does the treatment facility decrease peak runoff rates?

For the Project, the stormwater monitoring data will be used to estimate pollutant treatment effectiveness by comparing influent vs. effluent streams at each monitoring location and comparing effluent concentrations to receiving water quality objectives. Sampling will attempt to represent the entire storm duration using flow-weighted composite autosamplers so that event mean concentrations (EMCs) for each analyte can be estimated.

In addition to measurement of pollutant concentrations at influent and effluent points for each facility, hydrology will be monitored by identifying sources and sinks of water flow into and out of each facility and directly measuring each where possible. Each facility will have continuous flow measurements collected at influent and effluent points. The Project

will also estimate in-basin bypass, or flow that is only partially treated by detention within the facility but not fully treated by filtration through soil media<sup>5</sup>.

- Task 2. Assessing O&M Impacts - Ongoing O&M actions at monitored LID facilities will be documented during periodic site assessments to evaluate the necessary level of O&M required to maintain proper functioning of the facilities (Management Question 2). Documenting O&M actions will provide qualitative and quantitative data. Maintenance-related monitoring questions include:
  1. Is the manufacturer / designer recommended level of maintenance sufficient to achieve optimal system performance?
  2. Do the results suggest needed changes to the recommended inspection and maintenance protocols and/or facility design?
  3. How does flow into the facilities vary as a function of time elapsed from previous maintenance?
  4. How do pollutant concentrations vary as a function of time elapsed from previous maintenance?
  5. What were the catchment conditions that may have affected observed variations in flow?

The SCVURPPP efforts focus on monitoring two similarly constructed bioretention facilities in similar catchments with similar levels and types of O&M actions throughout the length of the study. Maintenance assessments conducted periodically throughout each rainy season will be used to document the maintenance status of each facility over the course of the permit term and provide data to evaluate if the necessary level of O&M to maintain proper functioning of the facilities was accomplished during the Project. These data will also be compared with data from facilities monitored by regional partners that had different levels and types of ongoing O&M during the Project.

### **3.2. LID Monitoring Sites**

The two LID facilities selected for monitoring during this Project include Treatment Control Measure 4 (TCM4) and Treatment Control Measure 6 (TCM 6) located in the public right-of-way (ROW) at the Top Golf Public Green Street Project in the City of San José (Figure 3.1). Each facility, constructed in 2022, is a concrete flow-through bioretention planter box with a partially open bottom. The facilities are located within a 240-acre catchment in the Alviso neighborhood as shown on Figure 3.1. The catchment is at the downstream end of the much larger (181 square-mile) Guadalupe River watershed. Stormwater in the catchment flows roughly to the north-east and drains to the Alviso Pump Station, where the flows are pumped directly into the Guadalupe River just upstream of where the river connects to the Alviso Slough and drains into the Bay. Land uses in the catchment include approximately 30 acres of old industrial, 20 acres of old commercial/old transportation, 100 acres of old residential, 41 acres of new urban, and the remaining areas are open space. The immediate project area underwent major redevelopment in recent years including redevelopment of the 30-acre area adjacent to the

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<sup>5</sup> There are two types of bypass that are possible with typical bioretention facility design: (1) street bypass that does not enter the treatment facility due to limited capacity and/or obstructions, and (2) in-basin bypass that enters the cell but exceeds the facility's filtration capacity and flows directly to an overflow drain. This Project will only measure in-basin (i.e., overflow) bypass at each of the facilities in this Project.

project site with the Top Golf venue and major roadway improvements on North First Street that included widening, regrading and repaving of the street, and construction of new sidewalks and curbs and gutters. Because the major roadway improvement project on North First Street met the definition of a provision C.3 regulated project under the previous MRP<sup>6</sup>, bioretention facilities were constructed to treat drainage from North First Street as part of this project following all C.3 regulated project requirements.

### 3.2.1. Sampling Stations

Each facility has two primary sampling stations: (1) an influent sampling station, and (2) an effluent sampling station. The locations of these sampling stations at TCM6 are shown in Figure 3.2. Each facility has two trench drain curb openings to allow inflow to the units. At each facility, the influent sampling station is configured with a tray between the two inlets to allow flows from both inlets to come together prior to sampling. The influent sampling station set-up at TCM4 is shown in Figure 3.3. The effluent sampling station at each facility is located within the underdrain pipe as it discharges into the overflow riser vault. In-basin bypass that enters each facility, but exceeds the facility's filtration capacity and flows directly to the overflow drain is measured with a water-level sensor installed at the overflow vault. In-basin bypass is partially treated by detention within the facility but not fully treated by filtration through soil media. The in-basin bypass and effluent sampling station set-ups at TCM6 are shown in Figure 3.4.

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<sup>6</sup> MRP 2.0 (Order No. R2-2015-0049; Permit No. CAS612008) provision C.3.b.ii(4) defines road widening projects that add new traffic lanes and create 10,000 SF or more of newly constructed contiguous impervious surfaces as C.3 regulated projects subject to the LID and numeric sizing criteria requirements in provisions C.3.c and C.3.d.

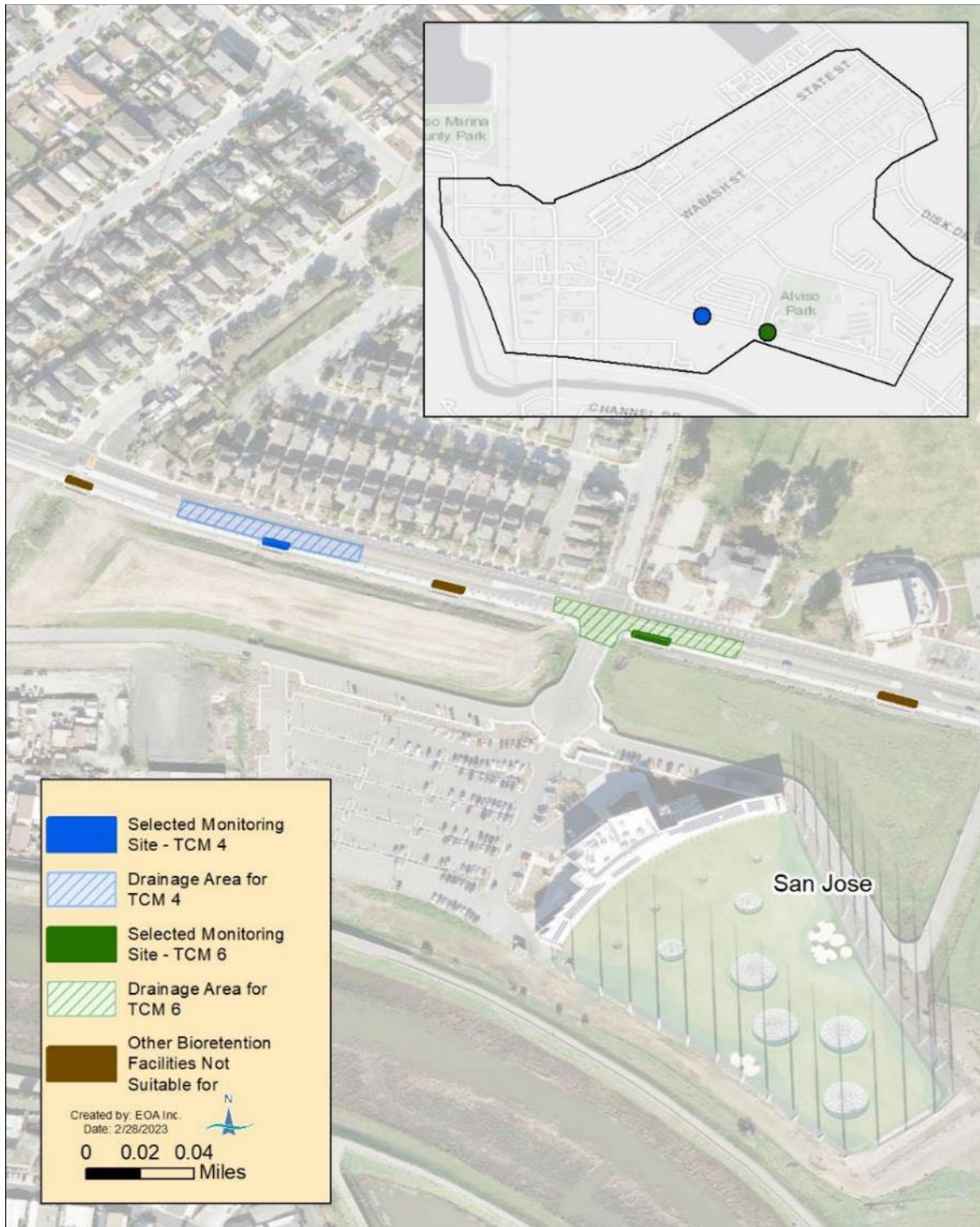


Figure 3.1 Location and drainage areas of two LID monitoring sites at the Top Golf Public Green Streets Project in San José, CA.

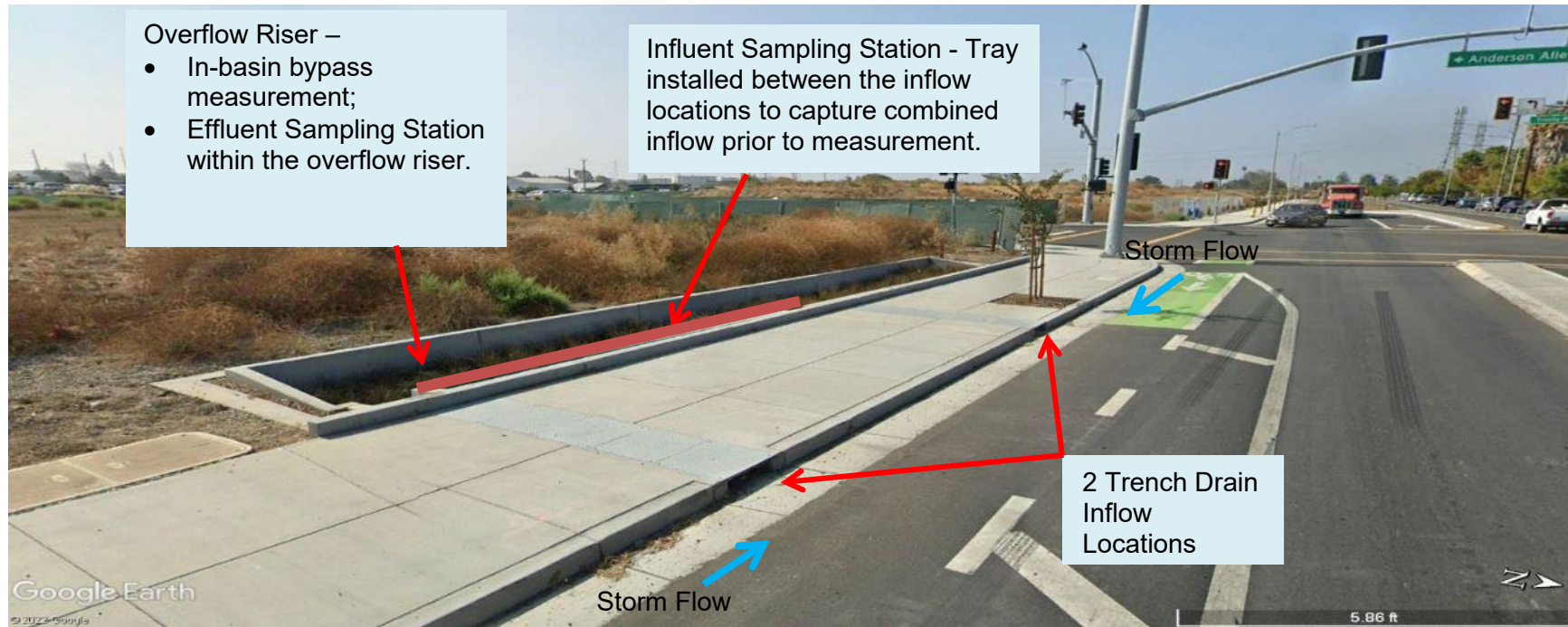


Figure 3.2 Approximate locations of influent and effluent sampling stations and in-basin bypass measurement location at TCM6 at the Top Golf Public Green Streets Project in San José, CA.



Figure 3.3 Influent collection device, weir, and ISCO enclosure at TCM4 at the Top Golf Public Green Streets Project in San José, CA.



Figure 3.4. Effluent measurement device installed within the overflow vault (left), and the in-basin bypass measurement device installed outside the overflow vault (right) at TCM6 at the Top Golf Public Green Streets Project in San José, CA.

### **3.3. Monitoring Methods**

#### **3.3.1. Flow Monitoring**

The influent flow to each facility is directly measured with a compound vee-notch weir primary flow device located at the end of the influent collection tray constructed to combine flows from the two trench drain inlets to each bioretention facility (Figure 3.3). Secondary flow measurement devices include a bubbler water level sensor that is connected to a programmable, remotely operated datalogger / controller. In-basin bypass within each facility is measured with a bubbler water level sensor located next to the overflow riser (Figure 3.4).

The effluent flow is measured with a compound vee-notch weir that is installed at the end of the underdrain pipe as it discharges into the overflow riser vault (Figure 3.4). Flow monitoring equipment will be active throughout the wet-weather season so that flow rates and storm volume may be documented for sampled events as well as for non-sampled events.

#### **3.3.2. Precipitation Monitoring**

A calibrated tipping-bucket rain gauge was installed at the monitoring location to estimate rainfall within the Drainage Management Area (DMA) to the study site. The rain gauge will be re-calibrated at least annually.

#### **3.3.3. Water Quality Sample Collection**

Water level sensors at the influent and effluent points for each monitoring facility were connected to programmable, remotely operated datalogger/controller to measure the volume of stormwater passing through the influent and effluent locations, and independently trigger automated sample collection at equal volume intervals for the influent station and separate equal volume intervals for the effluent station. The equal volume intervals, or pacing values, for the influent station and the effluent station were selected for each monitoring event based on the following factors: DMA, runoff coefficient (average percent imperviousness), quantitative precipitation forecast (QPF), probability of precipitation (POP), antecedent dry period, volume of each aliquot (1 L), and the minimum sample volume required for laboratory analysis (approximately 10 L). A pacing value spreadsheet will be developed for each station, and over time, a rating curve will be developed and continually refined based on empirical data of runoff (e.g., the ratio of volume to rainfall).

Water quality sampling equipment was selected to best ensure compliance with MRP 3.0 permit conditions, and to the maximum extent practicable, to be consistent with standard sample collection and analysis methods. Key components of the sampling equipment employed include:

- Programmable autosamplers (Teledyne ISCO®)
- Styrene-ethylene-butylene-styrene (SEBS) pump roller tubing, replaced each event
- High density polyethylene (HDPE) intake tubing, replaced per monitoring season
- Stainless steel intake strainer
- Borosilicate glass carboys

- Dual carboy stainless steel solenoid valve

Specific compromises were made in sample collection techniques in order to best achieve the overall goals of the sampling design while maintaining permit compliance. These compromises included use of autosamplers for some analytes that are typically sampled manually, delaying filtering past typical requirements for some analytes, and use of alternative materials (e.g., monitoring for PFAS precluded use of Teflon® tubing, which is typical for PCBs analysis). A full list of variations from standard methods is detailed in the Monitoring Plan (SCVURPPP 2023).

#### **3.3.4. Sample Handling**

At the conclusion of each sampling event, field staff decommissioned sampling stations and transferred sample media to Caltest Laboratories (Caltest) for processing and analysis. As part of this process, field staff capped and removed individual carboys from job boxes, completed labeling, replenished ice, and transferred all carboys to Caltest. Upon receipt, Caltest staff filled analyte-specific sample containers from the carboys, processed samples intended for internal analysis, and distributed sample material to subcontract / collaborating laboratories (i.e., Pace Analytical for TPH and Enthalpy Analytical for PCBs and PFAS).

#### **3.3.5. Laboratory Analyses**

WY 2024 samples were analyzed for parameters selected from the following suite: pH, hardness, TSS, TPH as diesel and motor oil, total and dissolved copper, total and dissolved mercury, total and dissolved zinc, total PCBs and PFAS, as shown in Table 3.1.

Table 3.1. WY 2024 LID monitoring analytes, analytical methods, reporting limits and holding times.

Water Analytical Test	Method	Reporting Limit	Holding Time
pH			Immediate
Hardness as CaCO <sub>3</sub>	SM 2340 C	5.0 mg/L	6 months
Total Suspended Solids (TSS)	SM 2540 D	3.0 mg/L	7 days
TPH as Diesel C12-C24	EPA 8015	200 µg/L <sup>a</sup>	7 days until extraction, 40 days to analyze
TPH as Motor Oil C24-C36	EPA 8015	500 µg/L <sup>b</sup>	7 days until extraction, 40 days to analyze
Total Copper	EPA 200.8	0.50 µg/L	6 months following acidification
Total Mercury	EPA 1631E	0.0005 µg/L	90 days following acidification
Total Zinc	EPA 200.8	1.0 µg/L	6 months following acidification
Dissolved Copper	EPA 200.8	0.50 µg/L	Filter immediately, 6 months following acidification
Dissolved Mercury	EPA 1631E	0.0005 µg/L	Filter immediately, 90 days following acidification
Dissolved Zinc	EPA 200.8	1.0 µg/L	Filter immediately, 6 months following acidification
PCBs (RMP 40 congeners) <sup>c</sup>	EPA 1668C	10 - 40 pg/L <sup>d</sup>	1 year until extraction, 1 year after extraction to analyze
PFAS <sup>e</sup>	EPA 1633	1.42 – 8.00 ng/L <sup>d</sup>	28 days until extraction, when stored at 0 - 6°C

a Starting in WY 2025, TPH as Diesel will have an RL of 50 µg/L.

b Starting in WY 2025 TPH as Motor Oil will have an RL of 100 µg/L.

c San Francisco Bay Regional Monitoring Program (RMP) 40 PCB congeners include PCB-8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, and 203.

d A range is given for reporting limits (RLs) due to varying values for the individual congeners.

e Analysis included the following 40 PFAS: Perfluorobutanoate, Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid, 11-, Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid, 9-, Dioxo-3H-Perfluorononanoate Acid, 4,8-, Ethyl Perfluorooctane Sulfonamido Acetic Acid, N-, Ethyl-perfluorooctanesulfonamidoethanol, N-, Fluorotelomer Carboxylic Acid, 3:3-, Fluorotelomer Carboxylic Acid, 5:3-, Fluorotelomer Carboxylic Acid, 7:3-, Fluorotelomer Sulfonate, 4:2-, Fluorotelomer Sulfonate, 6:2-, Fluorotelomer Sulfonate, 8:2-, Methyl Perfluorooctane Sulfonamido Acetic Acid, N-, Methyl Perfluorooctane Sulfonamido Acetic Acid, N-, Methyl-perfluorooctanesulfonamide, N-, Methyl-perfluorooctanesulfonamidoethanol, N-, Perfluoro(2-ethoxyethane)sulfonic acid, Perfluoro-2-Propoxypropanoic Acid, Perfluoro-3,6-dioxaheptanoate, Perfluoro-3-methoxypropanoate, Perfluoro-4-methoxybutanoate, Perfluorobutanesulfonate, Perfluorodecanesulfonate, Perfluorodecanoate, Perfluorododecanesulfonate, Perfluorododecanoate, Perfluoroheptanesulfonate, Perfluoroheptanoate, Perfluorohexanesulfonate, Perfluorohexanoate, Perfluorononanesulfonate, Perfluorononanoate, Perfluorooctanesulfonamide, Perfluorooctanesulfonate, Perfluorooctanoate, Perfluoropentanesulfonate, Perfluoropentanoate, Perfluorotetradecanoate, Perfluorotridecanoate, Perfluoroundecanoate.

EPA U.S. Environmental Protection Agency

SM Standard Methods for the Examination of Water and Wastewater, American Public Health Association

## 4. WY 2024 LID MONITORING ACCOMPLISHMENTS

During WY 2024, SCVURPPP began conducting LID Monitoring at TCM4 and TCM6 at the Top Golf Public Green Street Project in San José, CA. Throughout WY 2024, SCVURPPP also continued to work with other countywide stormwater programs as part of the BAMSC LID Monitoring Workgroup. The BAMSC LID Monitoring Workgroup met every other month to discuss implementation of LID monitoring, sampling and equipment issues, revisions to the LID monitoring plans, and to plan the annual TAG meeting. The BAMSC LID Monitoring Workgroup also facilitated ongoing discussions with Water Board staff and the TAG.

### 4.1. Description of Monitoring Activities

All flow and water quality monitoring equipment was installed prior to the start of the WY 2024 rainy season. Under agreement with Water Board staff, the initial storm events in WY 2024 were used by SCVURPPP monitoring staff to observe the effect of monitoring-related modifications made to the facilities upon site hydrology and to better understand the relationship between rainfall and runoff to set pacing values for autosamplers.

#### 4.1.1. Hydrologic Monitoring

Hydrologic monitoring consisted of continuous data collection of rainfall depth, influent flow rate, effluent flow rate, and ponding depth. Water-level bubblers used to determine influent and effluent flows were procured, bench-tested, and installed in late WY 2023, prior to the WY 2024 rainy season. The first storm event of WY 2024 took place on October 17<sup>th</sup>. Only hydrologic monitoring was conducted during this event. Unfortunately, this and subsequent events in early WY 2024 identified problems with the bubblers used to measure flow rates. The bubbler units proved to fail under field conditions by not returning reliable data over fluctuating temperatures. After unsuccessfully working with the manufacturer to troubleshoot the issue, BAMSC Programs made the collective decision to replace the faulty bubblers in use at all LID monitoring stations. The faulty bubblers were returned to the manufacturer, Teledyne ISCO, for replacement with bubblers from another manufacturer, Campbell Scientific Instruments. Replacement of the bubbler units delayed the collection of reliable depth data from the target date of October 1, 2023 to the actual date of January 2, 2024. All flow data collected prior to installation of the replacement bubblers are considered highly uncertain and were rejected.

Hydrographs for rainfall and flow monitoring conducted during the entire WY 2024 sampling season are presented in Figures 4.1 (TCM4) and 4.2 (TCM6). After the replacement bubblers were installed, influent and effluent were successfully measured throughout the remainder of the rainy season during WY 2024 at TCM6. At TCM4, only influent was observed, with a gap between February and March when the influent bubbler was temporarily removed to support LID monitoring at a site in San Mateo County so at least one site per county was operational while waiting for all the replacement bubblers to arrive. One issue that was noted at TCM4 was that influent volume was low for the expected drainage area. The Project Team theorized that relatively small storms were likely 100% infiltrated, resulting in no observed effluent flow. However, in subsequent larger storm events, the Project Team also discovered leaks in the overflow vault which caused any effluent to bypass the flow monitoring equipment. Initially the Project Team attempted to patch these leaks, however the patches proved insufficient. The City of San José construction contractor was required to conduct a more extensive repair of the

system to stop the leaks, which was done at the end of the rainy season (May 2024). Therefore, no effluent flow was observed at TCM4 during the entirety of the WY 2024 monitoring period.

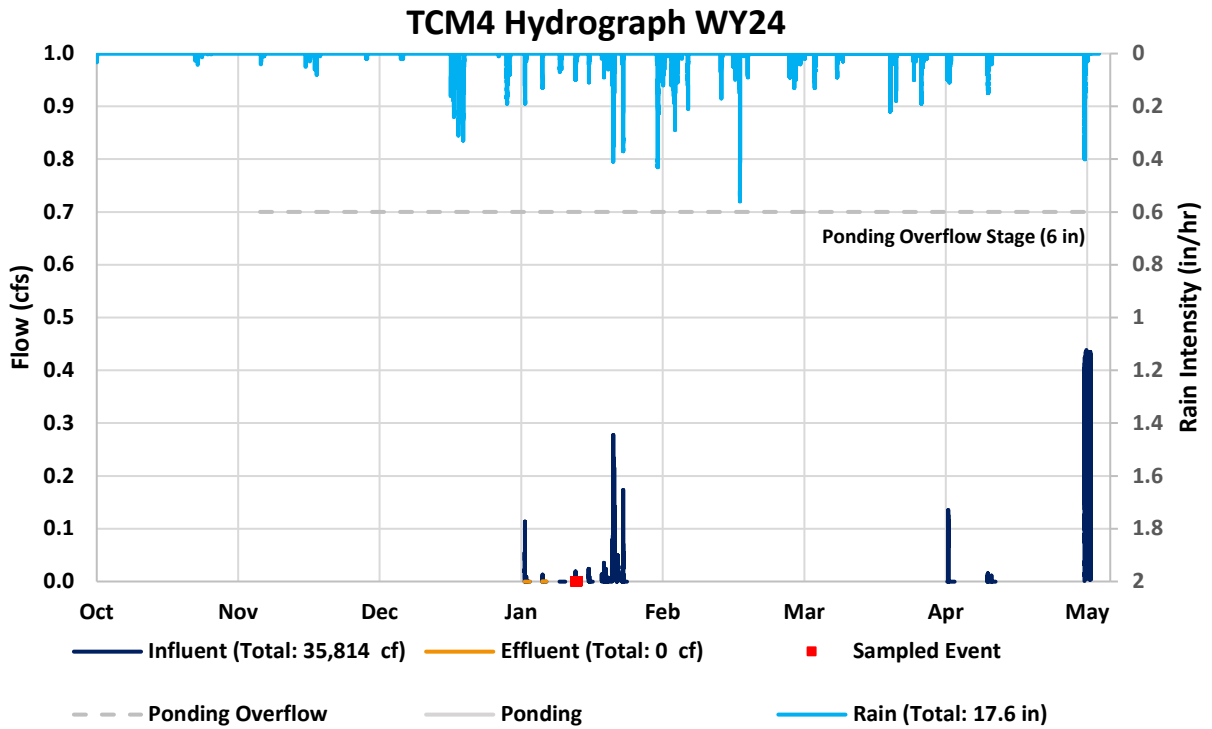


Figure 4.1. Hydrology data measured during WY 2024 at TCM4 in San José, CA.

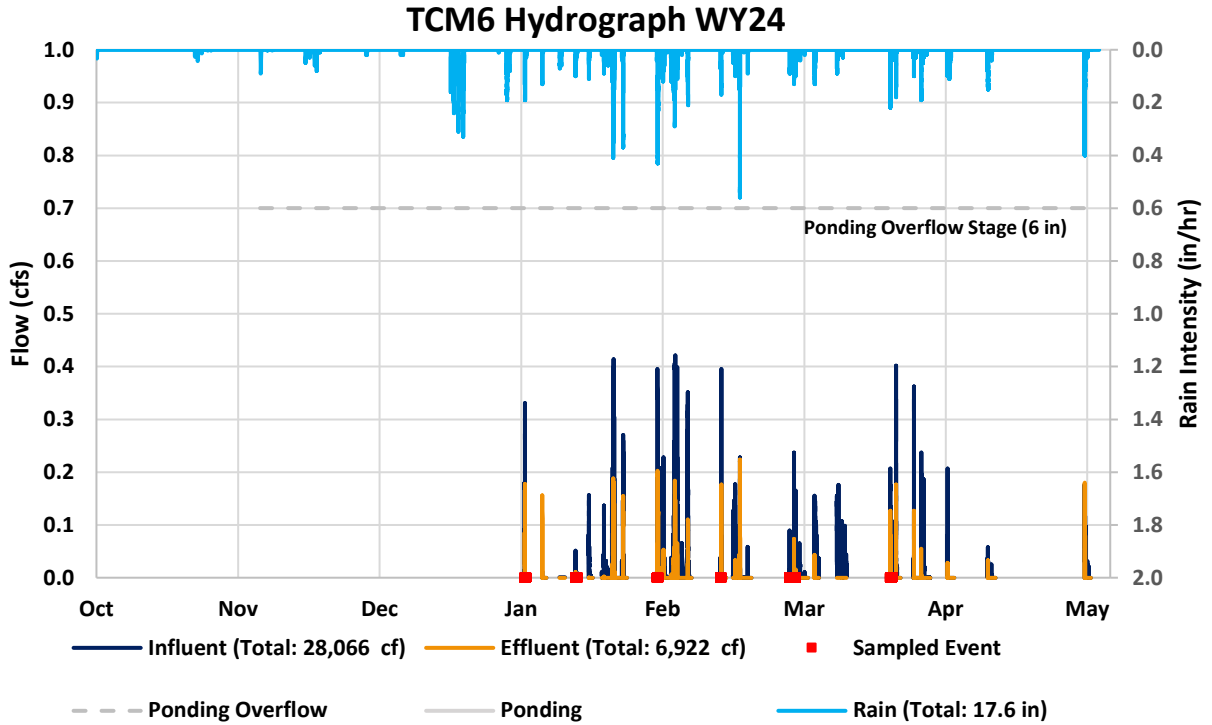


Figure 4.2. Hydrology data measured during WY 2024 at TCM6 in San José, CA.

#### 4.1.1. Water Quality Monitoring

During WY 2024, SCVURPPP successfully completed seven water quality sampling events over the course of six storms. Six events were completed at TCM6 and one at TCM4. Statistics for each water quality sampling event are detailed in Table 4.1 and Table 4.2. Hydrographs for each successful sampling event are shown in Figures 4.3 through 4.9.

**Table 4.1. Water Year 2024 water quality storm event statistics at TCM6, San José, CA.**

Storm Number	Storm Date	Antecedent Dry Period (Hours)	Total Rainfall (inches)	Rainfall Duration (hours)	Maximum Rainfall Intensity (in/hr) <sup>a</sup>	Influent Total Storm Volume (cf)	Effluent Total Storm Volume (cf)	Max Ponding Stage (in)	No. of Influent / Effluent Samples	% Storm Capture Influent / Effluent	% Volume Reduction
1	01/03/2024	75	0.41	9	0.18	457	234	0.00	12 / 16	66 / 90	49%
2	01/14/2024	71	0.31	12	0.08	243	6	1.34	16 / 0	100 / NA <sup>b</sup>	98%
3	02/01/2024	174	1.11	8	0.38	1,344	904	4.85	27 / 31	100 / 100	33%
4	02/14/2024	169	0.25	5	0.17	370	146	NM <sup>c</sup>	21 / 8	100 / 80	61%
5	03/02/2024	256	0.47	33	0.13	583	49	NM <sup>c</sup>	24 / 6	100 / 86	92%
6	03/23/2024	249	0.58	11	0.18	655	236	0.00	21 / 15	100 / 100	64%

- a Maximum Rainfall Intensity (in/hr) is calculated over 60-minute integration intervals.
- b NA = Not Applicable - no effluent sample was collected due to low storm volume.
- c NM = Not Measured due to equipment issues.

**Table 4.2. Water Year 2024 water quality storm event statistics at TCM4, San José, CA.**

Storm Number	Storm Date	Antecedent Dry Period (Hours)	Total Rainfall (inches)	Rainfall Duration (hours)	Maximum Rainfall Intensity (in/hr) <sup>a</sup>	Influent Total Storm Volume (cf)	Effluent Total Storm Volume (cf)	Max Ponding Stage (in)	No. of Influent / Effluent Samples	% Storm Capture Influent / Effluent	% Volume Reduction
2	01/14/2024	71	0.31	12	0.08	114	NM <sup>b</sup>	NM <sup>b</sup>	10 / 0	100 / NA <sup>c</sup>	100%

- a Maximum Rainfall Intensity (in/hr) is calculated over 60-minute integration intervals.
- b NM = Not Measured due to low storm volume which allowed full infiltration of all influent to the facility, resulting in no effluent flow.
- c NA = Not Applicable - no effluent sample was collected due to low storm volume.

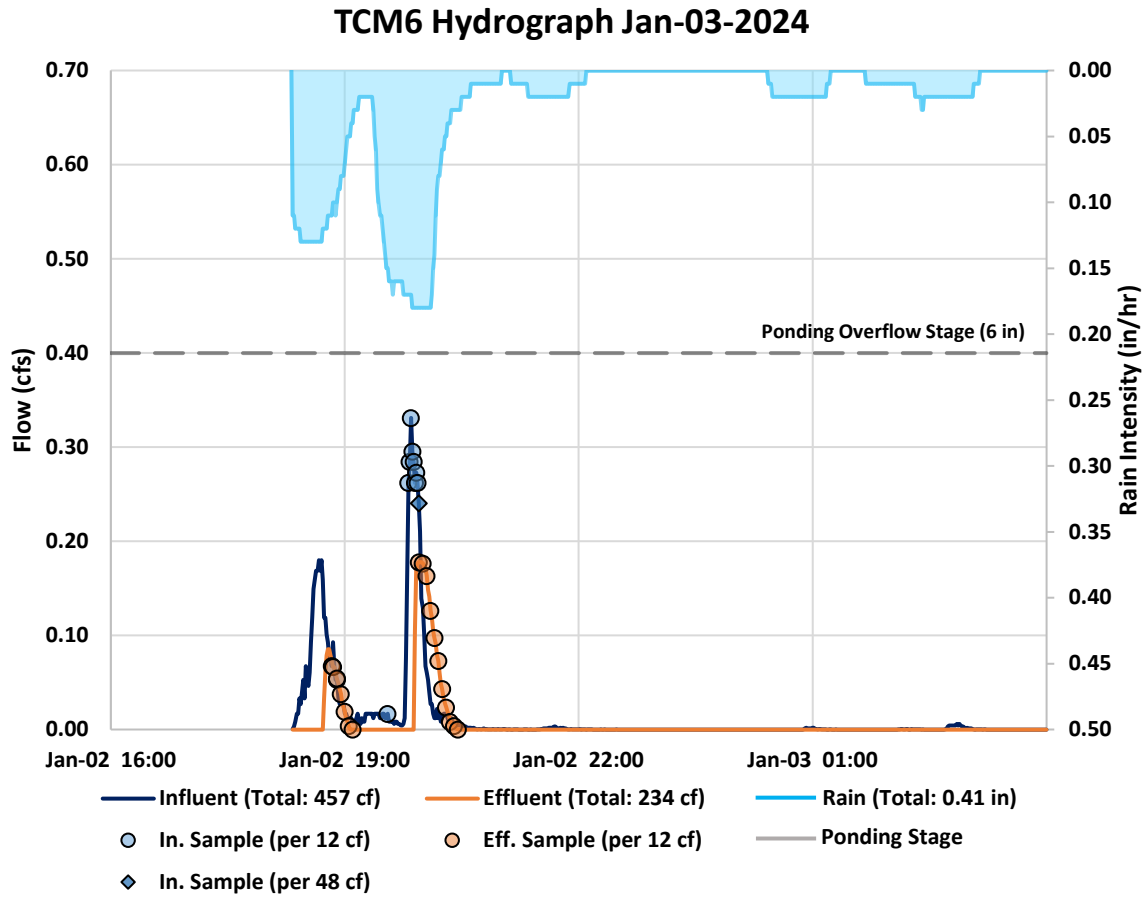


Figure 4.3. Rainfall, flow and sample collection during storm event 1 at TCM6 in San José, CA..

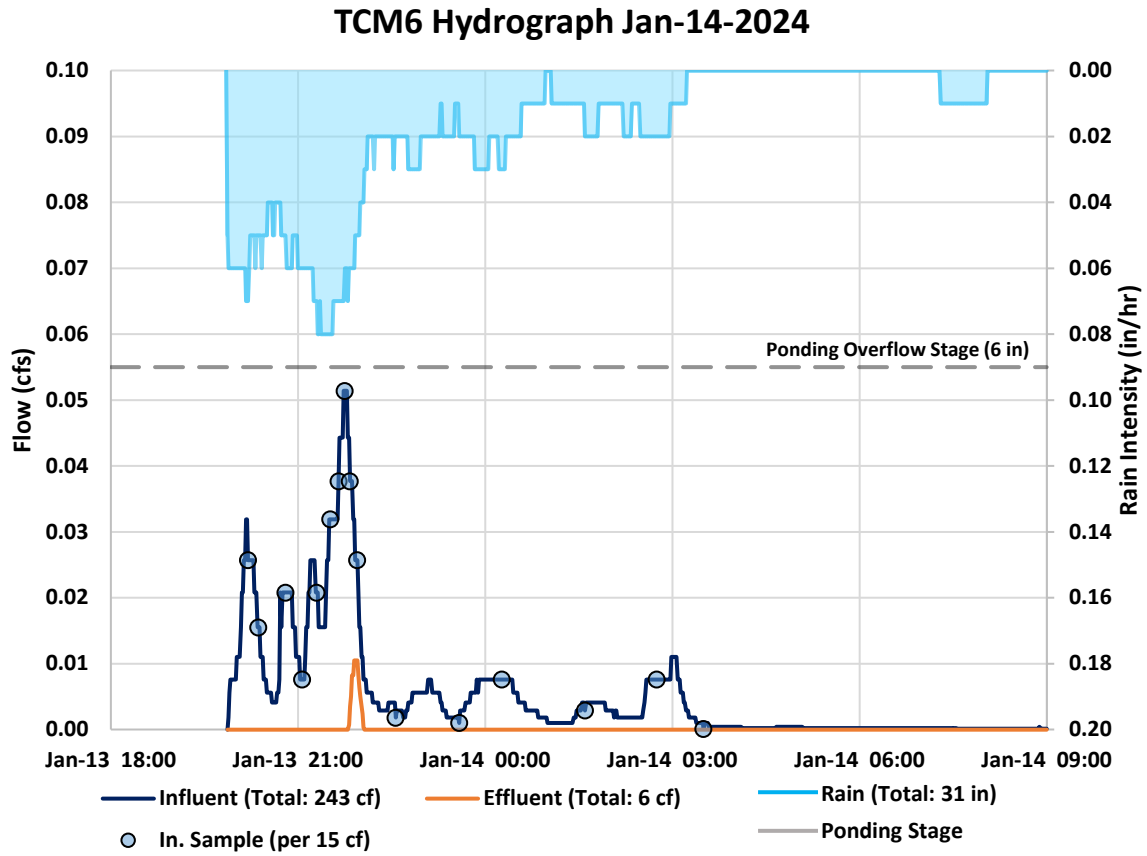


Figure 4.4. Rainfall, flow and sample collection during storm event 2 at TCM6 in San José, CA.

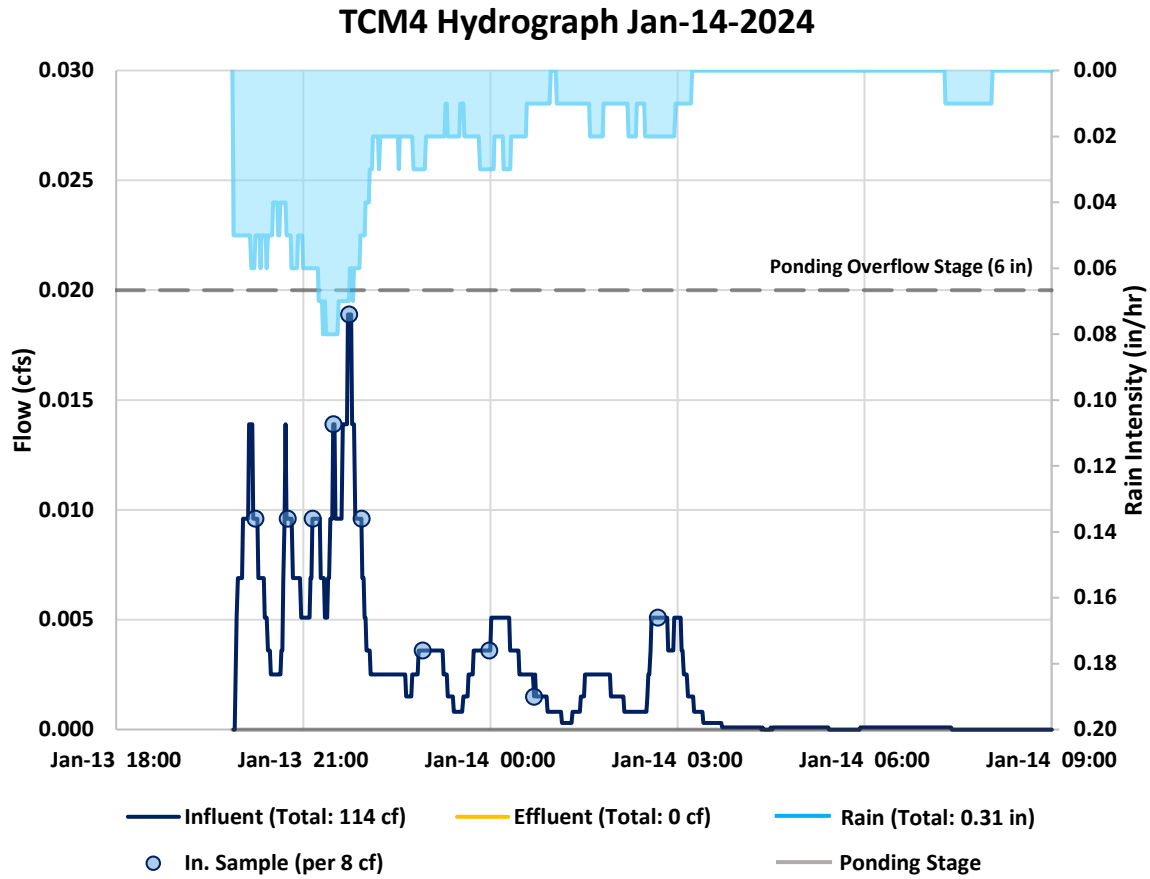


Figure 4.5. Rainfall, flow and sample collection during storm event 2 at TCM4 in San José, CA.

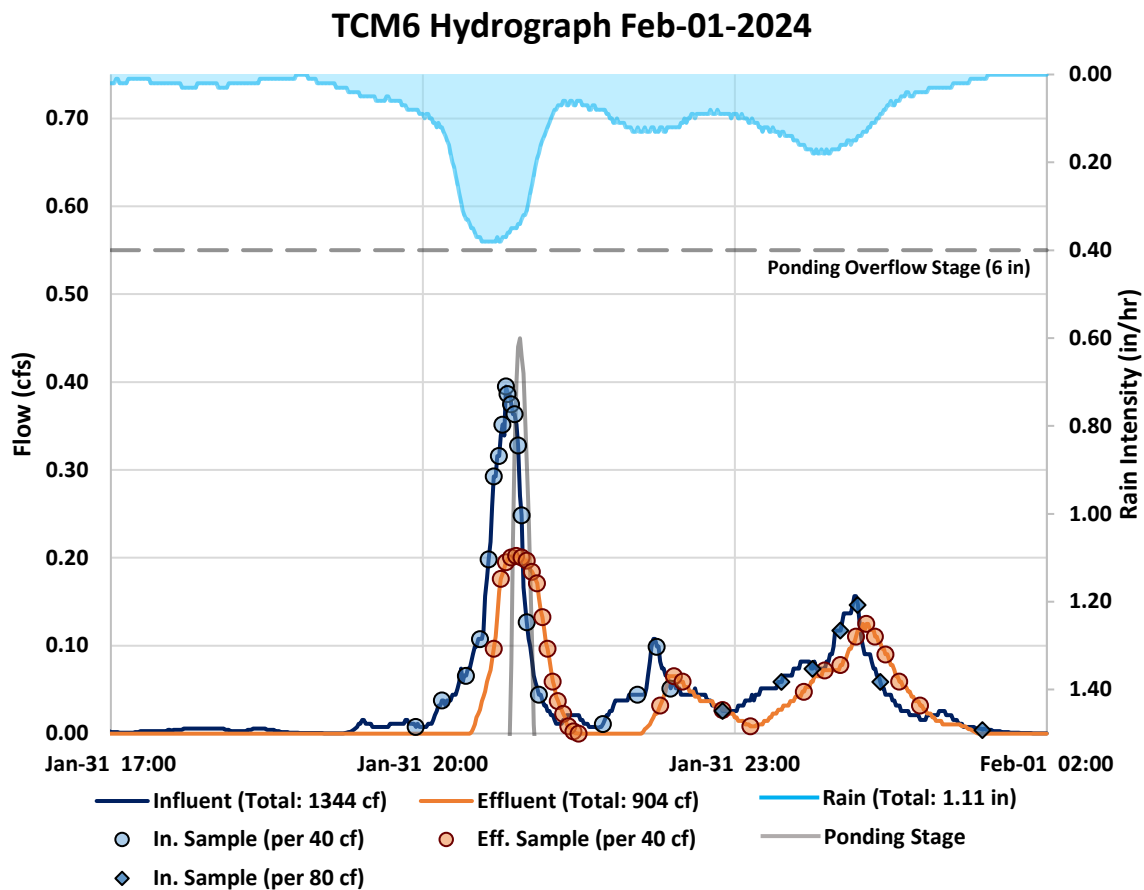


Figure 4.6. Rainfall, flow and sample collection during storm event 3 at TCM6 in San José, CA.

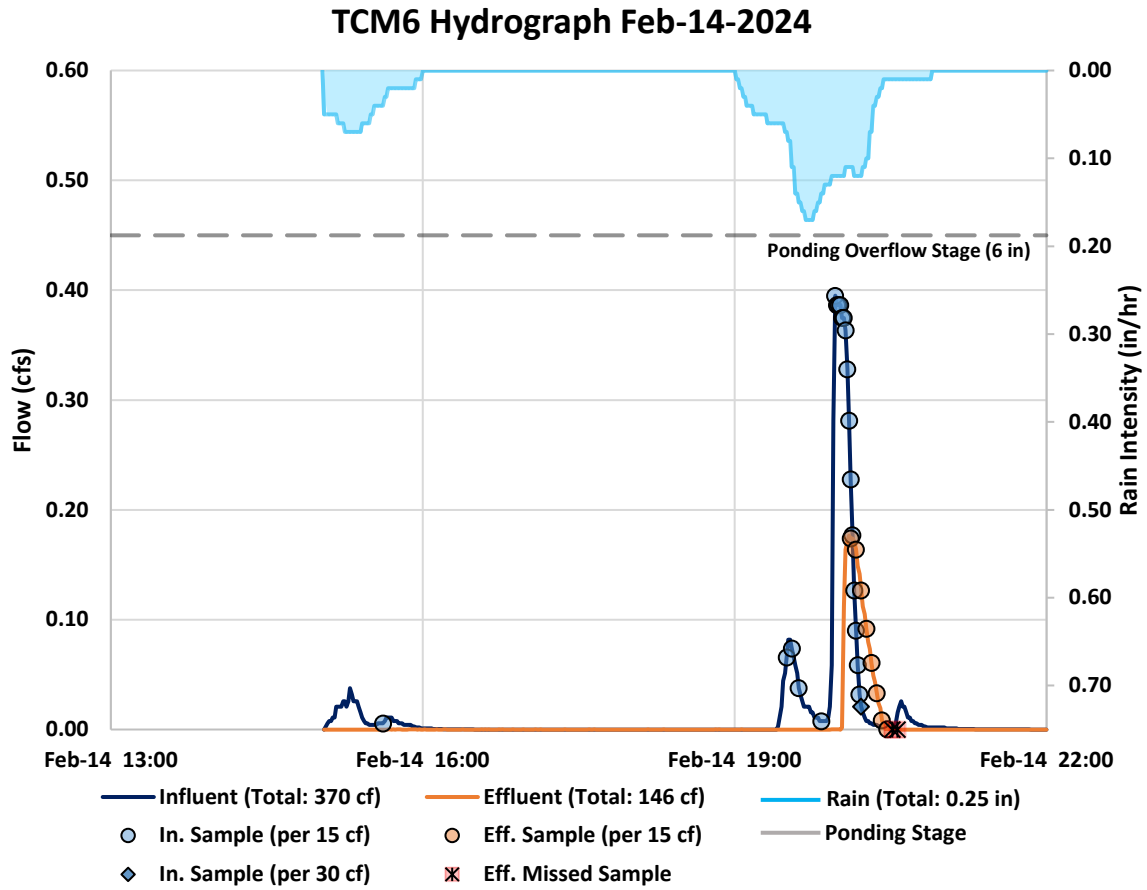


Figure 4.7. Rainfall, flow and sample collection during storm event 4 at TCM6 in San José, CA.

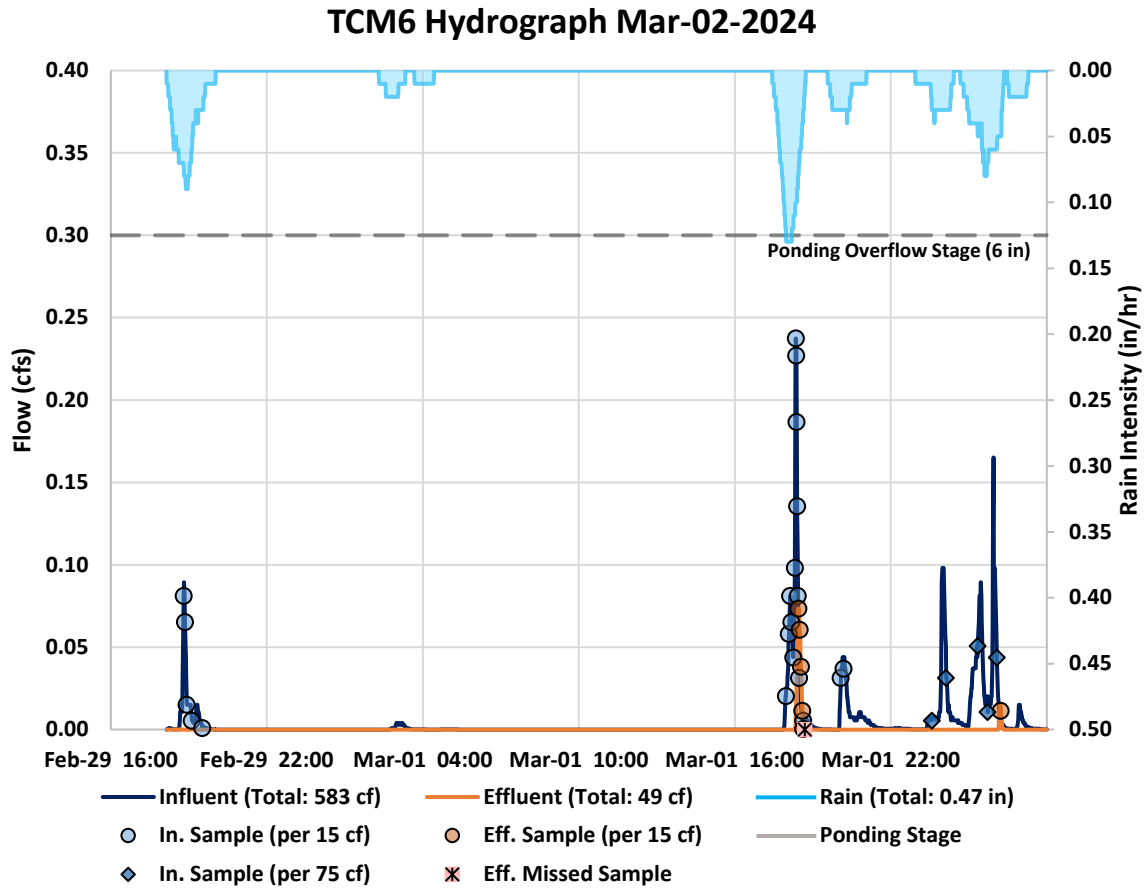


Figure 4.8. Rainfall, flow and sample collection during storm event 5 at TCM6 in San José, CA.

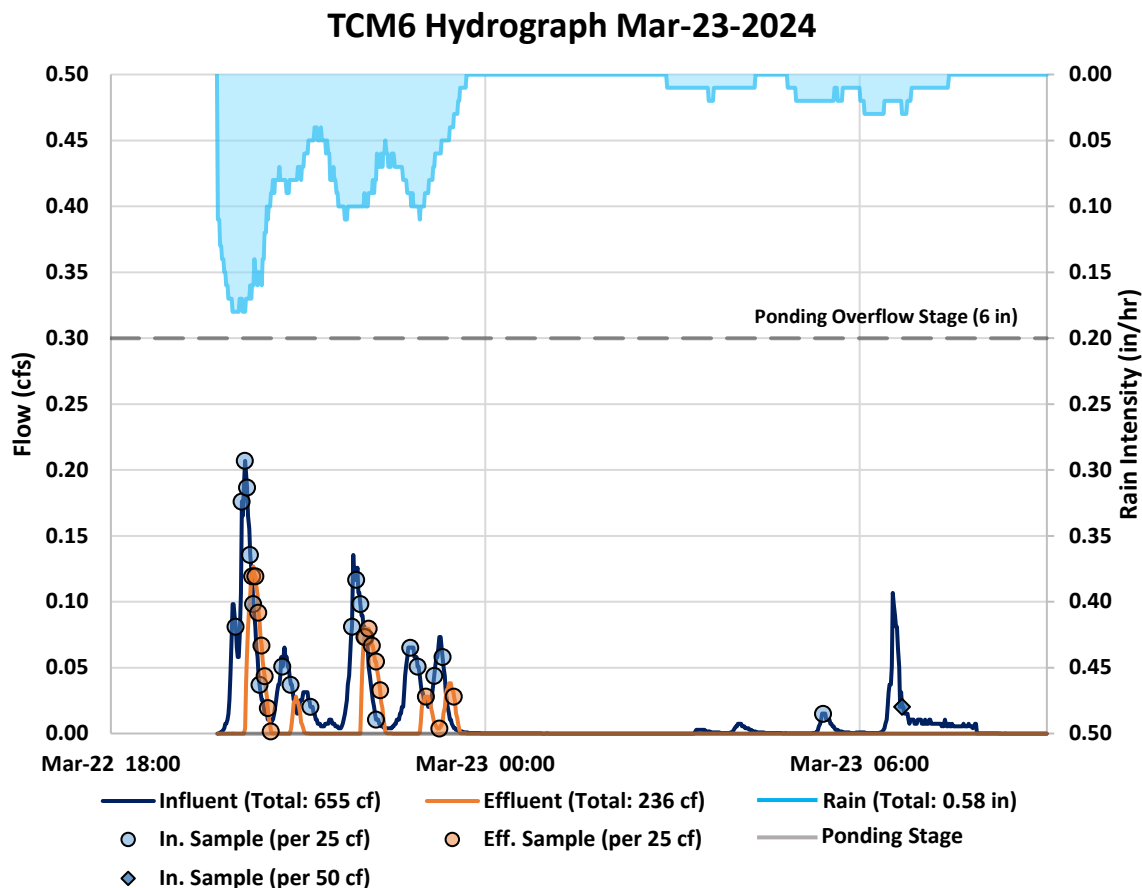


Figure 4.9. Rainfall, flow and sample collection during storm event 6 at TCM6 in San José, CA.

#### 4.1.2. Analytical Results

WY 2024 analytical results are summarized in Table 4.3 for TCM4 and Table 4.4 for TCM6. The table displays WY 2024 influent and effluent arithmetic means and average percent reduction for each analyte or analyte class. Two Project analytes, TPH and PFAS, experienced a relatively high proportion of non-detect (ND) results in WY 2024 sampling. For TPH analyses, 92% of results were reported as NDs. For PFAS analyses, 85% of results were reported as NDs and 11% of results were reported between the method detection limit (MDL) and the reporting limit (RL) and flagged with the detected not quantified (DNQ) Result Qualifier Code (ResQualCode), indicating inherent uncertainty associated with the result. However, since such a large proportion of the data was DNQ flagged, these data were treated as quantified measurements for interpretative purposes, which is consistent with previous SCVURPPP / BAMSC reporting. This issue is discussed further in Section 6, Lessons Learned.

Table 4.3. Summary of Water Year 2024 water quality data collected at TCM4, San José, CA.

Analytes	Units	Storm Date		WY2024 Percent Reduction (%)
		1/14/2024		
		Influent	Effluent	
<b>Conventional, Physical, and Synthetic Organics</b>				
pH	none	7.5	NA	100%
Hardness as CaCO3	mg/L	32	NA	100%
Total Suspended Solids	mg/L	56	NA	100%
TPH as Diesel C12-C24	µg/L	ND	NA	NC
TPH as Motor Oil C24-C36	µg/L	ND	NA	NC
<b>Total Metals</b>				
Copper	µg/L	8.4	NA	100%
Mercury	µg/L	0.033	NA	100%
Zinc	µg/L	80	NA	100%
<b>Dissolved Metals</b>				
Copper	µg/L	1.8	NA	100%
Mercury	µg/L	0.002	NA	100%
Zinc	µg/L	12	NA	100%
<b>PCB Congeners</b>				
Total RMP 40 PCB Congeners	ng/L	6.4	NA	100%
<b>PFAS</b>				
<b>Polyfluoroalkyl Substances</b>				
Perfluoroalkane Sulfonamido Substances (6 compounds)	ng/L	ND	NA	NC
Fluorotelomer Substances (6 compounds)	ng/L	ND	NA	NC
Polyfluoroalkyl Ether Acids (3 compounds)	ng/L	ND	NA	NC
<b>Perfluoroalkyl Substances</b>				
Perfluoroalkyl carboxylic acids - PFCAs (11 compounds)	ng/L	6.1	NA	100%
Perfluoroalkane sulfonic acids - PFSAAs (9 compounds)	ng/L	0.57	NA	100%
Perfluoroalkyl ether sulfonic acids - PFESAs (1 compound)	ng/L	ND	NA	NC
Perfluoroalkyl ether carboxylic acids - PFECAs (4 compounds)	ng/L	ND	NA	NC

NC Not calculable  
 ND Analyte not detected at or above the method detection limit (includes J-flagged congeners / compounds included in totals)  
 NA Not analyzed; there was no effluent flow due to 100% infiltration.

Table 4.4. Summary of Water Year 2024 water quality data collected at TCM6, San José, CA.

Analytes	Units	Storm Date												Influent Mean	Effluent Mean	WY2024 Percent Reduction (%)
		1/2/2024		1/14/2024		2/1/2024		2/14/2024		3/2/2024		3/23/2024				
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent			
<b>Conventional, Physical, and Synthetic Organics</b>																
pH	none	7.0	7.0	7.5	NA	7.1	7.0	7.3	7.2	7.3	7.3	7.2	7.1	7.2	7.1	2%
Hardness as CaCO3	mg/L	40	30	24	NA	18	16	20	42	30	40	18	30	25	32	-26%
Total Suspended Solids	mg/L	310	15	48	NA	53	8.6	87	11	68	8.4	81	9.2	108	10	90%
TPH as Diesel C12-C24	µg/L	ND	ND	310	NA	ND	ND	ND	ND	ND	ND	ND	ND	52	ND	NC
TPH as Motor Oil C24-C36	µg/L	ND	ND	420	NA	ND	ND	ND	ND	ND	ND	ND	ND	70	ND	NC
<b>Total Metals</b>																
Copper	µg/L	33	8.3	8.6	NA	8.4	4.7	10.0	5.5	9.8	6.7	12	7.8	14	6.6	52%
Mercury	µg/L	0.05	0.01	0.01	NA	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	55%
Zinc	µg/L	338	8.8	103	NA	100	6.2	117	7.4	129	10	159	8.8	158	8.2	95%
<b>Dissolved Metals</b>																
Copper	µg/L	3.4	6.6	2.9	NA	1.5	3.7	1.8	4.2	3.4	5.4	3.8	6.2	2.8	5.2	-86%
Mercury	µg/L	0.002	0.001	0.002	NA	0.003	0.005	0.001	0.004	0.002	0.005	0.002	0.005	0.002	0.004	-105%
Zinc	µg/L	32	2.9	37	NA	15	1.5	12	2.6	51	4.0	35	4.3	30	3.1	90%
<b>PCB Congeners</b>																
Total RMP 40 PCB Congeners	ng/L	0.23	0.42	1.7	NA	1.8	0.27	3.6	0.23	2.2	0.28	1.7	0.14	1.9	0.27	86%
<b>PFAS</b>																
<b>Polyfluoroalkyl Substances</b>																
Perfluoroalkane Sulfonamido Substances (6 compounds)	ng/L	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC
Fluorotelomer Substances (6 compounds)	ng/L	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC
Polyfluoroalkyl Ether Acids (3 compounds)	ng/L	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC
<b>Perfluoroalkyl Substances</b>																
Perfluoroalkyl carboxylic acids - PFCAs (11 compounds)	ng/L	13	23	7.2	NA	0.36	6.2	ND	18	6.5	22	1.0	25	4.6	19	-309%
Perfluoroalkane sulfonic acids - PFSAAs (9 compounds)	ng/L	ND	5.3	ND	NA	0.56	3.9	ND	4.5	ND	5.9	1.3	3.5	0.30	4.6	-1421%
Perfluoroalkyl ether sulfonic acids - PFESAs (1 compound)	ng/L	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC
Perfluoroalkyl ether carboxylic acids - PFECAs (4 compounds)	ng/L	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC

NC Not calculated due to the high number of non-detects in the storm-specific influent and effluent data.  
 ND Analyte not detected at or above the method detection limit (includes J-flagged congeners / compounds included in totals)  
 NA Not analyzed due to low sample volume

#### **4.1.3. Maintenance Activities**

During WY 2024 regular maintenance was performed at both TCM4 and TCM6 by a contractor for the City of San José approximately twice per month. Maintenance activities included removing debris from inlets, cleaning and re-establishing cobble as needed, removing weeds and invasive vegetation, removing sediment and trash, ensuring a full 3 inches of mulch coverage within the facilities, checking plant health, pruning overgrown plants, and replacing missing or dead plants.

In addition to the regularly scheduled maintenance that was conducted by the City's contractor, KEI conducted maintenance assessments of each facility prior to selected water quality monitoring events using the BAMSC Maintenance Assessment Form. The information gathered during these maintenance assessments has been compiled and is summarized in Table 4.5. In general, the assessments periodically noted issues such as small amounts of trash within the facilities, minor issues with plant health, and sediment build up around the cobble.

Combined, the information on the timing and activities of maintenance at each site and the assessment data collected prior to monitored storm events documents the maintenance status of each facility during storm events when water quality data were collected. This information will be used in the future to evaluate if the necessary level of O&M to maintain proper functioning of the facilities was accomplished during the Project, and to compare with data from LID monitoring facilities across the region that had different levels and types of ongoing O&M during the Project.

Table 4.5. Summary of WY 2024 maintenance assessments at SCVURPPP LID monitoring sites in San José, CA.

Site ID		TCM4	TCM6	TCM6	TCM6	TCM6	TCM6
Assessment Date		10/9/2023	10/9/2023	1/30/2024	2/14/2024	2/28/2024	3/29/2024
Date of most recent maintenance by City Contractor prior to assessment		10/3/23	10/3/23	1/16/24	2/13/24	2/27/24	3/19/24
Category	Assessment Type	Dry Weather Assessment	Dry Weather Assessment	Pre-Storm Monitoring	Pre-Storm Monitoring	Pre-Storm Monitoring	Pre-Storm Monitoring
	Was follow-up maintenance needed?	N <sup>a</sup>	N	Y <sup>b</sup>	Y (trash)	Y (trash)	Y (Trash)
Trash or debris	Is trash or debris present in the treatment area?	N	N	Y	N	N	U <sup>c</sup>
	Are one or more inlets, outlets or overflow structures obstructed?	N	N	N	N	N	U
Weeds	Are weeds present in the treatment area?	N	N	N	N	N	U (tumbleweed)
	Are invasive plants present?	N	N	N	U	U	U
	Are weeds about to or currently going to seed?	N	N	N	Y	Y	Y
Plant Health	Are all plants healthy, thriving, and aesthetically pleasing?	Y	Y	Y	N	N	U
	Are there signs of diseased or distressed plants in the treatment area?	N	N	N	Y	Y	U
Pruning	Is the system well-manicured & properly pruned, trimmed, dead headed and thinned?	Y	Y	Y	N	N	U
	Are plants over pruned or overgrown in the treatment area?	N	N	N	N	N	U
Plant Density	Are plants overcrowded?	N	N	N	N	N	U
	Are there bare spots in the treatment area?	N	N	N	N	N	U
	Are plants obstructing one or more inlets/overflows/irrigation system?	N	N	N	Y	Y	Y
Mulch	Is there full coverage of at least 3" of composted arbor mulch?	N	N	Y	N -sediment	Y	Y
	Is the mulch free of sediment and not clumped together?	N	N	Y	Y	Y	Y
Cobble & Flow Dissipation	Is appropriately sized cobble placed at all inlets/outlets/splash pads?	Y	Y	Y	Y	Y	Y
	Is the cobble free of sediment, debris, and clogging?	Y	Y	Y	N	N	N
	Are there signs of erosion at any inlets, outlets, or splash pads?	N	N	N	N	N	N
Erosion & Sedimentation	Are there signs of erosion or sedimentation in the treatment area?	N	N	N	Y	Y	Y
	Are the treatment area and adjacent areas protected from erosion?	Y	Y	N	N	N	N
	Are there signs of erosion at any inlets, outlets, or splash pads?	N	N	N	N	N	N
	Are there signs of channelization and scour or loss of soil?	N	N	N	Y	Y	N
Standing Water & Vector Control	Is all water drained from treatment system within 72 hours from rain?	U	U	Y	N	N	N
	Is there evidence of mosquitoes in the treatment area?	N	N	N	N	N	U
	Is there evidence of rodent activity in the treatment area?	N	N	N	N	N	N

Site ID		TCM4	TCM6	TCM6	TCM6	TCM6	TCM6
Assessment Date		10/9/2023	10/9/2023	1/30/2024	2/14/2024	2/28/2024	3/29/2024
Date of most recent maintenance by City Contractor prior to assessment		10/3/23	10/3/23	1/16/24	2/13/24	2/27/24	3/19/24
<b>Structural Damage</b>	Is there structural damage to the treatment system?	N	N	N	Y	Y	N
<b>Irrigation</b>	Is the irrigation system functioning properly with no leaks, breaks, etc.?	U	U	Y	Y	Y	U
	Are all landscaped portions of the treatment area receiving proper irrigation?	N	N	Y	Y	Y	U
<b>Contamination</b>	Is there evidence of contamination in the treatment area?	N	N	N	U	N	U
	Area any BMPs implemented to prevent contamination?	N	N	N	N	N	U
<b>Vandalism</b>	Are there any signs of vandalism or graffiti?	N	N	N	N	N	N
<b>Other</b>	Amount of material (trash, debris, sediment) collected: (number of bags, pounds, or gallons/bag):	0	0	5 Pounds	1 Gallon Bag	1/10 Gallon	0
	General Observations/Maintenance Performed	None	None	Inlets free of obstructions	None	None	None

- a N=no;
- b Y=yes;
- c U=unknown.

## 5. STATEMENT OF DATA QUALITY

A comprehensive quality assurance/quality control (QA/QC) program was implemented by SCVURPPP covering all aspects of LID monitoring. Monitoring for LID analytes was performed according to protocols specified or referenced in the BAMSC LID Quality Assurance Project Plan (QAPP; AMS 2023). The LID influent and effluent sampling data were collected and evaluated as governed by the LID Monitoring Plan (SCVURPPP 2023) and QAPP.

### 5.1. Hydrology

As discussed previously, erroneous flow measurements associated with failure of the bubblers to operate consistently over fluctuating temperatures precluded collection of consistent hydrologic data with any confidence level. Therefore, all flow data collected prior to installation of replacement bubblers are considered highly uncertain and were rejected.

### 5.2. Laboratory Analyses

Data were assessed for representativeness, comparability, completeness, sensitivity, contamination, accuracy, and precision. These seven attributes are compared to data quality objectives (DQOs), which were established to ensure that data collected are of adequate quality and sufficient for the intended uses. DQOs address both quantitative and qualitative assessment of the acceptability of data. Representativeness and comparability are qualitative while completeness, sensitivity, contamination, accuracy, and precision are quantitative assessments. Specific DQOs are based on Measurement Quality Objectives (MQOs) for each analyte.

In general, the laboratory analyses conducted in support of WY 2024 LID monitoring achieved data quality objectives except for minor instances detailed in Table 5.1. While some data were flagged by the QA Officer based on the MQOs and DQOs identified in the QAPP, all of the laboratory data was of acceptable quality to be included in this report's dataset.

The main data quality concern related to the sensitivities of WY 2024 analytical capabilities of TPH and PFAS that resulted in a low proportion of detectable concentrations for these two classes. RLs for analysis of both TPH as diesel and TPH as motor oil were consistently above QAPP targets. Affected data were flagged with the "VREL" qualifier. Actions that will be taken to address these issues are discussed in more detail in Section 6, Lessons Learned.

Lastly, during ongoing communications with the PFAS analytical laboratory and CEDEN data node at Moss Landing Marine Laboratories (MLML), it was discovered that analyte names contained with CEDEN Controlled Vocabulary did not entirely align with EPA final method 1633 analytes. SCVURPPP and collaborating BAMSC agencies are going through the process of reviewing and updating CEDEN EDDs as required to conform with EPA 1633 terminology. BAMSC agencies are also working with MLML to update Controlled Vocabulary (both analyte names and associated constituent information). It is anticipated that this process will be completed and data conforming to EPA 1633 will be uploaded to CEDEN by March 31, 2025. It is also anticipated that BAMSC will revise the Project QAPP during WY 2025 to address this and any other issues that require update following the first year of Project implementation.

**Table 5.1. Quality control issues and analysis for WY 2024 LID monitoring analytical laboratory data.**

Sample ID/ Type	Issue	Analysis
TCM4-I-FB-20240520/Cu/Zn TCM6-E-FB-20240520/Cu/Zn TCM6-I-FB-20240520/Cu/Zn	Time of preservation exceeds 48 hours after sample collection.	Results are ND for the field blank. No obvious effects on data quality. Minor data quality impacts are possible for ≥48 hours. Flagged by QA Officer. No further action required.
TCM6-I-20240102/TPH(Diesel/Motor Oil)/Cu/Zn TCM6-I-20240302/TPH(Diesel/Motor Oil) LCS/TSS (n=5) 000NONPJ/Cu/Zn/TSS/Hardness(CaCO3)	MRLs would have been met if dilution had not occurred.	Results are quantified. No effect on data quality. Common for RLs to be elevated in samples with high amounts of solids from stormwater. Flagged by QA Officer. No further action required.
MB for HBN 17599 [MPR/2001]/Zn Pour Blank(Z020719003)/Hg	Detections of analytes above RLs in laboratory blank samples.	Data quality is not significantly affected. Possible positive sample bias due to interference/contamination. Data flagged by QA Officer and no further action taken.
TCM6-I-20240114/Fluorotelomer Sulfonate-13C2, 8:2 TCM6-I-20240302/Fluorotelomer Sulfonate-13C2, 4:2/Fluorotelomer Sulfonate-13C2, 8:2 TCM6-E-20240302/Fluorotelomer Sulfonate-13C2, 4:2 LCS (B24A258-BS-1)/PCBs(n=14) Lab Blank (B24B194-BLK1)/PFAS(n=4) TCM6-I-20240201/Tetracosane, n-(Surrogate) TCM6-I-20240323/ Tetracosane, n-(Surrogate) TCM6-E-FB-20240520/ Tetracosane, n-(Surrogate)	Surrogate and MS recoveries were beyond MQO limits for several analytes.	Most analytes had recoveries below the control limits and would reflect a negative bias for sample results. Some PFAS compounds were above recovery limits reflecting a positive bias in sample results. Data flagged by QA Officer and no further action taken. Additional QA codes for recovery exceedances were flagged by the analytical laboratory.
SMS-D-20240302(SMCWPPP)/Hg/Zn/PCBs(n=28)	The RPDs from the regional field duplicate sampled on behalf of Santa Clara County were beyond the MQOs.	Precision was beyond 25% Relative Percent Difference for three analytes and 28 PCB congeners. Data not rejected. Flagged by QA Officer and no further action taken.

## 6. RESULTS AND CONCLUSIONS

### 6.1. Lessons Learned

#### 6.1.1. Equipment Selection and Monitoring Implementation

With the exception of the aforementioned bubbler failures, the monitoring scheme and installed sample measurement and collection equipment appeared to function as intended to support monitoring objectives. The replacement bubblers appear to be working as designed to accurately measure flow and support collection of appropriate flow-weighted composites. There are no major changes to the monitoring equipment or their usage envisioned for WY 2025 monitoring activities.

A minor change proposed for WY 2025 is to increase the size of the influent weir at TCM6 due to the flow exceeding the capacity of the weir on rare occasions. The existing eight-inch weir and collection pipe will be replaced with a ten-inch weir and collection pipe prior to the start of WY 2025. This will allow for better characterization of higher flows at the TCM6 influent location.

#### 6.1.2. Hydrology

Effluent flow was not detected at TCM4 during the first storm event monitored on January 2, 2024. Field crews discovered leaks in the overflow vault while conducting storm observations 4 days later. Initially the Project Team attempted to patch these leaks on January 9th, however the patches proved insufficient. The City of San José construction contractor was required to conduct a more extensive repair of the system to stop the leaks, which was done at the end of the rainy season (May and June 2024). Therefore, no effluent flow was measured at TCM4 during WY 2024.

#### 6.1.3. Laboratory Analyses

##### SAMPLE VOLUME

Initial discussions with analytical laboratories indicated that a minimum volume of 6 L would be required to supply sufficient volume to support all Project analyses. Pacing values were therefore set to target this minimum volume per each sampling event and to guard against collecting too much volume to overflow sample collection carboys.

In practice, however, it was learned that additional sample volume should be supplied to the laboratories to allow for loss during transfer from carboys to individual sample containers and to support re-analyses of samples, if warranted. For these reasons, the minimum volume target for WY 2025 sampling events will be increased to 10 L per event.

##### SENSITIVITY

##### *TPH*

TPH was analyzed as both Diesel (C12-C24) and Motor Oil (C24-C36) at PACE Analytical, as a subcontractor to Caltest Analytical, in WY 2024. RLs at PACE for TPH-diesel were 200 µg/L with an MDL of 74 µg/L and TPH-motor oil had a RL of 500 µg/L with an MDL between 160 µg/L

and 180 µg/L. These RLs met QAPP targets (AMS 2023). However, WY 2024 results saw very few instances of quantified values for TPH across all counties for the BAMSC coordinated LID sampling. This, combined with PACE no longer reporting the carbon ranges requested, led to finding a new laboratory for TPH analysis. Beginning in WY 2025, TPH will be sent to Moore Twining Associates in Fresno, which will allow the Project to have TPH reported in the same carbon ranges for consistency and with lower RLs. The RLs for TPH in WY 2025 will be TPH-diesel: RL=50 µg/L, MDL=42 µg/L and TPH-motor oil: RL=100 µg/L, MDL=25 µg/L. Changing to a laboratory with lower RLs will allow the Project greater sensitivity for the TPH analysis.

## PFAS

As mentioned previously, approximately 85% of individual WY 2024 SCVURPPP PFAS results were reported as NDs by Enthalpy. Discussions with the lab have indicated some possibility that restrictions inherent to the draft EPA Method 1633 specifying how samples presenting with higher turbidity can be handled may have contributed to the high number of NDs.

With the draft analytical method used in WY 2024, the laboratory analyst inspects the sample media before sample preparation commences. If there are no or low visible suspended or sinking solids, the sample proceeds to prep. If there are visible signs of solids that appear close to the subsample threshold, analysis of TSS is required to inform the decision of whether subsampling is required or not. If subsampling is indicated, this restricts analytical volume and elevates the MDLs and RLs, increasing the likelihood of a sample ND.

With the transition to the final method 1633 protocols in WY 2025, centrifuging of samples is added as an option beyond subsampling, which will facilitate analyses of samples up to 2.5% solids without subsampling. This may serve to decrease the proportion of samples that were reported with elevated MDLs and RLs relative to results of WY 2024 samples. Centrifuging, however, is not expected to be as effective in samples with a high degree of dissolved solids, as the pores on Solid Phase Extraction (SPE) cartridges can clog and thereby limit sample volume able to be passed through the cartridges.

## BLANK TESTING

Consistent with the SCVURPPP Monitoring Plan (SCVURPPP 2023), SCVURPPP collected pre-sampling equipment blanks on all sample collection materials and laboratory pour blanks in collaboration with BAMSC partner agencies (Table 6.1), and end-of-season field blanks at both TCM4 and TCM6 sampling sites (Table 6.2). Protocols associated with blank sample collection are summarized in SCVURPPP (2024), and a detailed protocol for end-of-season field blanks is contained within AMS (2023).

Results of all sample analyses for all analytes achieved relevant MQOs in each case, as was similarly the case for all collaborating BAMSC Programs. Per prior discussions with Water Board staff, the results of the field blanks will be reviewed in WY 2025 with the TAG to inform the need to repeat these blanks and the frequency at which they may be incorporated into future sampling efforts.

Table 6.1. Analytical results for LID monitoring pre-season equipment blanks for the SCVURPPP sites prior to WY2024.

Analyte	Unit	SCVURPPP - 2023/24 Pre-season Blank	
		Carboy-02	Tubing <sup>a</sup>
<b>Conventional, Physical, and Synthetic Organics</b>			
Hardness as CaCO <sub>3</sub>	mg/L	2.0J	ND <sup>b</sup>
Total Suspended Solids	mg/L	ND	ND
TPH as Diesel C12-C24	µg/L	ND	ND
TPH as Motor Oil C24-C36	µg/L	ND	ND
<b>Total Metals</b>			
Copper	µg/L	ND	ND
Mercury	µg/L	0.00024J <sup>c</sup>	0.00034J
Zinc	µg/L	ND	ND
<b>PCB Congeners</b>			
Total RMP 40 PCB Congeners	ng/L	ND	ND
<b>PFAS</b>			
<b>Polyfluoroalkyl Substances</b>			
Perfluoroalkane Sulfonamido Substances (6 compounds)	ng/L	ND	ND
Fluorotelomer Substances (6 compounds)	ng/L	ND	ND
Polyfluoroalkyl Ether Acids (3 compounds)	ng/L	ND	ND
<b>Perfluoroalkyl Substances</b>			
Perfluoroalkyl carboxylic acids - PFCAs (11 compounds)	ng/L	ND	ND
Perfluoroalkane sulfonic acids - PFSAAs (9 compounds)	ng/L	ND	ND
Perfluoroalkyl ether sulfonic acids - PFESAAs (1 compound)	ng/L	ND	ND
Perfluoroalkyl ether carboxylic acids - PFECAAs (4 compounds)	ng/L	ND	ND

a Tubing includes HDPE intake tubing and SEBS peristaltic pump-roller tubing.

b ND = Analyte not detected at or above the MDL

c "J" qualifier applies to values that fall between the reporting limit (RL) and the method detection limit (MDL); these values are considered estimated values.

Table 6.2. Analytical results for end-of-season field blanks at the SCVURPPP sites in WY 2024.<sup>a</sup>

Analyte	Unit	TCM4	TCM6	
		Influent	Influent	Effluent
<b>Conventional, Physical, and Synthetic Organics</b>				
Hardness as CaCO <sub>3</sub>	mg/L	ND <sup>b</sup>	ND	ND
Total Suspended Solids	mg/L	ND	ND	ND
TPH as Diesel C12-C24	µg/L	ND	ND	ND
TPH as Motor Oil C24-C36	µg/L	ND	ND	ND
<b>Total Metals</b>				
Copper	µg/L	ND	ND	ND
Mercury	µg/L	ND	ND	ND
Zinc	µg/L	ND	ND	ND
<b>Dissolved Metals</b>				
Copper	µg/L	ND	ND	ND
Mercury	µg/L	ND	ND	ND
Zinc	µg/L	ND	ND	ND
<b>PCB Congeners</b>				
Total RMP 40 PCB Congeners <sup>c</sup>	ng/L	ND	0.0123J <sup>d</sup>	ND
<b>PFAS</b>				
<b>Polyfluoroalkyl Substances</b>				
Perfluoroalkane Sulfonamido Substances (6 compounds)	ng/L	ND	ND	ND
Fluorotelomer Substances (6 compounds)	ng/L	ND	ND	ND
Polyfluoroalkyl Ether Acids (3 compounds)	ng/L	ND	ND	ND
<b>Perfluoroalkyl Substances</b>				
Perfluoroalkyl carboxylic acids - PFCAs (11 compounds)	ng/L	ND	ND	ND
Perfluoroalkane sulfonic acids - PFASAs (9 compounds)	ng/L	ND	ND	ND
Perfluoroalkyl ether sulfonic acids - PFESAs (1 compound)	ng/L	ND	ND	ND
Perfluoroalkyl ether carboxylic acids - PFECAs (4 compounds)	ng/L	ND	ND	ND

a End of season blank includes station HDPE intake tubing and new SEBS peristaltic pump-roller tubing.

b ND = Analyte not detected at or above the MDL

c PCB 182/187 was detected above the MDL but below the RL of 0.0197ng/L at TCM6 influent at a value of 0.0123J ng/L. This accounts for the entire sum of PCBs at this site.

d "J" qualifier applies to values that fall between the reporting limit (RL) and the method detection limit (MDL); these values are considered estimated values.

## **6.2. Interim Conclusions**

After issues with hydrologic monitoring were resolved, SCVURPPP collected continuous hydrologic monitoring data and successfully collected seven paired water quality samples, above the MRP 3.0 minimum number specified. The following sections describe findings from Year 1 of monitoring Project implementation.

### **6.2.1. Hydrology**

Due to the previously-mentioned issues with bubblers used to develop flow measurements, all hydrology data collected prior to installation of the replacement bubblers in January 2024 are considered highly uncertain and were rejected. All data collected beginning on January 1, 2024 are considered representative of the current hydrologic regime and will be used for assessment purposes.

Effluent flow at TCM4 was not observed during any storm in WY 2024. City of San José staff performed maintenance on the overflow vault to mitigate observed leaks at the end of the sampling season. It is unclear if the absence of effluent flow was only due to the leaks in the vault or if the basin itself is oversized for the volume of water the system receives, resulting in 100% infiltration (i.e., treatment). Continued hydrologic monitoring in WY 2025 will help to address this question.

### **6.2.2. Water Quality**

Bioretention features treat stormwater primarily through solids removal processes. Therefore, they should be most effective at removing sediment-associated pollutants. Initial indications from the successful SCVURPPP WY 2024 sampling events suggest this to be the case.

As identified in the SCVURPPP Monitoring Plan (SCVURPPP 2023), the Project analytes that are considered sediment-associating include total PCBs, total fraction trace metals (mercury, copper, zinc), and total suspended solids (TSS). WY 2024 water quality monitoring results comparing influent and effluent concentrations for individual storm events at TCM6 are shown graphically in Figures 6.1 through 6.8 for all non-PFAS analytes. At TCM6, dissolved mercury and dissolved copper concentrations exhibited lower concentrations in influent relative to effluent for all WY 2024 sampling events. With limited exceptions, all other non-PFAS analytes had higher influent relative to effluent concentrations, indicating removal within the bioretention facility.

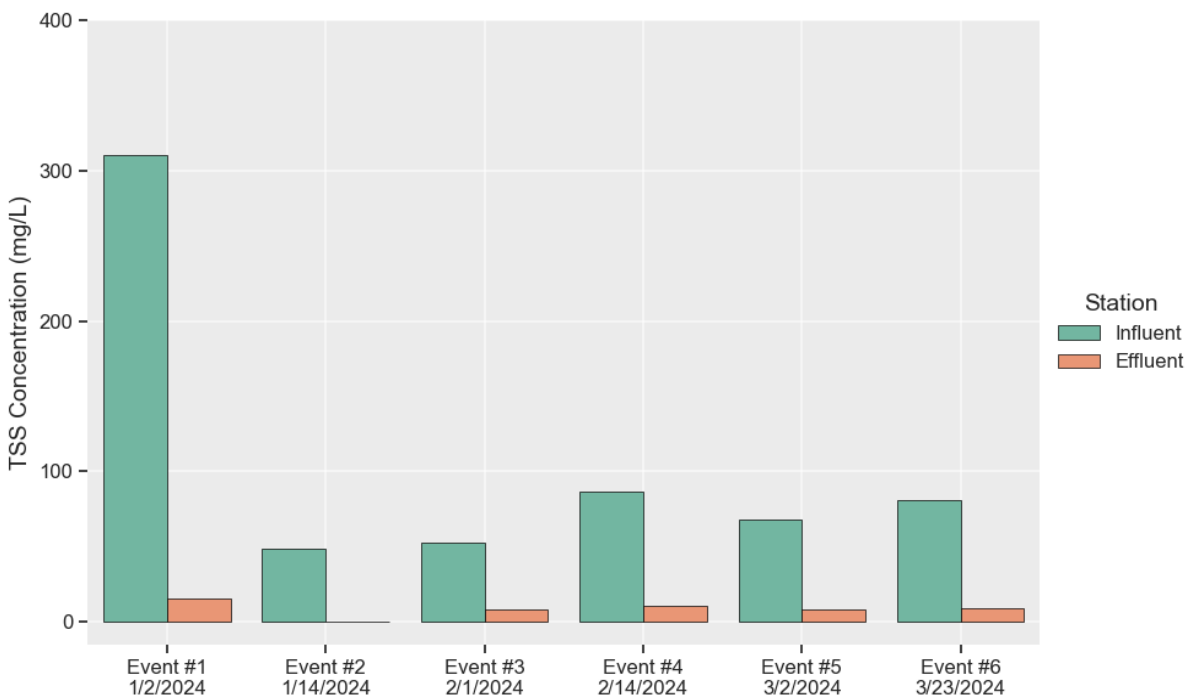


Figure 6.1. Comparison of TSS results in influent and effluent at TCM6 in San José, CA.

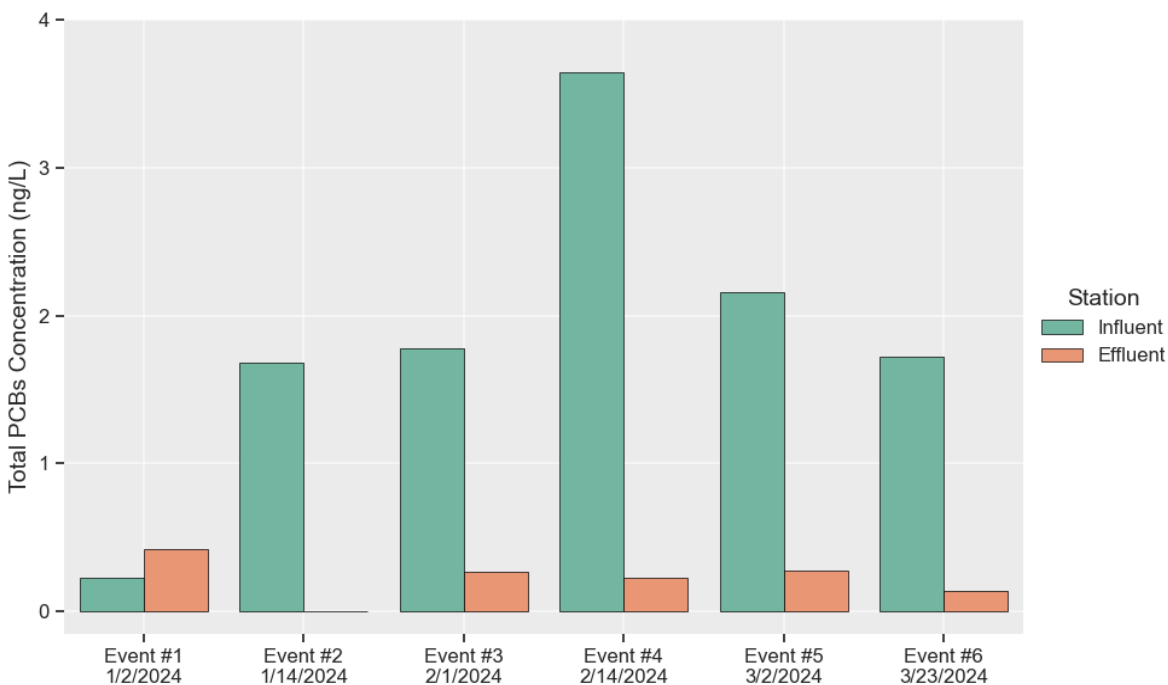


Figure 6.2. Comparison of PCBs results in influent and effluent at TCM6 in San José, CA.

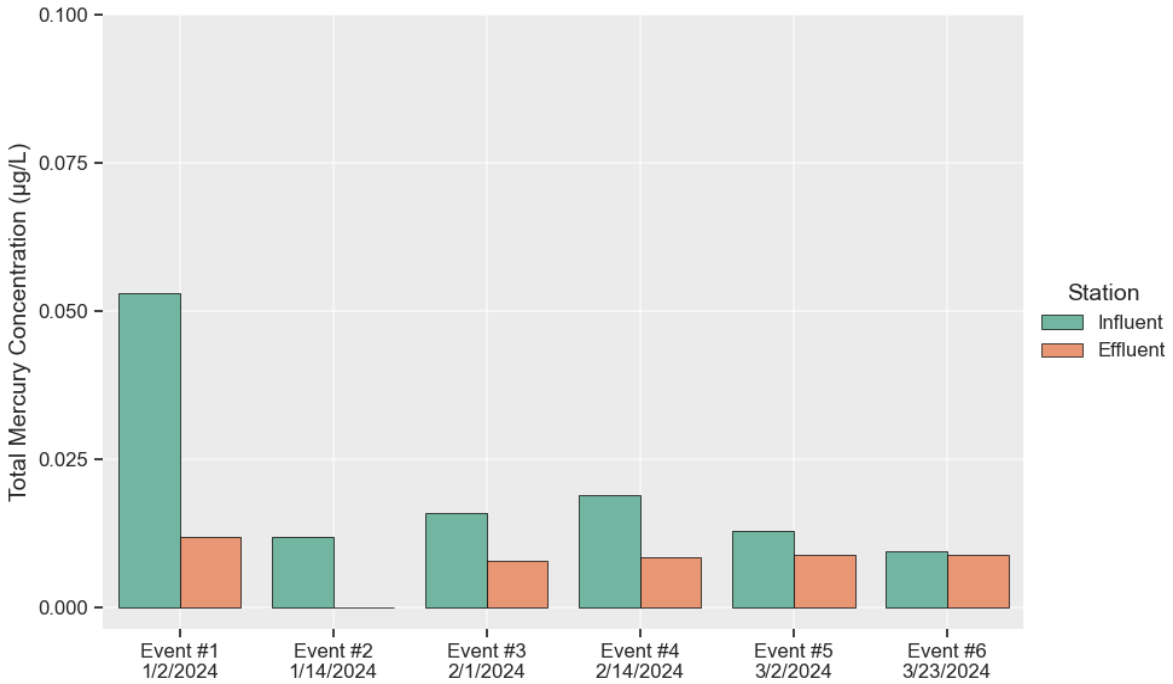


Figure 6.3. Comparison of total mercury results in influent and effluent at TCM6 in San José, CA.

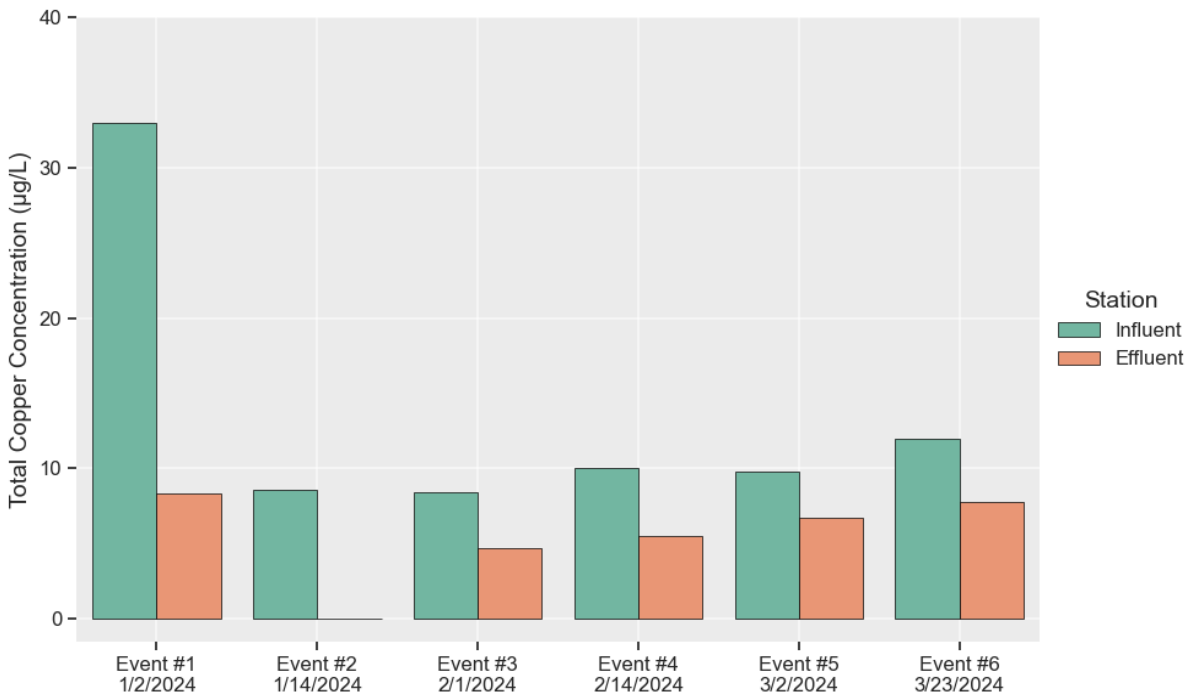


Figure 6.4. Comparison of total copper results in influent and effluent at TCM6 in San José, CA.

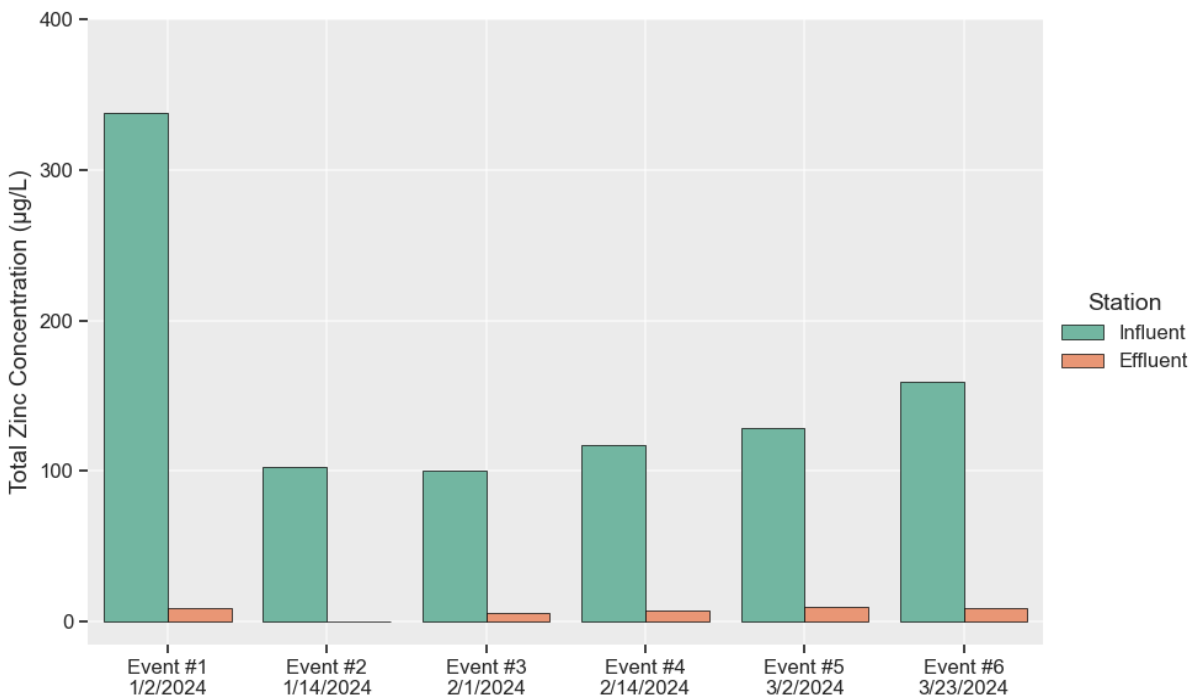


Figure 6.5. Comparison of total zinc results in influent and effluent at TCM6 in San José, CA.

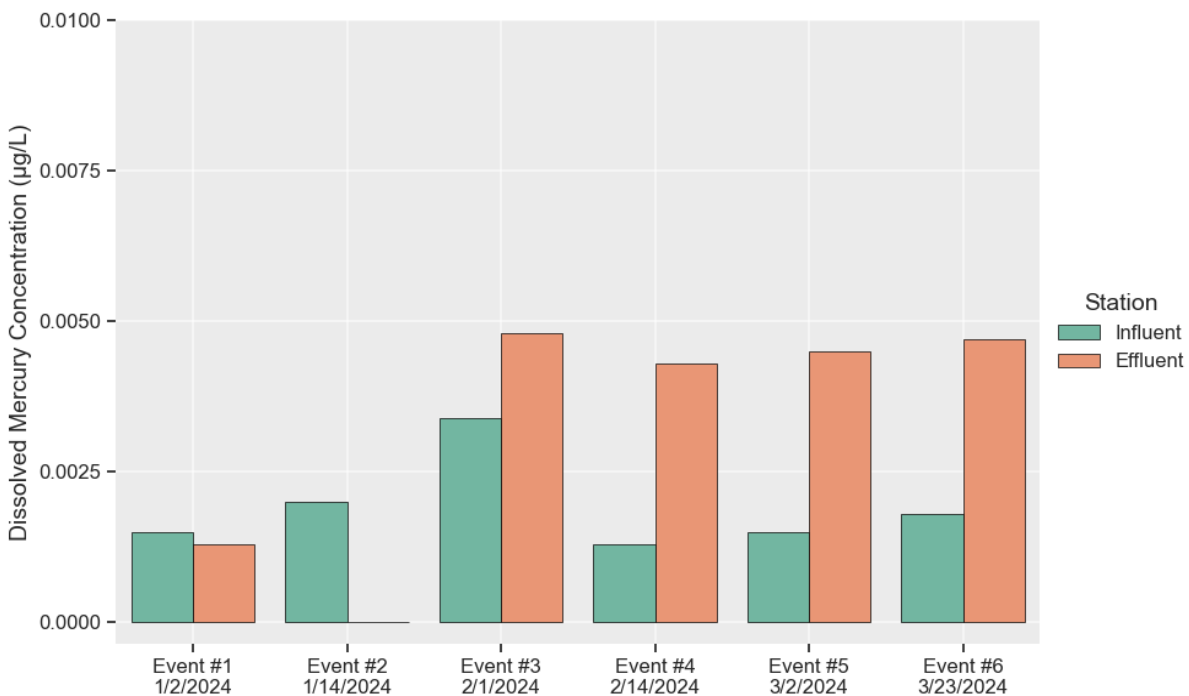


Figure 6.6. Comparison of dissolved mercury results in influent and effluent at TCM6 in San José, CA.

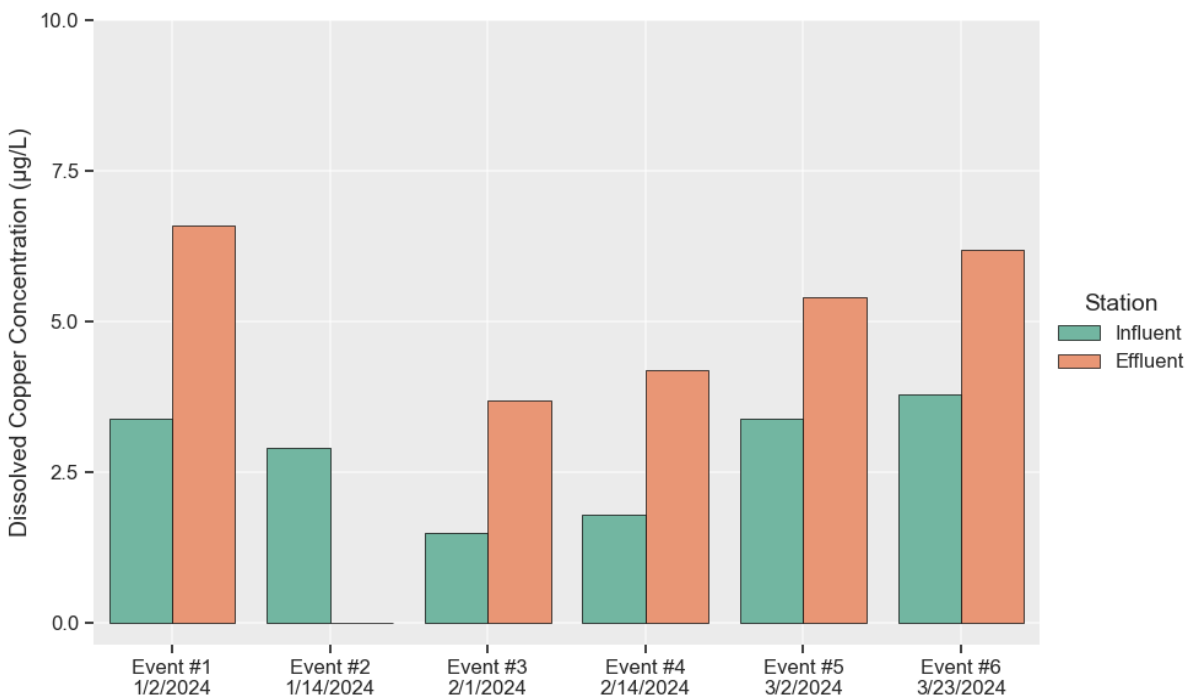


Figure 6.7. Comparison of dissolved copper results in influent and effluent at TCM6 in San José, CA.

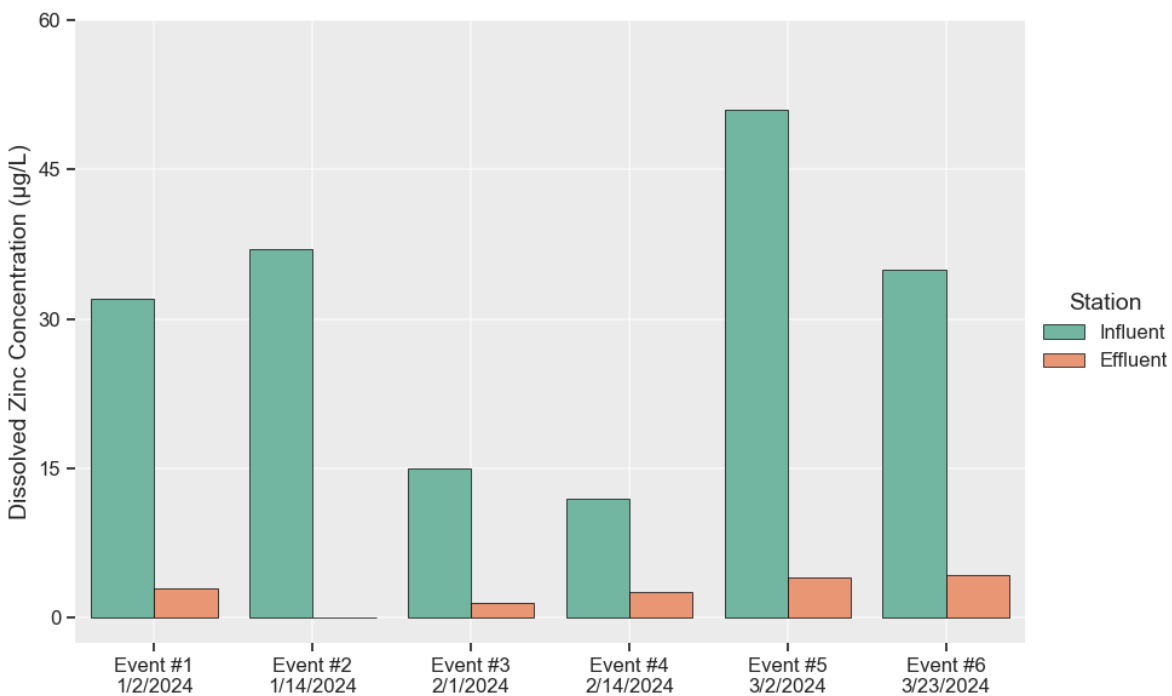


Figure 6.8. Comparison of dissolved zinc results in influent and effluent at TCM6 in San José, CA.

Interpretation of PFAS results presents a more complex situation than that of Project analytes that are traditionally considered to be more or less sediment-associated. The general understanding of environmental fate and transport of PFAS compounds is at a much earlier stage of development relative to the other analytes targeted by this Project. Additionally, the 40 PFAS analytes that are measured through EPA 1633 include a variety of compounds with very different makeup and properties, including long- and short-chain compounds, presence as precursors or end products, differences in water solubility, etc.

For interpretive purposes, individual PFAS compounds were placed into either the polyfluoroalkyl or perfluoroalkyl substances subclass. Each subclass is further divided into PFAS groups and sub-groups (Figures 6.1 and 6.2) consistent with previously reported investigations (e.g., Sedlak et al. 2018; Pulster et al. 2024)<sup>7</sup>.

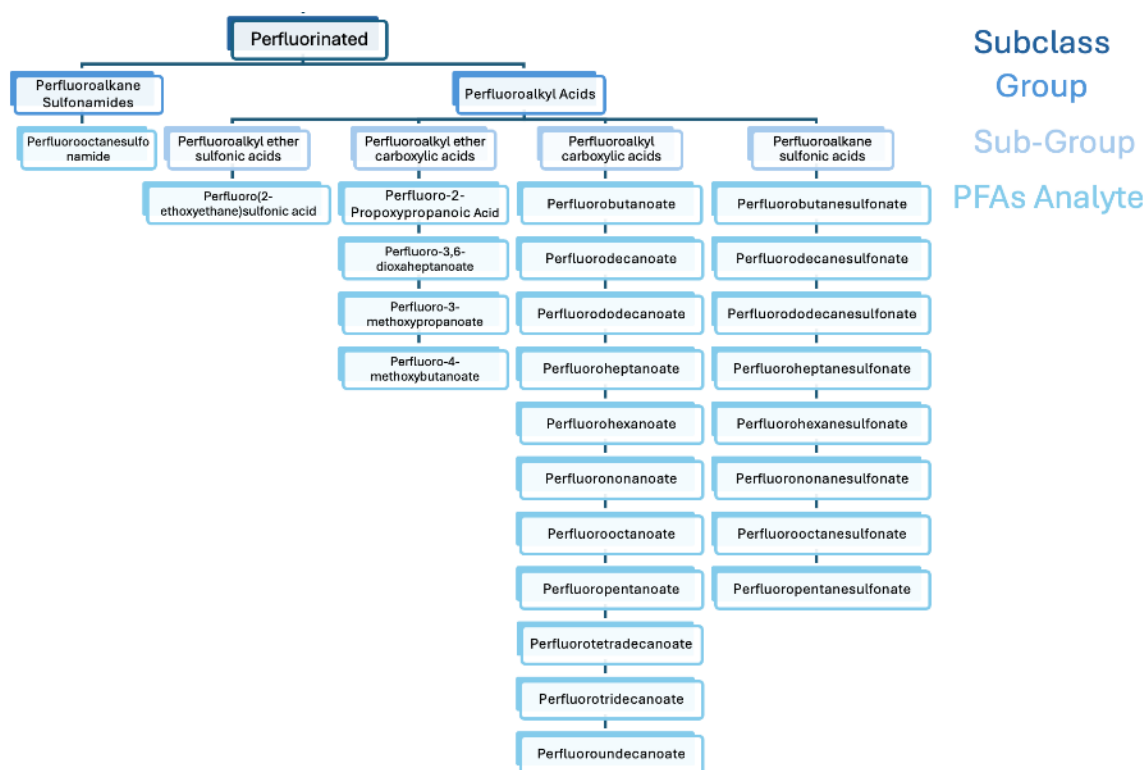
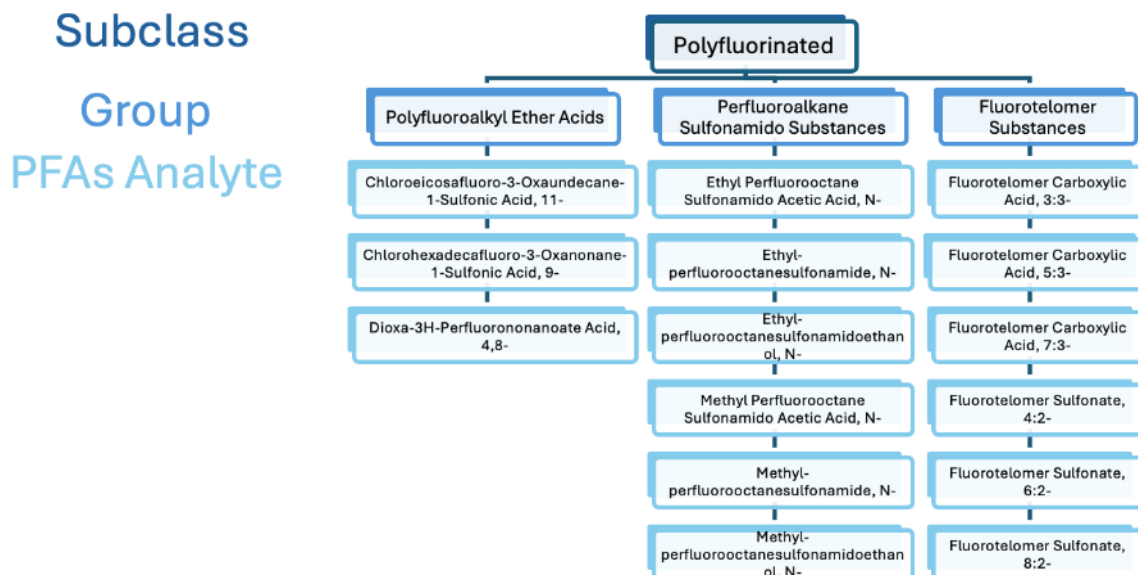


Figure 6.9. PFAS WY2024 individual analytes from the perfluoroalkyl substances (perfluorinated) subclass, which are further broken down into PFAS group and subgroup categories. Groups: perfluoroalkane sulfonamides and perfluoroalkyl acids. Subgroups: perfluoroalkyl ether sulfonic acids, perfluoroalkyl ether carboxylic acids, perfluoroalkyl carboxylic acids, and perfluoroalkane sulfonic acids.

<sup>7</sup> Consistent with the way the RMP reports PFAS concentrations, NDs have been substituted with a value of “0” and J-flagged data is quantified as reported in generating sums for total PFAS and individual subgroups.



**Figure 6.10. PFAS WY 2024 individual analytes from the polyfluoroalkyl substances (polyfluorinated) subclass, which are further broken down into PFAS group categories: polyfluoroalkyl ether acids, perfluoroalkane sulfonamido substances, and fluorotelomer substances.**

The sum of the individual PFAS analytes within each subclass group (as reported in Tables 4.3 and 4.4) for all SCVURPPP WY 2024 data were reported at higher concentrations in the effluent samples compared to influent samples during all events with detected PFAS. There is the possibility that waters flowing through the facility are enriching in PFAS as they percolate through the soil and gravel layers, or as they come into contact with structural materials within the facility (e.g., underdrain, adhesives, landscape fabric).

Another possible explanation for higher concentrations on the effluent side lies with the limitations of the analytical method itself. EPA 1633 quantifies 40 of several thousand possible PFAS compounds, many of these terminal products of breakdown processes. There exists the possibility that overall mass of PFAS in influent and effluent samples may not be dissimilar, but that transformation processes within the facility are converting PFAS precursor compounds that are not analyzed via EPA 1633 into terminal products that are. A recent SFEI study investigated influent and effluent samples in wastewater with similarly higher concentrations in effluent relative to influent. Follow-on analyses included an experimental Total Oxidizable Precursor (TOP) assay in combination with EPA 1633 on replicate sample material, which indicated the presence of precursors in wastewater influent samples that were not detectable by the EPA method (Lin et al. 2024).

### 6.2.3. Maintenance Assessments

Throughout WY 2024, the TCM4 and TCM6 facilities were similarly maintained, with relatively few issues noted during the assessments other than small amounts of trash, which were removed by the KEI Team. Given identical maintenance practices were performed at each facility throughout WY 2024, we would not expect to see any differences in the performance of the two monitored facilities due to differences in maintenance levels.

In future reports to the Water Board, this issue will be further evaluated by comparing the maintenance status at each facility during a given storm event and the pollutant removal performance associated with that storm event. This information will be used to assess whether there is an association between the level of maintenance and facility performance. This information will also be used to conduct a regional analysis aimed at understanding the minimum level of maintenance needed for the proper functioning of these facilities. The regional evaluation will consider variability in the frequency and level of effort of maintenance activities at the LID Monitoring sites across the region due to differences across cities, maintenance crews, catchment characteristics, etc. The variation in maintenance levels across sites and across the region will allow the Project Team to assess potential performance differences between the facilities that may be due to differences in maintenance, and to better understand the minimum level of maintenance needed for the proper functioning of these facilities.

## 7. PLANNED WY 2025 MONITORING

SCVURPPP plans to initiate hydrologic monitoring with the start of the WY 2025 monitoring year and to sample a minimum of six water quality sampling events throughout the course of the wet season.

There are several modifications to the sampling program that have been / will be implemented based on WY 2024, some of which have been identified previously. Additional modifications to the sampling program were also incorporated into the Revised LID Monitoring Plan (SCVURPPP 2024) based on the Water Board and TAG input. The following sections describe these modifications in more detail.

### 7.1. Modifications to Facilities

As discussed previously, construction issues that created substantial leaks in the overflow vault at TCM4 were discovered during WY 2024. These leaks prevented collection of effluent flow at this facility during much of WY 2024. The leaks were investigated and repaired during the summer of 2024. Therefore, monitoring at this facility will continue during WY 2025. Should the repairs prove insufficient, SCVURPPP will take additional steps to investigate and address the problems.

Hydrographs from TCM6 influent showed the flow exceeding the capacity of the weir on rare occasions. Consequently, the weir size will be increased for the start of WY 2025 to allow for better characterization of higher flows at the influent location.

### 7.2. Analytical Methods

#### 7.2.1. TPH

TPH was analyzed as both Diesel (C12-C24) and Motor Oil (C24-C36) at PACE Analytical as a subcontractor to Caltest Analytical in WY 2024. RLs at PACE for TPH-diesel were between 200 µg/L and 220 µg/L with an MDL between 74 µg/L and 83 µg/L. TPH-motor oil had a RL between 500 µg/L and 560 µg/L with an MDL between 160 µg/L and 180 µg/L. WY 2024 results saw few instances of quantified values for TPH across all counties for the BAMSC coordinated LID sampling. This combined with PACE no longer reporting the carbon ranges requested led to finding a new laboratory for TPH analysis. Beginning in WY 2025, TPH will be sent to Moore Twining Associates in Fresno, which will allow the Project to have TPH reported in the same carbon ranges for consistency and with lower RLs. The RLs for TPH in WY 2025 will be TPH-diesel: RL=50 µg/L, MDL=42 µg/L and TPH-motor oil: RL=100 µg/L, MDL=25 µg/L. Although the RLs from PACE met the Project required limits, the hope is the lower RLs at Moore Twining will allow the Project greater sensitivity for the TPH analysis.

#### 7.2.2. PFAS

As discussed previously, adoption of the final EPA Method 1633 will allow analytical laboratories the flexibility to adapt protocols used in WY 2025 to deal with samples with higher levels of suspended sediment. This method will be employed by Enthalpy beginning with WY 2025 analyses, which may tend to increase analytical sensitivity and thereby decrease the proportion of NDs reported.

### 7.3. Definition of a Storm

Discussions with TAG members have indicated a preference for conducting water quality monitoring under a variety of storm types to better understand performance of monitored facilities under representative environmental conditions. As part of monitoring plan development, the BAMSC Programs developed the following guidelines for consistency in defining storms while allowing flexibility for Programs to tailor monitoring efforts to site-specific conditions.

- 1 “A storm with precipitation of 0.10 inches or greater that produces measurable discharge and that occurs at least 72 hours from the previous measurable (greater than 0.10-inch precipitation) storm event, however the 72-hour antecedent dry period requirement may be waived at times to ensure that Project data sets are not biased with antecedent dry periods consistently greater than 72 hours (Caltrans 2020, USEPA 2018).
- 2 The storm event begins with a period of six consecutive hours with cumulative precipitation of at least 0.10 inches (Caltrans 2020).
- 3 The storm event ends with a period of 6 consecutive hours, each hour with precipitation less than or equal to 0.01 inches.”

Storm observations and review of monitoring data confirmed that in multiple cases viable storms were not sampled (or served as false starts) due to storms not meeting the requirements above. Specifically, storms often did not present as more uniform intensity storms over a given duration. Instead, storms often presented in a series of fronts with dry gaps that failed to meet the definition of a storm. This was often due to a small front passing that did not meet the minimum magnitude followed by a larger front that occurred more than six hours after the end of initial precipitation but too short a duration to meet the antecedent dry condition.

To address this situation, BAMSC Programs incorporated a slight change into their respective monitoring plans to expand the definition of a storm and reviewed with Water Board staff prior to finalizing. Beginning with WY 2025 monitoring, the storm event end criterion will be adjusted so that it ends “with a period of **between 6 and 24** consecutive hours, each hour with precipitation less than or equal to 0.01 inches.”

### 7.4. Water Balance Inputs

Beginning in WY 2025, water storage within each facility and exfiltration to native soil (i.e., discharge to groundwater) will be measured throughout the wet season. A single, shallow monitoring well (i.e., piezometer) will be installed in the approximate geographical center of the facility and outfitted with a pressure transducer to measure hydrostatic water pressure within the piezometer and record water depth once per minute throughout the wet weather season. The addition of this new equipment will support an assessment of the water balance at each facility.

### 7.5. Changes to Blank Testing

As described previously, sampling results for all end-of-season blanks collected by BAMSC Programs indicated that contamination / bias from sampling methods was not an issue in WY 2024 at any sampled facility. Given that the cost associated with these analyses raises the analytical budget by approximately 30% overall, not to mention increased sampling costs, BAMSC Programs would be interested in dropping this requirement or decreasing the rate at

which it is performed. SCVURPPP and BAMSC Programs will discuss this issue with Water Board staff and the TAG at the next opportunity and adjust monitoring procedures accordingly.

## **8. ASSESSMENT OF WATER QUALITY**

WY 2024 monitoring data provides a starting point for comparison of water quality data against relevant water quality standards. SCVURPPP successfully completed a total of seven water quality sampling events (one at TCM4 and six at TCM6) during the monitoring season. These sampling events generated between zero and seven quantified datapoints for each Project analyte at the influent and effluent points associated with each facility.

Modifications to analytical programs being incorporated by BAMSC Programs for WY 2025 implementation should result in a greater proportion of quantified analytical results for year 2 of monitoring. This should be especially relevant for the two analyte types that exhibited the highest proportion of non-detectable results in year 1 (TPH and PFAS).

SCVURPPP will, as part of a regional collaboration with BAMSC Programs, identify relevant water quality standards during WY 2025 for each Project analyte. With a second year of monitoring completed, we anticipate having a sufficient number of quantified datapoints for most or all Project analytes to begin to draw meaningful conclusions regarding influent and effluent water quality at our monitoring stations. These assessments will be presented in the Integrated Monitoring Report (IMR) following conclusion of WY 2025 monitoring.

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