CONTRA COSTA
CLEAN WATER
PROGRAM

April 2, 2024

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SUBJECT: Submittal of the WY2023 Urban Creeks Monitoring Report in Accordance with MRP 3 Provisions C.8.h.iii, C.8.h.iv, and C.19.d.iii

Dear Ms. White and Mr. Pulupa,

Attached please find the Water Year 2023 Urban Creeks Monitoring Report (UCMR) submitted on behalf of all Contra Costa Permittees per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (Order No. R2-2022-0018). We are submitting this report concurrently to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) and the Central Valley Regional Water Quality Control Board (CVRWQCB). Contra Costa Clean Water Program (CCCWP) copies the CVRWQCB on monitoring reports as stipulated in MRP Provision C.19.d.iii.

With approval and direction from duly authorized representatives of each CCCWP Permittee, I am authorized to submit and certify under penalty of law that this document and all attachments were prepared under my direction of supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Regards,

Rinta Perkins
Interim Program Manager
Contra Costa Clean Water Program

cc: Tom Mumley, SFBRWQCB
Keith Lichten, SFBRWQCB
Joseph Martinez, SFBRWQCB
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Contra Costa Clean Water Program (CCCWP) Permittees

CONTRA COSTA CLEAN WATER PROGRAM

Urban Creeks Monitoring Report: Water Year 2023

(October 2022 – September 2023)




Submitted to the San Francisco Bay and Central Valley Regional Water Quality Control Boards in Compliance with NPDES Permit Provision C.8.h.iii

NPDES Permit No. CAS612008

March 31, 2024

A Program of Contra Costa County, its Incorporated Cities and Towns, and the Contra Costa Flood Control & Water Conservation District

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Contra Costa Clean Water Program

Urban Creeks Monitoring Report: Water Year 2023
(October 2022 – September 2023)

March 31, 2024

Prepared for

Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

Contra Costa Clean Water Program Participants

- Cities of Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek
- Unincorporated Contra Costa County
- Contra Costa County Flood Control & Water Conservation District

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Acronyms and Abbreviations

ACCWP	Alameda Countywide Clean Water Program
BAMSC	Bay Area Municipal Stormwater Collaborative
BASMAA	Bay Area Stormwater Management Agencies Association
Bay	San Francisco Bay
CCCWP	Contra Costa Clean Water Program
CEDEN	California Environmental Data Exchange Network
CVRWQCB	Central Valley Regional Water Quality Control Board
Delta	Sacramento-San Joaquin River Delta
IMS	Information Management System
LID	low impact development
MP	Monitoring Plan
MRP	Municipal Regional NPDES Stormwater Permit
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
P/S	pilot and special studies
PAH	polycyclic aromatic hydrocarbon
POC	pollutants of concern
QAPP	quality assurance project plan
Region 2	San Francisco Bay Regional Water Quality Control Board
Region 5	Central Valley Regional Water Quality Control Board
RMP	Regional Monitoring Program for Water Quality in San Francisco Bay
RWL	receiving water limitations
RWQCB	Regional Water Quality Control Board
S&T	status and trends program
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SPoT	Stream Pollution Trends
SSA	Solano Stormwater Alliance
SWAMP	California Surface Water Ambient Monitoring Program
TMDL	Total maximum daily load
UCMR	urban creeks monitoring report
USGS	U.S. Geological Survey
WY	water year

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Preface

On May 11, 2022, the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) adopted the third Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit per Order No. R2-2022-0018 (MRP 3.0). This permit became effective July 1, 2022, at the start of the fourth quarter of water year 2022, superseding Order No. R2-2019-0004 (MRP 2.0). This Urban Creeks Monitoring Report (UCMR) is the second UCMR to be submitted under MRP 3.0, and the first UCMR solely to address monitoring requirements issued by Order No. R2-2022-0018.

The UCMR and all monitoring plans and status report appendices presented herein fulfill reporting requirements specified in MRP Provision C.8.h.iii. Data presented in this report were collected pursuant to Provisions C.8 and C.19 of the MRP, in accordance with standard operating procedures, monitoring plans, and quality assurance project plans (QAPP). Where applicable, monitoring data were derived using methods comparable with methods specified by the California Surface Water Ambient Monitoring Program (SWAMP) QAPP. Data presented in this report were also submitted in electronic SWAMP comparable formats to Moss Landing Marine Laboratory for transmittal to the Regional Water Quality Control Board (RWQCB) on behalf of the Contra Costa Clean Water Program (CCCWP) permittees and pursuant to the MRP Provision C.8.h.ii requirements for electronic data reporting.

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1 Introduction

This Urban Creeks Monitoring Report (UCMR) was prepared by the Contra Costa Clean Water Program (CCCWP) on behalf of its 21 member agencies (19 cities/towns, County of Contra Costa, and Contra Costa County Flood Control and Water Conservation District). CCCWP reports monitoring progress and data to ensure its program members comply with the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP). The UCMR and its appendices present data through statistical and graphical analysis to summarize MRP Provisions C.8 and C.19 data in Contra Costa County.

This UCMR, including appendices and attachments, fulfills the requirements of MRP Provision C.8.h.iii for summarizing, interpreting, and reporting monitoring data collected during water year 2023 (October 1, 2022-September 30, 2023). All monitoring data presented in this report were submitted electronically to the Regional Water Quality Control Board (RWQCB) by CCCWP (Attachment A). Data collected from receiving waters may be obtained via the California Environmental Data Exchange Network (CEDEN) website.[1] This web site contains information related to data retrieval from the CEDEN Query Tool, the California State Open Data Portal, and the Tableau Public Visualization Tool.

1.1 Regulatory Context

Contra Costa County lies within the jurisdictions of both the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) (Region 2) and the Central Valley Regional Water Quality Control Board (CVRWQCB) (Region 5). Municipal stormwater discharges in Contra Costa County were previously regulated by the requirements of two NPDES stormwater permits: the MRP in Region 2 (Order No. R2-2015-0049) (MRP 2.0), and the East Contra Costa County Municipal NPDES Permit (Central Valley Permit) in Region 5 (Order No. R5-2010-0102).

Prior to the issuance of MRP 2.0 in 2015, the requirements of the two permits were effectively identical. With the reissued MRP, there were some differences between MRP 2.0 and the Central Valley Permit, although in most respects monitoring and reporting requirements remained similar. In 2019, to address differences between the two permits, per agreement between the Central Valley and San Francisco Bay Regional Water Quality Control Boards, the SFBRWQCB adopted Order No. R2-2019-0004 to include the eastern portion of Contra Costa County under the jurisdiction of the MRP, rendering the Central Valley Permit obsolete.

On May 11, 2022, the SFBRWQCB adopted the third Municipal Regional Stormwater NPDES Permit (Order No. R2-2022-0018) (MRP 3.0) which became effective July 1, 2022, at the start of the fourth quarter of water year 2022. With the issuance of MRP 3.0, Contra Costa County cities and agencies located in the CVRWQCB's geographic jurisdiction continue to be included as Permittees in the SFBRWQCB permit subject to Provision C.8 monitoring and reporting requirements. Provision C.19 also incorporates requirements from the CVRWQCB's TMDLs and control programs applicable to East County Permittees.

[1] Information on how these data may be obtained is available at http://www.ceden.org/find_data_page.shtml.

This UCMR and all reports herein fulfill reporting requirements in accordance with MRP 3.0 Provision C.8.h.iii.

1.2 Bay Area Municipal Stormwater Collaborative (BAMSC) Overview

In 2021, CCCWP joined with several other stormwater programs to form the Bay Area Municipal Stormwater Collaborative (BAMSC)[2]. This regional collaborative coordinates on Permittee advocacy and information sharing through informal workgroups. BAMSC workgroup participants include the following stormwater programs:

- Alameda Countywide Clean Water Program (ACCWP)
- Contra Costa Clean Water Program (CCCWP)
- San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)
- Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
- Solano Stormwater Alliance (SSA)

BAMSC workgroups coordinate water quality monitoring projects regionwide, assist Permittees in complying with the requirements of MRP 3.0, develop and implement regionally consistent monitoring approaches, and help stabilize the cost of monitoring by reducing duplication of effort (e.g., development of regional quality assurance project plans). Details on the respective BAMSC stormwater program participants and their co-permittees are presented in Table 1.

Table 1. BAMSC Workgroup Participants

Stormwater Programs	Permittees
Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)	Cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, Sunnyvale, Los Altos Hills, and Los Gatos; Santa Clara Valley Water District; and Santa Clara County
Alameda Countywide Clean Water Program (ACCWP)	Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City; Alameda County; Alameda County Flood Control and Water Conservation District; and Zone 7 Water Agency
Contra Costa Clean Water Program (CCCWP)	Cities/Towns of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek, Danville, and Moraga; Contra Costa County; and Contra Costa County Flood Control and Water Conservation District
San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)	Cities and towns of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, South San Francisco, Atherton, Colma, Hillsborough, Portola Valley, and Woodside; San Mateo County Flood Control District; and San Mateo County
Solano Stormwater Alliance (SSA)	Cities of Fairfield, Suisun City, Vallejo, and Vallejo Sanitation and Flood Control District

[2] In April 2021, the Bay Area Stormwater Management Agencies Association (BASMAA) dissolved. The coordination efforts of BASMAA have been replaced by the Bay Area Municipal Stormwater Collaborative (BAMSC), which is a less formal organization without contracting capability. Reports and committees created by BASMAA and retained under BAMSC will be referred to as BAMSC reports and workgroups beginning with the water year 2023 UCMR. BAMSC will continue to serve as a consortium of municipal stormwater programs, representing over 90 agencies, including 79 cities and 6 counties, focused on regional challenges and opportunities to improve the quality of stormwater that flows to our creeks, the San Francisco Bay, the Sacramento-San Joaquin River Delta and the Pacific Ocean (CCCWP 2023a).

1.3 Report Organization

This report is organized by the sub-provisions of MRP Provision C.8, incorporating applicable sub-provisions of Provision C.19 as follows:

1. Compliance Options (Provision C.8.a), Monitoring Protocols and Data Quality (Provision C.8.b), San Francisco Estuary Receiving Water Monitoring (Provision C.8.c), MRP 2.0 Monitoring
2. Low Impact Development (LID) Monitoring (Provision C.8.d) (Appendix 1)
3. Trash Monitoring (Provision C.8.e) (Appendix 2)
4. Pollutants of Concern Monitoring (Provision C.8.f) (Appendix 3)
5. Pollutants of Concern Receiving Water Limitations Monitoring (Provision C.8.f) (Appendix 4)
6. Pesticides and Toxicity Monitoring (Provision C.8.g) (Appendix 5)
7. East County Annual Mercury Monitoring Plan (Provision C.19.d) (Appendix 6)

Figure 1 maps the locations of CCCWP monitoring sites associated with MRP Provisions C.8 and C.19 compliance in water year 2023, including LID, trash outfall monitoring, pollutants of concern (POC), pesticide and toxicity, and annual mercury monitoring sites.

Monitoring results, plans and status reports discussed herein were performed in accordance with the requirements of MRP 3.0. Key technical findings, methods, results, and status updates associated with these reports are summarized and provided in their respective appendices, as referenced within the applicable sections of the main body of this report.

1.4 Compliance Options (C.8.a)

Provision C.8.a allows Permittees to comply with MRP 3.0 monitoring requirements through regional collaboration, utilization of data collected by third-party monitoring, or by contributing to their countywide stormwater program. The primary method of regional collaboration on C.8 monitoring is through the BAMSC workgroup, which coordinates with and on behalf of member programs to comply with monitoring requirements and needs, including:

- Shared standard operating procedures
- Shared quality assurance project plans (QAPPs)
- Site selection and number of sites per program
- Timing of sampling events
- Data quality assurance and quality control procedures
- Database management

The main benefit of the BAMSC workgroup to the CCCWP Permittees is assurance the results meet RWQCB expectations for data content and quality. The MRP defines the type, amount, and frequency of monitoring; however, many details of execution require operator judgements (e.g., how to best screen LID and trash monitoring sites, select and configure sampling equipment, or identify acceptable data quality objectives). Discussion at the BAMSC workgroup meetings provides a point of communication and common documentation to align details across programs and allow the RWQCB to comment on approach. The BAMSC workgroup is likely cost-neutral, in that the staff time and consultant support necessary to collaborate is offset by cost efficiencies achieved by sharing methods and documents.

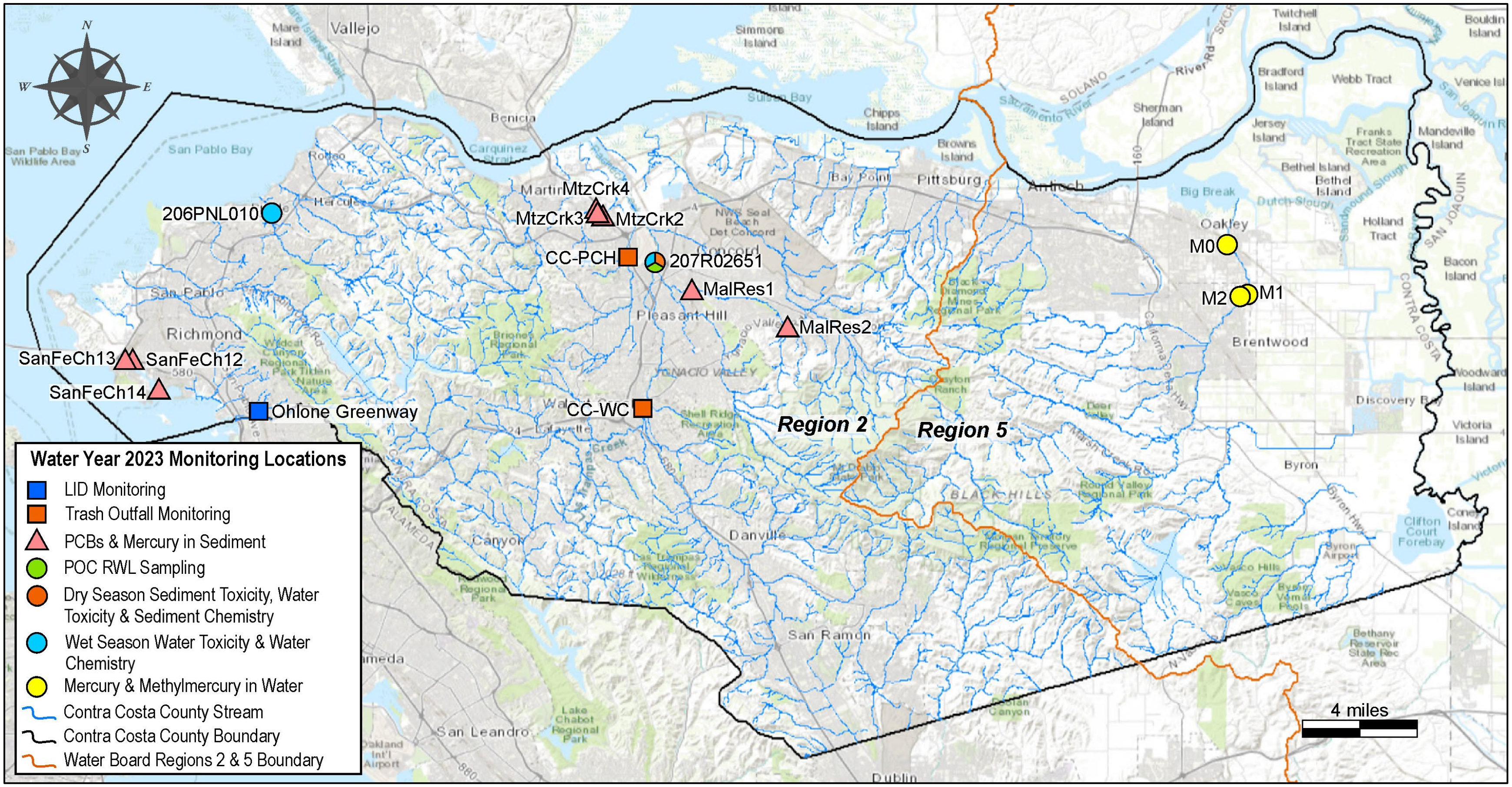

Figure 1. MRP Provision C.8 and C.19 Monitoring Sites in Water Year 2023

In addition to regional collaboration, CCCWP works with third-party water quality monitoring partners to benefit local, regional, and statewide monitoring efforts. Provision C.8.a.iii allows permittees to work with third-party organizations, such as the SFBRWQCB, CVRWQCB, State Water Resources Control Board, or California Department of Pesticide Regulation, to fulfill monitoring requirements if data meets water quality objectives described in Provision C.8.b. Monitoring locations in Contra Costa County are sampled in a manner to be comparable to the protocols of the state's Surface Water Ambient Monitoring Program (SWAMP) and assessed for pesticide pollution and toxicity through the Stream Pollution Trends (SPoT) Program (SWRCB 2021). SPoT monitors status and trends in sediment toxicity and sediment contaminant concentrations in selected streams and rivers throughout California and relates contaminant concentrations and toxicity test results to watershed land uses.

In addition, CCCWP supports efforts by local creek groups to monitor the San Pablo, Wildcat, Walnut, and Marsh Creek Watersheds.

1.5 Monitoring Protocols and Data Quality (C.8.b)

Provision C.8.b of the MRP requires water quality data collected by the Permittees to comply with and be of a quality consistent with the State of California's SWAMP standards set forth in the SWAMP QAPP and standard operating procedures. Protocols and procedures were developed to assist permittees with meeting SWAMP data quality standards and to develop data management systems which allow for easy access to water quality monitoring data by Permittees.

1.5.1 Standard Operating and Data Quality Assurance Procedures

For LID monitoring, CCCWP developed a monitoring plan (CCCWP 2023b) and QAPP (BAMSC 2023a) for Executive Officer approval in May of 2023. The SFBRWQCB conditionally approved the monitoring plan and QAPP in August 2023. The monitoring plan and QAPP are anticipated for final approval in water year 2024, following BAMSC workgroup collaboration to address individual plan comments.

A regional trash outfall monitoring plan (BAMSC 2023b) and QAPP (BAMSC 2023c) were developed in July of 2023, and conditionally approved by the SFBRWQCB in August 2023. The final regional trash monitoring plan and QAPP are anticipated for approval in water year 2024, following BAMSC workgroup collaboration to address required changes by July 31, 2024.

For POC monitoring, a sampling analysis plan (ADH and AMS 2020a) and QAPP (ADH and AMS 2020b) were developed in 2016 and finalized in 2020 to guide the monitoring efforts for each POC task.

For POC receiving water limitations monitoring, a regional monitoring plan (BAMSC 2023d) was developed in March 2023, and conditionally approved by the SFBRWQCB in June 2023. An addendum to the plan is anticipated for approval in water year 2024, following BAMSC workgroup collaboration to address required changes.

For pesticides and toxicity monitoring, CCCWP relied on the SOPs (BASMAA 2016) and QAPP (BASMAA 2020) developed previously by the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC), the predecessor to the BAMSC workgroups, along with the most recent SWAMP QAPP (SWRCB 2022), to document the field and laboratory procedures necessary to produce SWAMP-comparable, high-quality data, as required by the MRP.

For east county mercury monitoring, CCCWP developed a monitoring plan (CCCWP 2023c) that was submitted to the SFBRWQCB as part of the 2022 UCMR. This plan guides the monitoring efforts for each mercury monitoring task to be performed in water year 2024.

1.5.2 Information Management System Development/Adaptation

Permittees are required to report annually on water quality data collected in compliance with the MRP. To facilitate data management and transmittal, the BAMSC workgroup utilizes an information management system (IMS) to provide SWAMP-compatible storage and import/export of data for all BAMSC workgroup programs, with data formatted in a manner suitable for uploading to CEDEN.

BAMSC subsequently supplemented the IMS to accommodate management of POC data collected by stormwater programs. The expanded IMS provides standardized data storage formats which allow BAMSC participants to share data among themselves and to submit data electronically to the SFBRWQCB and CVRWQCB.

1.6 San Francisco Estuary Receiving Water Monitoring (C.8.c)

CCCWP contributes to the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), specifically the Status & Trends Monitoring Program (S&T Program) and the Pilot and Special Studies (P/S Studies). These efforts provide useful tools for CCCWP. Brief descriptions of the S&T Program and P/S Studies are provided below.

As described in MRP Provision C.8.c, Permittees are required to conduct or cause to be conducted receiving water monitoring in San Francisco Bay (the Bay). Permittees comply with this provision by making financial contributions through CCCWP to the RMP. Additionally, Permittees actively participate in RMP committees and work groups through Permittee and/or stormwater program representatives.

The Sacramento-San Joaquin River Delta (Delta) RMP serves a similar function in fulfilling receiving water monitoring requirements for dischargers located within the jurisdiction of the CVRWQCB. Some CCCWP Permittees (the cities of Brentwood, Antioch, and Oakley, and portions of unincorporated Contra Costa County and the Contra Costa County Flood Control District) are located within the CVRWQCB's jurisdiction; however, by agreement with the SFRWQCB and the CVRWQCB, those Permittees also meet receiving water monitoring requirements through funding of the San Francisco Bay RMP. This is consistent with the historic approach of managing the entire countywide program as a single, integrated program.

The RMP is a long-term, discharger-funded monitoring program directed by a steering committee and represented by regulatory agencies and the regulated community. In addition to regulators and the regulated community, the RMP Technical Committee includes participation by a local, non-governmental organization that specializes in water quality in the Bay. The goal of the RMP is to assess water quality in the Bay. The regulated community includes Permittees, publicly owned treatment works, dredgers, and industrial dischargers.

The RMP is intended to answer the following core management questions:

1. *Are chemical concentrations in the estuary potentially at levels of concern and are associated impacts likely?*

2. *What are the concentrations and masses of contaminants in the estuary and its segments?*
3. *What are the sources, pathways, loadings, and processes leading to contaminant-related impacts in the estuary?*
4. *Have the concentrations, masses, and associated impacts of contaminants in the estuary increased or decreased?*
5. *What are the projected concentrations, masses, and associated impacts of contaminants in the estuary?*

The RMP budget is generally broken into two major program elements: status and trends monitoring and Pilot/Special Studies. The RMP publishes reports and study results on their website at www.sfei.org/rmp.

1.6.1 RMP Status and Trends Monitoring Program

The S&T Program is the long-term contaminant monitoring component of the RMP. The S&T Program was initiated as a pilot study in 1989 and was redesigned in 2007 based on a more rigorous statistical design aimed at enabling the detection of trends. The S&T Program is comprised of the following program elements:

- Long-term water, sediment, and bivalve monitoring
- Episodic toxicity monitoring
- Sport fishing monitoring
- U.S. Geological Survey (USGS) hydrographic and sediment transport studies
- Factors controlling suspended sediment in San Francisco Bay
- USGS monthly water quality data
- Triennial bird egg monitoring (cormorant and tern)

Additional information on the S&T Program and associated monitoring data are available for download via the RMP website at www.sfei.org/content/status-trends-monitoring.

1.6.2 RMP Pilot and Special Studies

The RMP conducts pilot and special studies on an annual basis through committees, workgroups, and strategy teams. Studies are typically designed to investigate and develop new monitoring measures related to anthropogenic contamination or contaminant effects on biota in the estuary. Special studies address specific scientific issues that RMP committees and standing workgroups identify as priority for further study. These studies are developed through an open selection process at the workgroup level and are selected for further funding through RMP committees. Results and summaries of the most pertinent pilot and special studies can be found on the RMP web site (http://www.sfei.org/rmp).

1.6.3 Participation in Committees, Workgroups and Strategy Teams

CCCWP and/or other BAMSC representatives participate in the following RMP committees and workgroups:

- Steering Committee

- Technical Review Committee
- Sources, Pathways and Loadings Workgroup
- Emergent Contaminant Workgroup
- Nutrient Technical Workgroup
- Strategy teams (e.g., Small Tributaries, PCBs)

Committee and workgroup representation are provided by CCCWP, other stormwater program staff, and/or individuals designated by stormwater program participants. Representation includes participation in meetings, review of technical reports and work products, co-authoring or review of articles included in the RMP's annual publication, *Pulse of the Bay*, and general program direction to RMP staff. Representatives of the RMP also provide timely summaries and updates to and receive input from BAMSC stormwater program representatives (on behalf of the Permittees) during workgroup meetings to ensure the Permittees' interests are represented.

1.7 MRP 2.0 Monitoring

In water years 2018 and 2019, CCCWP conducted a stressors and source identification study in compliance with MRP 2.0 Provision C.8.e. The study focused on identifying the cause of fish mortality events observed in Marsh Creek. Throughout the multi-year study, CCCWP focused on low dissolved oxygen (DO) as the primary suspect cause of fish kills and evaluated pesticide toxicity as a potential cause of fish mortality (CCCWP 2020). On January 3, 2022, the SFBRWQCB issued a comment letter, agreeing with the study's conclusion in identifying low dissolved oxygen as the likely primary stressor contributing to fish mortality events in Marsh Creek.

In CCCWP's Marsh Creek SSID Study Year 2 Report, biochemical oxygen demand (BOD) is presented as one possible anthropogenic factor contributing to low DO conditions in addition to existing physical habitat conditions and erosion potential within Marsh Creek. While potential sources of BOD are listed in the Marsh Creek SSID Study Year 2 Report, the report does not describe efforts to investigate sources of BOD in Marsh Creek. To address comments presented in the January 3, 2022 letter, CCCWP conducted BOD sampling at 13 outfalls and one in-stream location to identify potential sources of BOD during storm events in water years 2022 and 2023. Analytical results from BOD sampling were uploaded to the CEDEN database on March 31, 2023 and April 2, 2024, as follow up to the next steps provided in the January 3, 2022 comment letter from the SFBRWQCB.

2 Low Impact Development (LID) Monitoring (C.8.d)

MRP 3 Provision C.8.d requires Permittees to conduct LID monitoring that is intended to answer the following two management questions:

- What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of the 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?
- What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?

In water year 2023, CCCWP selected one site for LID monitoring in the City of El Cerrito, continued discussions with the LID Technical Advisory Group (TAG), completed procurement and installation of monitoring and sampling equipment, and developed an LID monitoring plan and QAPP which, per Provision C.8.d.vi, was submitted for Executive Officer approval on May 1, 2023. On August 23, 2023, the LID Monitoring Plan and QAPP received conditional approval, with required changes scheduled for completion in water year 2024. A comprehensive summary of actions on LID monitoring in water year 2023 is presented in Appendix 1, including a discussion of the approach for LID monitoring in water year 2024.

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3 Trash Monitoring (C.8.e)

MRP Provision C.8.e requires Permittees to conduct trash monitoring that is intended to 1) verify whether Permittees' trash control actions to-date have effectively prevented trash from their jurisdictions from discharging to receiving waters, and 2) evaluate whether discharges of trash from areas of Permittees' jurisdictions where full trash capture equivalency (full trash capture devices and/or other actions verified with on-land visual trash assessments, as referenced in Provision C.10.b.iii) has been achieved are causing and/or contributing to adverse trash impacts in receiving waters.

Trash monitoring shall address the following management and monitoring questions:

1. *Have Permittees' trash management actions effectively prevented trash from their jurisdictions from discharging to receiving waters?*
2. *Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?*

In water year 2023, CCCWP identified and selected two trash outfall monitoring locations (one in the City of Walnut Creek and one in the census-designated place of Pacheco), coordinated and finalized permitting and equipment procurement with agencies and third-party vendors, continued technical discussions with the Trash Technical Advisory Group (TAG), and developed a Trash Monitoring Plan and QAPP which, per Provision C.8.e.v, was submitted on July 31, 2023 for Executive Officer approval. On August 31, 2023, the Trash Monitoring Plan and QAPP received conditional approval, with required changes scheduled for completion in water year 2024. Permittees began trash outfall monitoring on October 1, 2023, and will begin in-stream monitoring on October 1, 2024 (Provision C.8.e.iii). A summary of actions that CCCWP and BAMSC workgroup participants have taken on trash monitoring in water year 2023 is provided in Appendix 2.

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4 Pollutants of Concern Monitoring (C.8.f and C.19.d)

POC monitoring is intended to assess inputs of POCs to the Bay and Delta from local tributaries and urban runoff, assess compliance with receiving waters limitations, assess progress toward achieving wasteload allocations for TMDLs, and to help resolve uncertainties associated with loading estimates for these pollutants.

Under MRP Provision C.8.f., POC monitoring addresses six priority management information needs:

1. *Source Identification – identifying or confirming which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;*
2. *Contributions to Bay Impairment – identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);*
3. *Management Action Effectiveness – evaluating the effectiveness or impacts of existing management actions, including compliance with TMDLs and other POC requirements and providing support for planning future management actions;*
4. *Loads and Status – providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges;*
5. *Trends – evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time; and*
6. *Compliance with Receiving Water Limitations – providing information to assess whether receiving water limitations (RWLs) are achieved.*

Under Provision C.19.d.ii.(2), East County Permittees, including the cities of Antioch, Brentwood, and Oakley, unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District located in the jurisdiction of the CVRWQCB, must comply with POCs monitoring to address the Delta Methylmercury TMDL. Methylmercury monitoring in East County is designed to answer the following management questions:

1. *What are the annual methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?*
2. *Do the methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?*
3. *Are there any MS4 design features that increase mercury methylation in the discharge?*
4. *What MS4 water quality controls have been implemented or are planned to be implemented to reduce methylmercury production and transport in the MS4 discharge?*
5. *By January 1, 2024, address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March and Mid-November), and, if so:*

i. *Under what hydrologic or seasonal circumstances do increased methylmercury concentrations reach the Delta?*

ii. *Are there reasonable and foreseeable management actions to ameliorate increased methylmercury concentrations?*

4.1 Pollutants of Concern Monitoring Report

In water year 2023, CCCWP conducted source area assessments to investigate high interest parcels and areas for consideration of property referrals for PCBs and mercury controls. Street dirt and drop inlet sediments were sampled for POCs at eight locations within Concord, Martinez, and Richmond, as shown in Figure 1. These sediment monitoring activities addressed Monitoring Types 1 and 2 (source identification and contributions to Bay impairment). Table 2 presents a summary of water year 2023 C.8 POCs sediment monitoring locations. A summary report of these data is presented in the Pollutants of Concern Monitoring Report (Appendix 3).

Table 2. Summary of Water Year 2023 C.8 Pollutants of Concern Sediment Monitoring Sites

Station ID	Receiving Water Body	Land Use	Latitude	Longitude	City/Town
MalRes1	Mallard Reservoir	Region 2, Urban	37.96467	-122.02885	Concord
MalRes2	Mallard Reservoir	Region 2, Urban	37.94419	-121.96931	Concord
MtzCrk2	Martinez Creek	Region 2, Urban	38.00531	-121.08505	Concord
MtzCrk3	Martinez Creek	Region 2, Urban	38.00674	-122.08816	Martinez
MtzCrk4	Martinez Creek	Region 2, Urban	38.00819	-122.08889	Martinez
SanFeCh12	Santa Fe Channel	Region 2, Urban	37.92884	-122.37578	Richmond
SanFeCh13	Santa Fe Channel	Region 2, Urban	37.92882	-122.37974	Richmond
SanFeCh14	Santa Fe Channel	Region 2, Urban	37.91210	-122.36055	Richmond

In compliance with MRP Provision C.19.d.ii.(2), CCCWP conducted aqueous mercury monitoring in East County waterways that drain to the Delta to answer management questions in Provision C.19.d.ii.(2)(a)-(e). Table 3 presents a summary of water year 2023 Provision C.19 monitoring locations. A summary report of these data is presented in CCCWP's 2023 Annual Mercury Monitoring Report (CCCWP 2023d).

Table 3. Summary of Water Year 2023 C.19 Pollutants of Concern Aqueous Monitoring Sites

Station ID	Receiving Water Body	Latitude	Longitude	City/Town
544MSHM2	Marsh Creek	37.96264	-121.68786	Brentwood
544MSHM1	Marsh Creek	37.96393	-121.68375	Brentwood
544MSHM0	Marsh Creek	37.99036	-121.69591	Oakley

POCs monitoring activities anticipated for water year 2024 include:

- Continuation of mercury and PCBs source property and area investigations, as required by MRP Provision C.11.b/C.12.b (Monitoring Types 1, 2, and 5)
- Management action effectiveness (Type 3) studies through low impact development monitoring that is conducted per MRP Provision C.8.d;
- Revisiting monitoring locations to evaluate trends in POC loading to the Bay and/or local tributaries over time (Monitoring Types 4 and 5) and to confirm ongoing moderate or high levels of PCBs in areas identified in the Old Industrial Area Control Measure Plan (MRP Provisions C.11.c and C.12.c);
- Receiving water limitations sampling for Monitoring Type 6 per the Receiving Water Limitations Monitoring Plan (BAMSC 2023d);
- Methylmercury monitoring in the Marsh Creek subarea to address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods (Management Question 5; C.19.ii.(2)(e); and
- Mercury and methylmercury monitoring in the West Delta and Central Delta Subareas to address Provision C.19.d.ii.(2)(a)-(d), as detailed in the East County Annual Mercury Monitoring Plan (CCCWP 2023c).

POCs monitoring activities planned for water year 2025 include:

- Continuation of mercury and PCBs source property and area investigations, as required by MRP Provision C.11.b/C.12.b (Monitoring Types 1, 2, and 5)
- Management action effectiveness (Type 3) studies through low impact development monitoring that is conducted per MRP Provision C.8.d;
- Revisiting monitoring locations to evaluate trends in POC loading to the Bay and/or local tributaries over time (Monitoring Types 4 and 5) and to confirm ongoing moderate or high levels of PCBs in areas identified in the Old Industrial Area Control Measure Plan (MRP Provisions C.11.c and C.12.c);
- PCBs and mercury sampling at the bottom of the watershed in old industrial areas that are expected to have few source properties to confirm this assumption (Monitoring Types and 2 and 4);
- Continuation of receiving water limitations sampling for Monitoring Type 6 per the Receiving Water Limitations Monitoring Plan (BAMSC 2023d); and
- Continuation of mercury and methylmercury monitoring in the West Delta and Central Delta Subareas to address Provision C.19.d.ii.(2)(a)-(d), as detailed in the water year 2025 East County Annual Mercury Monitoring Plan (Appendix 6).

4.2 Stormwater Monitoring Strategy for Emerging Contaminants

MRP Provision C.8.f.ii requires participation by Permittees in the regional stormwater monitoring strategy for emerging contaminants. Provision C.8.f.ii (Table 8.2, footnote c) of MRP 3.0 states:

> *Permittees, collectively, shall produce or cause to be produced a stormwater monitoring strategy for emerging contaminants (ECs) by April 1, 2023 that prioritizes ECs for stormwater monitoring listed in this table and possibly others and establishes an approach for sampling stormwater ECs based on specific or likely physico-chemical properties, sources, transport pathways, and fate of prioritized ECs. Permittees must conduct or cause to be conducted ECs stormwater monitoring to execute the ECs stormwater monitoring strategy at a level of effort indicated in the table. This level of effort can be satisfied either through sampling and analysis of the number of samples indicated in this table or through augmentation of the San Francisco Bay Regional Monitoring Program Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined.*

As approved by the CCCWP Management Committee, Permittees have agreed to satisfy this MRP requirement by annually contributing their share of $100,000 to augment the RMP's Emerging Contaminant Monitoring Strategy[3]. For Permittees in Contra Costa County, annual contributions of $21,649 will be made through CCCWP (Table 4).

Table 4. Contributions the MRP Permittees have agreed to make annually to augment the RMP's Emerging Contaminant Monitoring Strategy during the term of the permit

Permittee Group	Annual Contribution	Relative Percentage[1]
Alameda County Permittees	$30,923	30.92%
Contra Costa County Permittees	$21,649	21.65%
Santa Clara County Permittees	$33,489	33.49%
San Mateo County Permittees	$13,939	13.94%
Total	***$100,000***	***100%***

1 Relative percentage is based on the populations within the MRP-associated portions of each county at the start of MRP 3.0 (Department of Finance, January 2022).

The stormwater portion of the RMP's Emerging Contaminants Monitoring Strategy is currently under development and builds upon a stormwater emerging contaminants screening study conducted from 2018-2023. The stormwater portion of the RMP's Emerging Contaminants Monitoring Strategy is scheduled for completion in late 2023 and will be implemented through the RMP during the current permit term. This portion of the RMP's Emerging Contaminant Monitoring Strategy includes both watershed and stormwater modeling and monitoring tasks to address high priority management questions established collaboratively through the RMP consistent with those included in MRP 3.0.

[3] https://www.sfei.org/sites/default/files/biblio_files/CEC%20Strategy%20-%202020%20Update%20-%20Final_92320.pdf

5 Pollutants of Concern Receiving Water Limitations Monitoring

MRP 3.0 Provision C.8.f.ii, Table 8.2, specifies that for POC receiving water limitations (RWLs) monitoring Permittees must collect, over the permit term, four wet season samples and one dry season sample for copper, zinc, and fecal indicator bacteria and additional analytes determined under Provision C.8.h.iv. In water year 2023, CCCWP selected a POC RWL monitoring site on Walnut Creek at Concord Avenue and developed a monitoring plan (BAMSC 2023d), which per Provision C.8.h.iv was submitted for Executive Officer approval on March 14, 2023. On June 12, 2023, the POC RWL monitoring plan was conditionally approved. An addendum to the POC RWL monitoring plan was prepared to address requirements in the conditional approval letter and is provided in Appendix 4.

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6 Pesticides and Toxicity Monitoring (C.8.g)

MRP Provision C.8.g., Pesticides and Toxicity Monitoring, contains the following elements:

- Toxicity in Water Column - Dry Weather: includes acute and chronic toxicity testing of water samples for several test species at one site annually during the permit term.
- Toxicity, Pesticides and Other Pollutants in Sediment - Dry Weather: includes acute toxicity testing (survival) of sediment samples for two aquatic invertebrate test species, and chemical analysis for pesticides, metals, PAHs, and other constituents at one site annually during the permit term.
- Wet Weather Pesticides and Toxicity Monitoring (Water Column): includes acute and chronic toxicity testing of water samples for several test species and chemical analysis for pesticides at two sites during one storm event during the permit term.

Pesticide analytical constituents common to dry weather sediment and wet weather water monitoring include bifenthrin, permethrin and several other pyrethroids, fipronil and its degradates, and imidacloprid, a neonicotinoid.

The site selected for the dry weather water and sediment monitoring (Walnut Creek at Concord Avenue) matches the site selected for POC receiving water limitations monitoring. Samples were collected for the required tests and analyses for water year 2023 on July 18, 2023.

The same Walnut Creek site, along with a site on Pinole Creek, were selected as the two CCCWP wet weather monitoring locations for pesticides and toxicity monitoring. Samples were collected from these two sites during a storm event on November 8, 2022. Acute toxicity to *Hyalella azteca* in the Walnut Creek sample required a retest, which was completed following sample collection during a subsequent storm event on January 10, 2023.

The wet weather sampling and analysis were coordinated by BAMSC and included monitoring of a total of ten sites regionwide; this fulfills the wet weather pesticides and toxicity monitoring requirement for the current permit term.

All toxicity test results and water and sediment analytical chemistry results (for pesticides and other constituents) are presented in Appendix 5.

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7 East County Annual Mercury Monitoring Plan WY 2025

MRP 3.0 Provision C.19.d.iii.(1) requires East County Permittees to submit a mercury monitoring plan annually on March 31 with the Urban Creeks Monitoring Report. The monitoring plan describes the annual monitoring schedule and specifies the proposed sampling locations for methylmercury sampling required under MRP 3.0 Provision C.19.d.ii.(2). The water year 2025 East County annual mercury monitoring plan is presented in Appendix 6.

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Appendix 1

Low Impact Development (LID) Monitoring Status Report: Water Year 2023

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Contra Costa Clean Water Program

Low Impact Development (LID) Monitoring Status Report: Water Year 2023

Submitted to the San Francisco Bay and Central Valley Regional Water Quality Control Boards

In Compliance with NPDES Permit Provision C.8.h.iii.(1)
Municipal Regional Stormwater Permit (Order No. R2-2022-0018)

March 31, 2024

Prepared for

Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

Prepared by

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Contra Costa Clean Water Program

Low Impact Development (LID) Monitoring Status Report: Water Year 2023

March 31, 2024

Prepared for

Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

Contra Costa Clean Water Program Participants

- Cities of: Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek
- Contra Costa County
- Contra Costa County Flood Control & Water Conservation District

Prepared by

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Acronyms and Abbreviations

ACS	American Chemical Society
BAMSC	Bay Area Municipal Stormwater Collaborative
CCCWP	Contra Costa Clean Water Program
CEDEN	California Environmental Data Exchange Network
DI	deionized
EDD	electronic data deliverable
HDPE	high density polyethylene
LID	low impact development
MDL	method detection limit
MQO	method quality objective
MRP	municipal regional stormwater permit
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
PCBs	polychlorinated biphenyls
PFAS	polyfluoroalkyl substances
QAPP	quality assurance project plan
pH	hydrogen ion concentration
RL	reporting limit
SEBS	styrene ethylene butylene styrene silicone
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SWAMP	Surface Water Ambient Monitoring Program
TAG	technical advisory group
TPH	total petroleum hydrocarbons
TSS	total suspended solids
WY	water year

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1 Introduction

This Low Impact Development (LID) Monitoring Status Report documents monitoring activities performed by Contra Costa Clean Water Program (CCCWP) during water year (WY) 2023 (October 1, 2022-September 30, 2023) on behalf of its 21 member agencies (19 cities/towns, the County of Contra Costa, and the Contra Costa County Flood Control and Water Conservation District), 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 No. 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 No. R2-2015-0049 (SFBRWQCB 2015; referred to as MRP 2.0). The current, and third, version of the MRP (SFBRWQCB 2022; referred to as MRP 3.0,) was issued by the Regional Water Board as Order No. 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 the LID monitoring accomplishments from the preceding water year (water year 2023) conducted in compliance with Provision C.8.d (LID Monitoring) of the MRP. Consistent with the requirements of Provision C.8.d, LID monitoring activities in water year 2023 focused on planning and preparation rather than sample collection. This report summarizes LID monitoring planning and preparation actions that took place in water year 2023.

2 LID Monitoring Requirements

“Low impact development” refers to structural control facilities or devices that treat stormwater runoff from urban infrastructure (roadways, parking lots, hardscape, buildings, etc.). LID is designed to meet some of the following goals: 1) slow the transport of stormwater to receiving waters, 2) attenuate peak runoff volumes and velocities, 3) promote infiltration into native soils, and 4) reduce pollutant loads to receiving waters through a variety of treatment methods, such as settling, infiltration, biofiltration, and mechanical filtration. Incorporation of post-construction LID measures into new development and redevelopment projects has been a key aspect of Contra Costa County’s stormwater management for the past 10+ years, and each iteration of Provision C.3 of the MRP has progressively prescribed more and more specific and stringent LID design and siting criteria.

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:

- What are the pollutant removal and hydrologic benefits (e.g., addressing impacts associated with hydromodification) of the 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?

- 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 Contra Costa 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 water year 2024. Each sampling event must consist of paired flow-weighted composite samples, collected with automated samplers, of the LID facility influent and effluent. Provision C.8.d.iv of the MRP specifies that all composite samples must be analyzed for total mercury, total polychlorinated biphenyls (PCBs), total suspended solids (TSS), per- and polyfluoroalkyl substances (PFAS), total petroleum hydrocarbons (TPH), total and dissolved copper, total hardness, and pH. In addition, flow must be measured at both influent and effluent sampling locations.

To assist development and implementation of scientifically-sound LID monitoring plans, facilitate regional consistency with respect to sampling and analytical methodology, and make recommendations about allocation of samples between and within different sites, Provision C.8.d.ii requires Permittees to form and convene a Technical Advisory Group (TAG) which includes impartial science advisors and Regional Water Board staff. The TAG was asked to review and make recommendations regarding the LID monitoring plans (including their study design, analysis methods, results, and conclusions) prior to submission of the LID monitoring plans to the executive officer. To effectuate this review, the Permittees submitted their draft LID monitoring plans to the TAG by March 1, 2023. Prior to the executive officer's approval or conditional approval of the LID monitoring plans, the TAG convened at least twice a year. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation of the LID monitoring plans.

CCCWP submitted a draft LID monitoring plan to the Regional Water Board in May 2023 (CCCWP 2023). Approval to proceed with equipment purchasing was given by the SFBRWQCB in June 2023. The LID monitoring plan and attendant quality assurance project plan (QAPP) (BAMSC 2023) were accepted with conditional approval by the SFBRWQCB in August 2023. The monitoring plan and QAPP are anticipated for final approval in water year 2024, following Bay Area Municipal Stormwater Collaborative (BAMSC) workgroup collaboration to address individual plan comments.

3 Water Year 2023 Monitoring Accomplishments

During water year 2023, CCCWP participated in the Bay Area Municipal Stormwater Collaborative (BAMSC) LID Monitoring Workgroup. Other members of the group include:

- Alameda Countywide Clean Water Program (ACCWP)
- San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)
- Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
- Solano Stormwater Alliance (SSA)

The LID Monitoring Workgroup meets every other month to discuss monitoring issues and generally supports regional consistency in LID monitoring across the Bay Area.

3.1 LID TAG

During water year 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 Quality Control Board (SFBRWQCB).
- Alicia Gilbreath – environmental scientist at the San Francisco Estuary Institute.
- Dipen Patel – research engineer at the Office of Water Programs at Sacramento State University.
- Eric Strecker – professional engineer in California and Oregon and principal investigator for the International BMP Database for over 20 years.
- Michael Stenstrom – distinguished professor at UCLA Civil and Environmental Engineering Department.

The first LID TAG meeting was held on December 8, 2022; the second LID TAG meeting was held on March 21, 2023. The Program worked with the BAMSC LID Monitoring Workgroup to coordinate on the agenda for the TAG meetings and prepare questions for the TAG to review and make recommendations regarding the LID Monitoring Plans (including their study design, analysis methods, results, and conclusions) prior to their submission.

3.2 LID Monitoring Plan and Quality Assurance Project Plan Preparation

In water year 2023, CCCWP collaborated with the other MRP stormwater programs to develop individual LID monitoring plans and a regional QAPP. These plans were designed to address the specific requirements of MRP Provision C.8.d. Draft plans were submitted to the TAG for review and discussion. Final plans were submitted to the SFBRWQCB for Executive Officer approval on May 1, 2023. On August 23, 2023, the LID Monitoring Plan (CCCWP 2023) and QAPP (BAMSC 2023) received conditional approval, with required changes scheduled for completion in water year 2024.

The LID QAPP is a written document describing the procedures that the monitoring project will use to ensure the data it collects and analyzes meet project requirements. In this case, all data must be comparable to the California Surface Water Ambient Monitoring Program (SWAMP). This means the project measurement quality objectives (MQOs) (i.e., acceptance criteria for the data) must be equivalent to or exceed SWAMP MQOs which are described in the SWAMP Quality Assurance Program Plan (SWAMP 2022). In the interest of achieving regional consistency among LID monitoring conducted by MRP Permittees, the BAMSC LID Monitoring Workgroup initiated a “Project of Regional Benefit” to develop a common QAPP for LID monitoring. The resultant QAPP is SWAMP comparable to the extent practical, including MQOs, sampling and handling protocols, and target reporting limits for analytical constituents.

3.3 Monitoring Station Establishment

CCCWP, with its member agencies and consultants, reviewed the permit requirements and decided monitoring in water year 2024 should be conducted at one LID facility to meet both the minimum required number of stormwater sampling events annually (three) and to work toward the required number of stormwater sampling events that must be collected during the permit term (n = 25). Through discussions with CCCWP’s monitoring contractor and Permittees, CCCWP identified the following ideal site criteria to meet the required monitoring methods.

- Safe and accessible for field crews;
- Space to install a security enclosure to house sampling equipment for the duration of the project;
- Single influent point to the LID facility and single effluent point from the LID facility;
- Structural design and construction that allows for accurate flow measurement at influent and effluent points;
- Public projects – to facilitate easier access/permission to install equipment; and
- Old industrial and/or old urban land uses in the drainage area – to increase the likelihood that the influent contains measurable quantities of the required monitoring analytes.

Following consultation with the Permittees, CCCWP conducted desktop and field reconnaissance at several prospective monitoring locations that potentially met these criteria. This process included meetings with Permittees and the TAG to discuss the design details of promising facilities. After field reconnaissance of two LID facilities in El Cerrito on February 15, 2023, with the City’s Environmental Programs Manager to confirm site feasibility and envision how the required monitoring equipment could be installed, a single LID bioretention facility was ultimately chosen for monitoring at the Ohlone Greenway Rain Garden.

3.4 Ohlone Greenway Bioretention Rain Garden

The Ohlone Greenway Bioretention Rain Garden facility was constructed in 2014 and provides treatment of approximately 1.7 acres along the south side of Fairmount Avenue, including runoff from older single-family residential and mixed land uses (Figure 1). This facility is relatively unique in that it treats a much larger area than most urban LIDs and has a relatively large footprint on the landscape.

Figure 1. Ohlone Greenway Rain Garden drainage area (yellow) and location of LID facility area (red)

The rain garden comprises a biofiltration basin of approximately 2,460 square feet, a single main inlet point, and a single underdrain outlet point. The LID basin is unlined to promote infiltration to native soil, features a single underdrain to convey filtered effluent to the MS4, and contains a single overflow structure to bypass flow directly to the MS4 when the design ponding depth is exceeded (Figure 2).

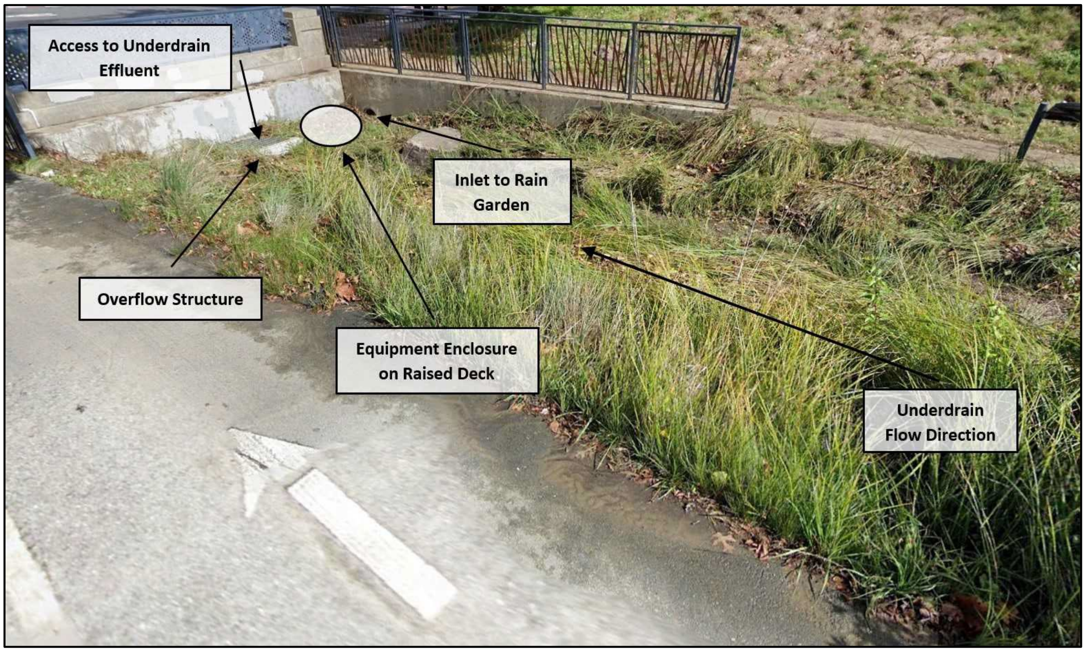

Figure 2. Ohlone Greenway Rain Garden detail

3.4.1 Equipment Procurement

Sampling equipment was selected to best ensure compliance with MRP permit conditions and, to the maximum extent practicable, to be consistent with standard sample collection and analysis methods. Regional Water Board approval for equipment procurement to establish the LID Stormwater station was given on June 9, 2023. Details of the equipment purchased are presented in Table 1.

Table 1. Monitoring Equipment Product Descriptions, Manufacturers, and Model Numbers for the Ohlone Greenway LID

Product Description	Manufacturer	Model Number
Steel security enclosure	Knaack	Jobmaster 69
Portable sampler	Teledyne ISCO Inc.	6712
Bubbler level sensor	Teledyne ISCO Inc.	730
Bubbler level sensor	Campbell Scientific Inc.	LevelVue B10
Volumetric weir	Thel-Mar	V-notch weir
Datalogger/controller	Campbell Scientific Inc.	CR1000X
NEMA 4X weather resistant enclosure	Campbell Scientific Inc.	ENC14/16-ES-NM
Wireless router	Sierra Wireless	Airlink RV50X
Omnidirectional antenna	Campbell Scientific Inc.	COAXSMA-L10
Rain Gage - 0.01" tipping bucket	Texas Electronics	TE525WS-L60-PT
Solar panel	Newpowa	12V 25W
Solar charge controller - 10 Amp	Victron SmartSolar	MPPT 75V
LiFePO4 Battery	Power Queen	12V 100Ah
Pyrex bottle with graduations – 19L	Pyrex	1596-19L
HDPE tubing intake tubing - 3/8" I.D. x 1/2" O.D.	VWR	MFLX95501-10
MasterFlex C-FLEX SEBS peristaltic pump tubing	VWR	MFLX06424-73
Low flow stainless steel intake strainer – 3/8" I.D.	Teledyne ISCO Inc.	SKU: 692903138
Stainless steel 2 Way ball valve	HSH-Flow	CR201-B 12V

HDPE high density polyethylene
I.D. Inner Diameter
LiFePO4 lithium iron phosphate
NEMA National Electrical Manufacturers Association
O.D. Outer Diameter
SEBS styrene ethylene butylene styrene silicone

3.4.2 Equipment Decontamination

Decontamination of sampling equipment must be conducted consistently to ensure the quality of samples collected. All equipment that comes into contact with sample water was decontaminated and blanked prior to installation/use. This equipment includes: 19-liter borosilicate glass carboys, high density polyethylene (HDPE) intake tubing, styrene ethylene butylene styrene silicone (SEBS) pump-roller tubing and stainless-steel strainers. The following cleaning procedures were followed to decontaminate equipment after initial purchase. Note that the SEBS pump roller tubing will be replaced with new, cleaned tubing prior to each monitoring event.

1. Wash with non-phosphate laboratory detergent
2. Rinse thoroughly with tap water
3. Rinse thoroughly with Type I deionized (DI) water
4. Wash glass carboys with 10 normal American Chemical Society (ACS) reagent grade nitric acid
5. Wash tubing and strainers with 2 normal ACS reagent grade nitric acid
6. Rinse thoroughly with Type I DI water

7. Wash with ACS reagent grade methanol
8. Seal carboys and tubing with cleaned polyethylene bags or clean nitrile material
9. Place cleaned tubing and strainers in clean polyethylene bags

Borosilicate glass carboys are recleaned and reused indefinitely, stainless steel strainers are cleaned at the beginning of each storm season and are reused until they show signs of degradation. HDPE intake tubing is cleaned following purchase and is discarded at the end of each monitoring season. SEBS pump-roller tubing is cleaned following purchase and is discarded at the end of each sampling event.

Since the HDPE intake tubing will not be replaced between monitoring events, the tubing will be back-purged with 2 liters of Type I DI water prior to each sampling event and immediately after each sampling event. This procedure will take place at the influent and effluent stations and is intended to reduce the amount of contaminants that are carried over from one storm to another and to purge foreign material from the tubing prior to initiation of sample collection.

3.4.3 Station Installation

A brief description detailing the installation of monitoring equipment and the construction of a temporary work platform is provided below.

- Precast concrete deck piers (approximately 12" L x 12" W x 8" H) were installed within the LID facility between the inlet and the outlet structure. 4" X 4" redwood lumber beams were placed across the concrete deck piers. A work platform (deck) using redwood 2" x 6" lumber on top of horizontal 4" x 4" beams was constructed. The completed deck measures 6' L x 4' W.
- The deck was constructed so the base elevation of the steel security enclosure is 3 inches above the overflow elevation (to prevent equipment flooding). A Knaack Model 69 steel security enclosure was placed on and mounted to the redwood deck. The enclosure dimensions are 60" L x 30" W x 34" H (Figure 3).
- Sampling and flow monitoring equipment were installed within the security enclosure (Figure 4).
- A vertical 10' x 2" diameter galvanized steel pole was installed and a rain gauge and solar panel were mounted near the top of the pole (Figure 3).
- To measure influent flow, a short section of 16-inch PVC pipe was installed to extend and elevate the existing 12-inch HDPE influent pipe. A 15-inch Thel-Mar weir was installed in the 16-inch PVC pipe extension. A length of flexible 1.5-inch diameter PVC conduit was run from the utility box to the influent pipe to accommodate a 0.5-inch diameter sample intake tubing with stainless steel strainer and a 0.25-inch diameter PVC bubbler tubing (Figure 5).
- A 2-inch diameter hole was drilled into the concrete overflow structure to access the effluent underdrain. A flexible 1.5-inch diameter PVC conduit was run from the utility box through the hole in the concrete overflow structure to the effluent underdrain to accommodate a 0.5-inch diameter sample intake tubing and a 0.25-inch diameter PVC bubbler tubing. Additionally, an 8-inch Thel-Mar weir was installed at the outlet of the underdrain to characterize the effluent flow (Figure 6).

Figure 3. Ohlone Greenway Equipment Installation

Figure 4. Ohlone Greenway Sampling and Flow Monitoring Equipment

Figure 5. Ohlone Greenway Influent Pipe Extension

Figure 6. Ohlone Greenway Effluent Weir and Sample Intake Tubing

4 Equipment Blanking Results

Equipment blank samples were analyzed for the following parameters: PCB congeners, mercury, copper, zinc, hardness, TSS, TPH as diesel and motor oil, PFAS, and hydrogen ion concentration (pH). Methods for analysis of project analytes are described in Table 2. MQOs for all project analytes are contained within the Project QAPP (BAMSC 2023).

Table 2. LID Monitoring Analytes, Methods, and Reporting Units

Analyte	Sampling Method	Recommended Analytical Method	Reporting Units
PCBs (congeners)	Automated composite	EPA 1668	pg/L
Mercury, total	Automated composite	EPA 1631	ug/L
Copper, dissolved and total	Automated composite	EPA 200.8	ug/L
Zinc, dissolved and total	Automated composite	EPA 200.8	ug/L
Hardness	Automated composite	EPA 1638M / SM 2340	mg/L
Total suspended solids	Automated composite	SM 2540D	mg/L
TPH as diesel & motor oil	Automated composite	EPA 8015 / 8260	ug/L
PFAS	Automated composite	EPA 1633 / 537	ng/L
pH	Automated composite	SM 4500-H+ B-00/-11	0.01 units

EPA U.S. Environmental Protection Agency
SM Standard Methods for the Examination of Water and Wastewater, American Public Health Association

For PCBs analysis, the laboratory reported results for 40 PCB congeners previously identified by the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP 40) consistent with what has been reported for many previous stormwater sampling efforts in the Bay Area. The laboratory also reported a sum of these 40 congeners associated with each sample. Laboratory reports and associated data files from the laboratory reported total PCBs (sum of 40 congeners) for each sample using the substitution technique of replacing each non-detected congener with a concentration of zero.

MQOs for laboratory analyses are defined in the Project QAPP (BAMSC 2023). Stormwater programs collaborating on LID project implementation have agreed to use common laboratories, including Enthalpy Analytical of El Dorado Hills (formerly Vista Analytical Laboratories) for PFAS and PCBs, and Caltest Analytical Laboratory of Napa for all remaining analytes, operating under the direction of a regional QAPP (BAMSC 2023).

Immediately following the cleaning procedures described in section 3.1.2, rinsate blanks were collected and analyzed for at a 5% frequency (e.g., one out of every 20 carboys cleaned), and from each batch of intake tubing cleaned. These results are presented in Table 3. Dissolved metals were not part of this initial blanking suite but will be included in future equipment blanking episodes.

Results from the blanking study performed in September 2023 showed only low-level signals in hardness and total mercury. In all cases, results were either below the method detection limit or were only slightly above the method detection limit. All results were well below reporting limits. Values found below the reporting limit are considered an estimate and are denoted with a “J” qualifier.

Table 3. Analytical Results for LID Equipment Blanking

Analyte	Unit	LID23-Carboy-01	LID23-Carboy-02	LID23-Tubing-01
Conventionals				
Hardness as CaCO3	mg/L	2.0J	2.0J	<1.7
Total Suspended Solids	mg/L	<1.0	<1.0	<1.0
TPH as Diesel C12-C24	ug/L	<74	<74	<74
TPH as Motor Oil C24-C36	ug/L	<160	<160	<160
Total Metals				
Copper	ug/L	<0.36	<0.36	<0.36
Mercury	ug/L	0.00024J	0.00024J	0.00034J
Zinc	ug/L	<0.70	<0.70	<0.70
PFAS / PFOA				
Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid, 11-	ng/L	<1.93	<2.02	<1.96
Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid, 9-	ng/L	<1.92	<2.01	<1.95
Dioxa-3H-Perfluorononanoate Acid, 4,8-	ng/L	<1.59	<1.66	<1.61
Ethyl Perfluorooctane Sulfonamido Acetic Acid, N-	ng/L	<0.687	<0.720	<0.698
Ethyl-perfluorooctanesulfonamide, N-	ng/L	<0.970	<1.02	<0.985
Ethyl-perfluorooctanesulfonamidoethanol, N-	ng/L	<2.54	<2.67	<2.58
Fluorotelomer Carboxylic Acid, 3:3-	ng/L	<1.58	<1.65	<1.60
Fluorotelomer Carboxylic Acid, 5:3-	ng/L	<6.75	<7.08	<6.86
Fluorotelomer Carboxylic Acid, 7:3-	ng/L	<3.58	<3.75	<3.64
Fluorotelomer Sulfonate, 4:2-	ng/L	<1.27	<1.33	<1.29
Fluorotelomer Sulfonate, 6:2-	ng/L	<1.22	<1.28	<1.24
Fluorotelomer Sulfonate, 8:2-	ng/L	<1.87	<1.95	<1.90
Methyl Perfluorooctane Sulfonamido Acetic Acid, N-	ng/L	<0.689	<0.722	<0.700
Methyl-perfluorooctanesulfonamide, N-	ng/L	<1.01	<1.06	<1.02
Methyl-perfluorooctanesulfonamidoethanol, N-	ng/L	<2.59	<2.72	<2.64
Perfluoro(2-ethoxyethane)sulfonic acid	ng/L	<0.371	<0.389	<0.377
Perfluoro-2-Propoxypropanoic Acid	ng/L	<1.70	<1.78	<1.72
Perfluoro-3,6-dioxaheptanoate	ng/L	<1.55	<1.62	<1.57
Perfluoro-3-methoxypropanoate	ng/L	<0.681	<0.714	<0.692
Perfluoro-4-methoxybutanoate	ng/L	<0.450	<0.471	<0.457
Perfluorobutanesulfonate	ng/L	<0.673	<0.706	<0.684
Perfluorobutanoate	ng/L	<1.60	<1.67	<1.62
Perfluorodecanesulfonate	ng/L	<0.563	<0.590	<0.572
Perfluorodecanoate	ng/L	<0.424	<0.444	<0.431
Perfluorododecanesulfonate	ng/L	<0.496	<0.520	<0.504
Perfluorododecanoate	ng/L	<0.223	<0.233	<0.226
Perfluoroheptanesulfonate	ng/L	<0.376	<0.394	<0.382

Table 3. Analytical Results for LID Equipment Blanking

Analyte	Unit	LID23-Carboy-01	LID23-Carboy-02	LID23-Tubing-01
Perfluoroheptanoate	ng/L	<0.270	<0.283	<0.275
Perfluorohexanesulfonate	ng/L	<0.503	<0.527	<0.511
Perfluorohexanoate	ng/L	<0.272	<0.285	<0.277
Perfluorononanesulfonate	ng/L	<0.603	<0.631	<0.612
Perfluorononanoate	ng/L	<0.241	<0.253	<0.245
Perfluorooctanesulfonamide	ng/L	<0.397	<0.416	<0.403
Perfluorooctanesulfonate	ng/L	<1.17	<1.22	<1.19
Perfluorooctanoate	ng/L	<1.78	<1.86	<1.80
Perfluoropentanesulfonate	ng/L	<0.483	<0.506	<0.491
Perfluoropentanoate	ng/L	<0.418	<0.438	<0.425
Perfluorotetradecanoate	ng/L	<0.238	<0.250	<0.242
Perfluorotridecanoate	ng/L	<0.255	<0.268	<0.259
Perfluoroundecanoate	ng/L	<0.412	<0.432	<0.419
PCB Congeners				
PCB 005/8	pg/L	<7.87	<7.81	<7.94
PCB 018	pg/L	<4.22	<4.19	<4.26
PCB 020/21/33	pg/L	<9.72	<9.65	<9.81
PCB 028	pg/L	<14.0	<13.9	<14.1
PCB 031	pg/L	<12.5	<12.4	<12.6
PCB 043/49	pg/L	<8.43	<8.37	<8.51
PCB 044	pg/L	<28.7	<28.5	<28.9
PCB 052/69	pg/L	<33.7	<33.4	<34.0
PCB 056/60	pg/L	<10.2	<10.1	<10.3
PCB 061/70	pg/L	<6.74	<6.69	<6.80
PCB 066/76	pg/L	<5.78	<5.74	<5.84
PCB 074	pg/L	<3.02	<3.00	<3.05
PCB 087/117/125	pg/L	<6.50	<6.45	<6.56
PCB 090/101	pg/L	<4.85	<4.81	<4.89
PCB 095/98/102	pg/L	<4.70	<4.66	<4.74
PCB 097	pg/L	<2.20	<2.18	<2.22
PCB 099	pg/L	<4.28	<4.25	<4.32
PCB 105	pg/L	<3.57	<3.54	<3.60
PCB 106/118	pg/L	<6.59	<6.54	<6.65
PCB 110	pg/L	<6.06	<6.02	<6.12
PCB 128/162	pg/L	<3.78	<3.75	<3.82
PCB 132/161	pg/L	<5.28	<5.24	<5.33
PCB 138/163/164	pg/L	<5.52	<5.48	<5.57

Table 3. Analytical Results for LID Equipment Blanking

Analyte	Unit	LID23-Carboy-01	LID23-Carboy-02	LID23-Tubing-01
PCB 139/149	pg/L	<7.85	<7.79	<7.92
PCB 141	pg/L	<2.52	<2.50	<2.55
PCB 151	pg/L	<4.74	<4.70	<4.78
PCB 153	pg/L	<4.78	<4.75	<4.83
PCB 156	pg/L	<3.57	<3.54	<3.60
PCB 158/160	pg/L	<5.22	<5.18	<5.27
PCB 170	pg/L	<3.30	<3.28	<3.34
PCB 174	pg/L	<3.35	<3.32	<3.38
PCB 177	pg/L	<3.43	<3.41	<3.47
PCB 180	pg/L	<3.87	<3.84	<3.91
PCB 182/187	pg/L	<5.06	<5.03	<5.11
PCB 183	pg/L	<3.24	<3.22	<3.27
PCB 194	pg/L	<4.57	<4.53	<4.61
PCB 195	pg/L	<3.35	<3.32	<3.38
PCB 196/203	pg/L	<5.09	<5.05	<5.13
PCB 201	pg/L	<2.89	<2.87	<2.92
Total PCBs		ND	ND	ND

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

< Denotes that the analyte was not detected at or above the MDL; the value following the “<” symbol is the numeric MDL; table entries that include the “<” symbol appear in gray font to set them aside from values detected at or above the associated MDL

ND Analyte not detected at or above the MDL

5 Monitoring and Related Activities Planned for Water Year 2024

Per MRP Provision C.8.d.v, CCCWP plans to implement the conditionally approved LID monitoring plan by October 1, 2023. This includes the collection of three to six or more influent/effluent paired stormwater composite samples that are collected with flow-weighted autosamplers in accord with the project monitoring plan and QAPP. To the maximum extent practicable, non-sampled storms as well as sampled storms will be monitored for rainfall and flow into, out of, and bypassing the LID facility. Hydrologic and autosampler data will be maintained in a project database and event hydrographs will be prepared. A rating curve of rainfall depth to runoff volume will be maintained as hydrologic data are collected throughout water year 2024.

Analytical laboratory results will be verified and validated as they are delivered by each of the contract laboratories. Electronic data deliverables (EDDs) will be prepared in California Environmental Data Exchange Network (CEDEN) format. Finalized laboratory reports and EDDs will be maintained in a project database and exported for statistical evaluation.

Facility maintenance assessment evaluations will be performed at the beginning of the monitoring season and immediately prior to each sampled event.

Consultation with the TAG will be ongoing in water year 2024 and the outcome of those discussions and conversations with representatives of the SFBRWQCB will inform revisions to the monitoring plan and QAPP. Topics for discussion will include the possible incorporation of additional analytes, probes, and/or sensors (e.g., dissolved mercury, soil moisture probes, turbidity sensors).

6 References

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Contra Costa Clean Water Program (CCCWP). 2023. Contra Costa County Clean Water Program Low Impact Development Monitoring Plan. Prepared by the Contra Costa Clean Water Program. May.

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Surface Water Ambient Monitoring Program (SWAMP). 2022. Surface Water Ambient Monitoring Program Quality Assurance Program Plan. Version 2. January.

Appendix 2

Trash Outfall Monitoring Progress Report: Water Year 2023

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Watching Our Watersheds (WOW) Regional Trash Monitoring Project

Funded through USEPA WQIF Grant

Trash Outfall Monitoring Progress Report

Water Year 2023 (October 2022 – September 2023)

FINAL March 31, 2024

Submitted in compliance with provision C.8.h.iii.(2) of NPDES Permit No. CAS612008, Order No. R2-2022-018

Prepared on behalf of:

Alameda Countywide Clean Water Program

Contra Costa Clean Water Program

San Mateo Countywide Water Pollution Prevention Program

Santa Clara Valley Urban Runoff Pollution Prevention Program

Solano Stormwater Alliance

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ACCWP	Alameda Countywide Clean Water Program
BAMSC	Bay Area Municipal Stormwater Collaborative
CBI	Catch Basin Insert
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and Wildlife
CMP	Corrugated Metal Pipe
FCS	Full Capture System
GIS	Geographic Information System
HDS	Hydrodynamic Separator
LID	Low Impact Development
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
OVTA	On-land Visual Trash Assessment
QAPP	Quality Assurance Project Plan
RCP	Reinforced Concrete Pipe
SAA	Stream alteration Agreement
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SSA	Solano Stormwater Alliance
SWRCB	State Water Resources Control Board
TAG	Technical Advisory Group
UCMR	Urban Creeks Monitoring Report
USEPA	United States Environmental Protection Agency
WQIF	Water Quality Improvement Fund
WOW	Watching Our Watersheds
WY	Water Year

1.0 INTRODUCTION

On behalf of all public agencies (i.e., Permittees) subject to the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP; Order No. R2-2022-0018) issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB or Regional Water Board) this *Annual Trash Monitoring Status Report*, *Water Year*[1] *(WY) 2023* was prepared collaboratively by members of the Bay Area Municipal Stormwater Collaborative (BAMSC) Trash Monitoring Workgroup. Members of the BAMSC Trash Monitoring Workgroup include the following Countywide Stormwater Programs:

- Alameda Countywide Clean Water Program (ACCWP)
- Contra Costa Clean Water Program (CCCWP)
- Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
- San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)
- Solano Stormwater Alliance (SSA)

This report fulfills the requirements of provision C.8.h.iii.(2) of the MRP for summarizing trash monitoring accomplishments from the preceding water year (i.e., WY 2023) conducted in compliance with provision C.8.e (Trash Monitoring) of the MRP. Consistent with the requirements of provision C.8.e, trash monitoring activities in WY 2023 focused on conducting planning tasks in preparation for trash monitoring activities that began in WY 2024.

This report was prepared as a task defined under the Watching Our Watersheds (WOW) Regional Trash Monitoring Project, which is funded by a grant from the United States Environmental Protection Agency (USEPA) Water Quality Improvement Fund (WQIF). The WOW project addresses several MRP provision C.8.e requirements for trash monitoring, including development of Regional Trash Monitoring Progress Reports.

[1] 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 2023 (WY 2023) began on October 1, 2022 and concluded on September 30, 2023.

2.0 TRASH MONITORING REQUIREMENTS

The level of trash in California's receiving waters has increased substantially over the past few decades, causing one of the state's most significant water quality issues (SWRCB 2015). Over the last decade, MRP Permittees have invested significant public resources to implement source controls and stormwater infrastructure improvement/upgrades to reduce the amount of trash discharged from their municipal separate storm sewer systems (MS4s) to receiving waters. Many of these actions are prescribed by provision C.10 of the MRP which mandates that Permittees achieve a 100% reduction of trash in stormwater discharges from baseline (2009) levels by June 2025.

With the adoption of the current MRP in WY 2022, the Regional Water Board also added significant trash monitoring requirements. Provision C.8.e directs Permittees to conduct trash monitoring at MS4 outfalls and in receiving waters, and prescribes specific monitoring location criteria, methods and frequencies that must be achieved to address the management questions and monitoring questions listed below. Provision C.8.e.v requires that Permittees submit a "collective" (i.e., regional) Trash Monitoring Plan that demonstrates how the requirements in provision C.8.e will be met. The deadline to submit the Trash Monitoring Plan to the Regional Water Board Executive Officer (EO) for approval was July 31, 2023. The Trash Monitoring Plan should be designed to address the following management and monitoring questions:

Management Questions:

1. Have Permittees' trash management actions effectively prevented trash from their jurisdictions from discharging to receiving waters?
2. Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving water?

Monitoring Questions:

1. What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
2. Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?

Provisions C.8.e.ii – iii of the MRP prescribe monitoring methods, sites, events, frequency, and intervals.

<u>Outfall Monitoring.</u> A minimum of 11 outfalls regionwide must be monitored during a minimum of three wet weather events per year beginning October 1, 2023. The required allocation of sites among the Stormwater Programs is listed in Table 1. Monitoring must be conducted with netting devices (or equivalent devices) attached to the end of the outfall pipe or other equivalent location that allows for capture of trash discharging through the MS4. Targeted outfalls must drain areas that are controlled to the low trash generation level and must be representative with respect to the types of trash controls present across the region. Provision C.8.e.ii also requires

direct measurement of flow at the monitoring station (to calculate loading) and collection of data on the type of material collected.

Receiving Water Monitoring. A pilot program to directly sample sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary areas controlled to the low trash generation level must begin October 1, 2024. At least six receiving water sites regionwide must be monitored during at least three wet weather events per year. The required allocation among the Stormwater Programs is listed in Table 1. Targeted storm events should be likely to result in discharges of trash through the MS4 system, and targeted receiving water monitoring locations should not be downstream of direct discharge sites (e.g., homeless encampments, illegal dumping sites). Provision C.8.e.ii also requires direct measurement of flow at the monitoring station (to calculate loading) and collection of data on the type of material collected.

Table 1. Number of MRP-required Trash Monitoring Sites for each Stormwater Program.

Countywide Program	# of Outfall Sites	# of Receiving Water Sites
ACCWP	3	2
CCCWP	2	1
SCVURPPP	3	2
SMCWPPP	2	1
SSA	1	0
Totals	**11**	**6**

2.1 Technical Advisory Group

To assist in the development and implementation of a scientifically-sound Trash Monitoring Plan, provision C.8.e.iv requires Permittees to form and convene a Technical Advisory Group (TAG) composed of impartial science advisors and Regional Water Board staff. The TAG was asked to review and provide input on site selection, monitoring methods, permitting, and methods of analyses including results, and conclusions. Prior to the submission of the Trash Monitoring Plan, the TAG was convened biannually. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation of the Trash Monitoring Plan. In addition, provision C.8.e.v requires Permittees to provide opportunities for input on development of the Trash Monitoring Plan by interested parties and scientific experts other than those participating in the TAG.

2.4 Reporting Requirements

Provision C.8.h.iii.(2) of the MRP requires Permittees to annually submit a single collective regionwide Trash Monitoring Annual Progress Report no later than March 31 with each Urban Creeks Monitoring Report, that includes the following information listed below:

a) Narrative description of monitoring conducted, including the number of sites monitored and the number of monitoring events completed;

b) Description of storms events that were sampled, including the date(s) and times when samples were collected, intensity and duration of the storm event, a description of where along the hydrograph the storm event was sampled, and justification used to determine the storm event was of appropriate size to displace and/or mobilize the transport of trash though the MS4 system;

c) Narrative description, including maps, of any MS4 outfalls, homeless encampments and illegal dumping sites, located upstream of each Outfall Monitoring sample site;

d) Description and the results of data analysis methods, including statistical analyses performed on the data collected, to compare the difference in the level of trash measured from the MS4 outfall, to the level of trash measured immediately upstream of the MS4 outfall;

e) Results and lessons learned from the data collected;

f) Data quality assurance procedures that were implemented for samples collected;

g) Monitoring events (including locations and methods) planned for the subsequent fiscal year(s); and

h) Updates of required Initial Trash Monitoring Plan elements.

By no later than March 31, 2026, Permittees shall collectively submit a comprehensive Trash Monitoring Report coincident with the Integrated Monitoring Report, which at a minimum, includes all items listed above, but for all prior water years.

3.0 WY 2023 TRASH MONITORING ACCOMPLISHMENTS

During WY 2023, the BAMSC Trash Monitoring Workgroup convened the Trash TAG and participated in two TAG meetings, developed a Regional Trash Outfall Monitoring Plan and QAPP that meet the requirements of provision C.8.e, and procured and installed monitoring equipment at 10 of the 11 regionwide outfall monitoring locations.

3.1 Technical Advisory Group

3.1.1 TAG Members

During WY 2023, the BAMSC Trash Monitoring Workgroup recruited technical experts to serve as Trash Monitoring TAG members and convened two TAG meetings. The Trash Monitoring TAG members include monitoring experts from throughout California. More information about the Trash Monitoring TAG members and their expertise is provided in the bullets below:

- **Tony Hale, PhD** - Director of the Environmental Informatics Program at the San Francisco Estuary Institute (SFEI).
- **Shelly Moore** - Executive Director of the Moore Institute for Plastic Pollution Research.
- **Tom Mumley, PhD** - Assistant Executive Officer at the San Francisco Bay Regional Water Board.
- **Dawn Petschauer** - Stormwater Program Administrator at the City of Pasadena.
- **Ted Von Bitner, PhD** - Assistant Vice President at WSP USA.

3.1.2 TAG Meetings

During WY 2023, the BAMSC Trash Monitoring Workgroup hosted two virtual Trash TAG meetings. The primary goal for both meetings was to leverage the combined expertise of the TAG members to inform the development of the Trash Outfall Monitoring Plan and QAPP. Non-regulatory TAG members were financially compensated for their time and effort. The focus and outcomes of the two WY 2023 Trash TAG meetings are described below.

<u>Trash TAG Meeting #1</u> (March 15, 2023). At the first TAG meeting, the BAMSC Trash Monitoring Workgroup presented information to the TAG members on proposed approaches for the Trash Outfall Monitoring Program, including summaries of the monitoring goals and permit requirements, the site selection criteria and process, and a description of the regionally consistent outfall monitoring methods. Each of the BAMSC Trash Monitoring Workgroup members also presented details of the site selection process within their county, outfalls selected for monitoring, and descriptions of the catchments that drain to the target outfalls, including land uses and trash control measures.

TAG members were supportive of the proposed outfall monitoring approaches and site selection. BAMSC documented the details in the Draft Regional Trash Outfall Monitoring Plan and QAPP that was sent to TAG members for review prior to the second TAG meeting.

Trash TAG Meeting #2 (May 22, 2023). At the second TAG meeting, the BAMSC Trash Monitoring Workgroup presented key sections of the Draft Regional Trash Outfall Monitoring Plan and QAPP, including sampling design, site selection, sample event selection criteria, field methods for trash collection and flow monitoring, sampling handling, trash characterization methods, quality control and quality assurance (QA/QC), and data evaluation and reporting procedures.

TAG members continued to be supportive of the proposed monitoring approaches. Based on discussions at the second Trash TAG meeting, the trash characterization categories were revised. The TAG members provided written comments on the Draft Regional Trash Outfall Monitoring Plan and QAPP in June 2023.

3.2 Trash Outfall Monitoring Plan Development

In WY 2023 the BAMSC Trash Monitoring Workgroup developed a final Regional Trash Outfall Monitoring Plan (MP) (BAMSC 2023) and QAPP (AMS 2023) that meets the requirements of provision C.8.e of the MRP. The MP and QAPP were submitted to the Regional Water Board for Executive Officer approval on July 31, 2023, in compliance with the deadline required in provision C.8.e.vi of the MRP. On August 31, 2023, the Regional Water Board EO conditionally approved the Regional Trash Outfall MP and QAPP, requiring that an updated version with changes be submitted on July 31, 2024.

The sections below briefly summarize the BAMSC Regional Trash Outfall MP and QAPP. These documents can be reviewed for specific details on the process used to select monitoring sites, monitoring approach, field methods for collecting trash and flow data, trash characterization, data evaluation and reporting procedures.

3.2.1 Site Selection Process

Each of the five Stormwater Programs went through an independent process to identify candidate locations to conduct trash outfall monitoring, but collaborated throughout the selection process to best ensure that a variety of settings and types of trash control measures were represented within the overall stormwater outfall monitoring scheme. In general, the Stormwater Programs implemented a three-step process to select stormwater outfalls for trash monitoring:

1. **GIS/Desktop Analysis:** Identify all MS4 outfall catchments in GIS or other desktop mapping platforms that meet the MRP criterion of being controlled to the low trash generation level (i.e., < 5 gallons/acre/year).
2. **Logistical Considerations:** MS4 outfalls receiving stormwater runoff from the catchments identified in Step 1 were assessed for logistical considerations (e.g., suitability for trash nets, physical access, safety).
3. **Environmental Permitting Considerations:** MS4 outfalls that appeared to be feasible locations for monitoring via Step 2 were assessed for environmental permitting needs.

All Stormwater Programs were able to identify the minimum number of sites required in the MRP for stormwater outfall monitoring. Table 2 lists the selected sites and these sites are illustrated in Figure 1.

Table 2. Trash Outfall Monitoring Locations.

County	Station ID	Waterbody	Location	Latitude	Longitude	Catchment Size (acres)	Outfall Diameter (in)
Alameda	AC-PUBSAF	Alamo Canal	Dublin	37.70317	-121.91971	11	36"
Alameda	AC-OUTBK	Dublin Creek	Dublin	37.69947	-121.92793	19	36"
Alameda	AC-CIVIC	Alamo Canal	Dublin	37.70333	-121.91934	13	24"
Contra Costa	CC-PCH	Grayson Creek	Pacheco	37.98345	-122.0684	3.9	18"
Contra Costa	CC-WC	Walnut Creek	Walnut Creek	37.90346	-122.05934	1.0	15"
San Mateo	SM-PIL	Canal to Pilarcitos Creek	Half Moon Bay	37.46929	-122.43381	86	47"
San Mateo	SM-SBS	Canal to Steinberger Slough	San Carlos	37.5123	-122.25785	57	30"
Santa Clara	SC-SFC	San Francisquito Creek	Palo Alto	37.44581	-122.17226	60	42"
Santa Clara	SC-STE	Stevens Creek	Mountain View	37.37815	-122.06934	137	54"
Santa Clara	SC-COY	Coyote Creek	San Jose	37.32246	-121.86009	450	60"
Solano	SSA-LOTZ	Suisun Marsh	Suisun City	38.243309	-122.038655	3	18"

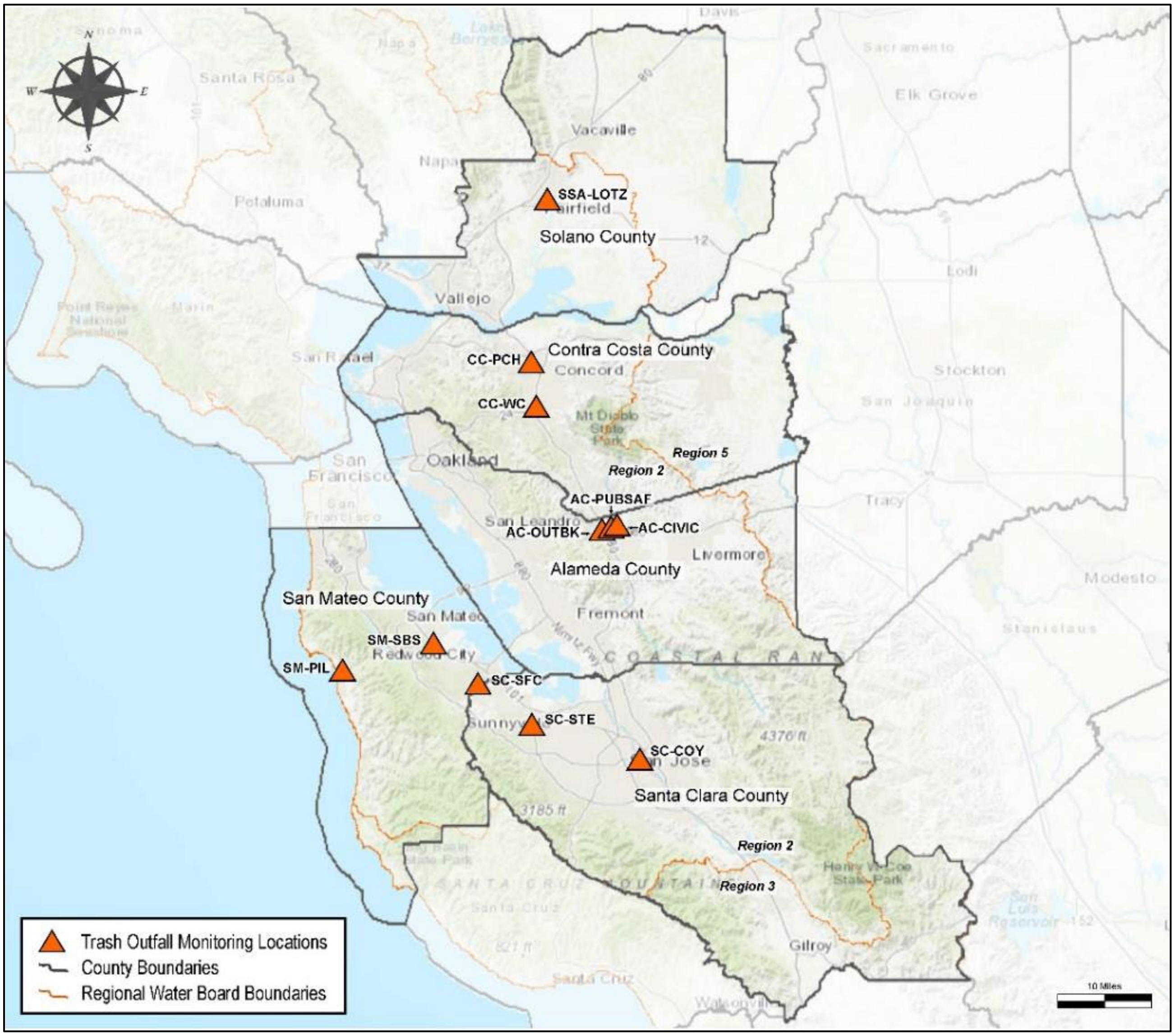

Figure 1. Trash Stormwater Outfall Monitoring Sites

3.2.2 Overall Monitoring Approach

The BAMSC Trash Monitoring Workgroup developed a regionally-consistent approach for outfall monitoring and data evaluation, informed by TAG member recommendations.

Sampling Equipment: The following equipment will be installed at each trash monitoring outfall:

- Oldcastle NetTech™ Gross Pollutant Trap system (trash net device), or equivalent, with 5 mm mesh size; and
- Water level sensor to monitor flow rate (e.g., In Situ Level TROLL® water level sensor).

The trash net component will be installed prior to and removed following each targeted storm event. Water level sensors will be used to measure the flow depth inside the stormdrain pipe just upstream of the trash net. Water depth measurements will be recorded for the entire wet season.

Sampling Events: Each Stormwater Program is required to monitor trash at outfalls during three storm events each water year over the duration of the MRP (WY 2024 – WY 2027). The type of storm that is targeted for a particular sampling event may vary based on the characteristics of the catchment, the prior storms monitored at a given location, information gained through previous monitoring, or other factors, but in general, will follow these guidelines:

- Quantitative precipitation forecast (QPF) of approximately 0.25 inch or greater;
- Probability of precipitation (POP) of approximately 70% or greater; and
- Antecedent dry period of approximately 72 hours or greater (defined as no event exceeding 0.1 inch of cumulative rainfall)

Using these guidelines, each Stormwater Program will attempt to meet the MRP requirements to monitor the following types of storms:

- Storms that trigger trash discharge and trash transport through the MS4 (0.25 inches of rain over 24-hour period); and
- The first significant storm event of each water year; and
- One storm per year that is forecasted to exceed the full capture design standard storm (i.e., the one-year, one-hour storm event).

The uncertainties related to weather forecasting may preclude collection of these events on an annual basis. Similarly, the first seasonal flush event may occur before the start of a given water year and may fall outside of the monitoring window or occur when field staff are unavailable to mobilize (e.g., a holiday).

Sample/Data Collection: Following each monitoring event, trash nets will be removed from the outfall, loaded into a truck and transported to an offsite dewatering and storage location. Nets will be stored at a secure location for approximately one week to allow for the water to drain out of the net. Following the dewatering period, the material will be removed from the net and placed on a large table that will be used to separate trash from organic debris (e.g., soil, sand, leaves, branches). Trash will be placed into storage bags (e.g., garbage bags or mesh bags) and the organic debris will be disposed of appropriately.

Trash Characterization: Each trash sample will be characterized by measuring the volume of collected trash following protocols defined in the *Standard Operating Procedure for Trash*

Characterization (Appendix E of BAMSC 2023) which describes the 13 categories for characterization. Trash will be sorted into different containers ranging in size from a 50 mL graduated cylinder to 5-gallon bucket. The total volume of trash items that do not fit into a 5-gallon bucket will be estimated and noted in the data collection form.

<u>Flow Measurement</u>: At the end of each storm event, field crews will download water level data. Flow rates from outfalls will be derived from water level data using Manning's equation and the resulting flow rates will be used to generate trash loading estimates for each monitored storm event at each monitoring site. The target range for flow monitoring will extend from October 1 to April 30 of each water year to coincide with the likely monitoring window.

3.2.3 Data Evaluation

Data evaluation will consist of a combination of graphics and statistical methods to calculate and assess trash capture rates and trash types across sites and across time. The parameters to be evaluated include trash discharge rates during monitored storm events, stormwater runoff volumes and flow rates, and the types of trash observed in stormwater discharges.

The annual trash load (in gallons/acre/year) for each monitored catchment will be modeled by extrapolating trash volumes collected during single storm events (in gallons/acre) to the annual hydrograph that will be developed through flow monitoring. Information about the magnitude and duration of each storm event throughout the year, including monitored events, will be used in these calculations. A rating curve of trash discharge (in gallons/acre) based on storm characteristics (e.g., intensity, duration, antecedent dry period) will be developed for each monitoring site, and updated as new data are collected. These rating curves will be used to estimate trash discharge for non-monitored storm events to calculate the annual trash load. Annual trash load data will be evaluated within the context of the contributing catchment area (e.g., types of trash control measures present, trash generation rates, land use, overall catchment size).

3.2.4 Data Reporting

Each stormwater program will develop Annual Trash Monitoring Progress Reports describing the results of the outfall monitoring in their county using the data evaluation methods described in the MP (i.e., in compliance with Provision C.8.h.iii.(2)). These Annual Trash Monitoring Progress Reports will be compiled under a regional executive summary, submitted by March 31 each year with the Stormwater Program's annual Urban Creeks Monitoring Report (UCMR), and will address data generated and updated in the prior WY (October through September).

3.2.5 Quality Assurance Project Plan

A key element of any monitoring program is a comprehensive QAPP. The QAPP is a written document that describes the procedures that the monitoring project will use to ensure the data it collects and analyzes meet the project requirements. In this case, all data must be comparable to the California Surface Water Ambient Monitoring Program (SWAMP). This means that the project Measurement Quality Objectives (MQOs) (i.e., acceptance criteria for the data) must be equivalent to or exceed SWAMP MQOs which are described in the SWAMP Quality Assurance Program Plan (QAPrP)[2]. In the interest of achieving regional consistency among Trash Monitoring conducted by MRP Permittees, the BAMSC Trash Monitoring Workgroup developed a common QAPP for Trash Monitoring (AMS 2023). The QAPP is SWAMP comparable to the

[2] The current version of the SWAMP QAPrP is available here: https://www.waterboards.ca.gov/water_issues/programs/swamp/docs/swamp-qaprp-2022.pdf

extent practical, including requirements for QA/QC samples (e.g., replicates/duplicates) and documentation, MQOs, and sampling and handling protocols.

3.3 Trash Outfall Monitoring

Trash monitoring at stormwater outfalls began in WY 2024, therefore no monitoring data were collected in WY 2023. However, in WY 2023, 10 of the 11 regional sites were prepared for trash monitoring by installing the net devices and water level sensors listed in Section 3.2.2 and described in the MP (BAMSC 2023) or by preparing sites for early-WY 2024 installation.[3] The process included varying levels of permissions and permits depending on the municipality where the outfall is located and the potential threats to special status species. Specific details on the accomplishments for each BAMSC Program during WY 2023 and early WY 2024 to prepare for trash outfall monitoring are summarized in Attachment A.

Future Trash Monitoring Progress Reports will include the elements listed in Section 2.4, including monitoring results, data analysis methods, modeling and statistical analysis results, data quality assurance procedures that were implemented for samples collected, and any lessons learned from monitoring conducted to date.

3.4 Investigation of Trash Generation Based on Monitoring Results

Prior to conducting trash outfall monitoring in WY 2024, each program will conduct trash characterization assessments within each catchment upstream of the outfall to be monitored. The assessment will include visual observations and written and photo-documentation of trash present along the roadway curb and gutter, and to the extent possible, within the catch basins and storm drains. Trash sources observed in the catchment will be documented with GPS coordinates and/or marked on maps.

If WY 2024 monitoring results suggest that trash loading from a monitored outfall is above five gallons/acre/year, a site-specific investigation into the causes will be conducted. Future Trash Monitoring Progress Reports will describe the scope and status of any investigations underway or planned to identify and address trash sources that may be contributing to trash loading from monitored outfalls at a level above the five gallons/acre/year threshold.

3.5 Planned Tasks and Refinements for the Next Water Year

MRP Permittees and associated stormwater programs are currently working together and with Regional Water Board staff and the TAG to address refinements to version 1.0 of the Trash Monitoring Plan – Stormwater Outfall Monitoring required by the EO in the conditional approval letter (dated August 31, 2023). These modifications are planned for completion by July 31, 2024. Specific details on planned refinements to trash assessment monitoring for each Stormwater Program during WY 2023 and early WY 2024 are summarized in Appendix A.

Additionally, a second Trash Monitoring Plan that meets the receiving water monitoring requirements of provision C.8.e will be developed in WY 2024 for review by the TAG prior to submittal to the Regional Water Board EO by July 31, 2024. The Receiving Water Trash Monitoring Plan is being developed regionally via the WOW project. Receiving water trash monitoring is scheduled to begin by October 1, 2024.

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[3] As described in Appendix A, the proposed trash outfall monitoring site in Solano County is currently under construction. Monitoring equipment will be installed as soon as possible.

3.6 Receiving Water Monitoring

During WY 2023, the City/County Association of Governments, San Mateo County (CCAG) released a Request for Proposals (RFP) for the Watching our Watersheds Regional Trash Monitoring Project, which is funded by a USEPA WQIF grant. The WOW project will address MRP provision C.8.e requirements for receiving water trash monitoring. The initial tasks that will be completed by the WOW project in WY 2024 will include an assessment of receiving water trash monitoring methods and equipment, and the selection of sites for monitoring that will begin in WY 2025. Work on these tasks began in December 2023 and an updated Trash Monitoring Plan is scheduled for completion in July 2024, consistent with MRP requirements.

4.0 CONCLUSIONS AND RECOMMENDATIONS

In WY 2023, members of the BAMSC Trash Monitoring Workgroup prepared for Trash Monitoring to begin at the start of WY 2024 by implementing the following provision C.8.3 planning tasks:

- Convened the Trash TAG and participated in two TAG meetings.
- Developed and submitted a final Regional Trash Outfall Monitoring Plan (BAMSC 2023) and a final QAPP (AMS 2023) by July 31, 2023.
- Received conditional approval of the Monitoring Plan and QAPP from the Regional Water Board EO on August 31, 2023
- Obtained the necessary permits/permissions and installed monitoring equipment at 10 of 11 regionwide outfalls.

Specific WY 2024 tasks will include:

- BAMSC Trash Monitoring Workgroup members will work with Permittees to conduct trash monitoring at 11 regionwide outfalls according to the methods and procedures described in the Regional Trash Outfall Monitoring Plan (BAMSC 2023) and Regional QAPP (AMS 2023). A minimum of three monitoring events will be conducted at each outfall. In addition, flow will be recorded throughout the WY 2024 wet season.
- The Regional Trash Outfall Monitoring Plan (BAMSC 2023) and QAPP (AMS 2023) will be updated by July 31, 2024 to include new requirements from the Regional Water Board's conditional approval letter as refined through TAG discussions and lessons learned from implementation of the Trash Monitoring Plan in WY 2024.
- The USEPA WQIF-funded WOW project will develop and submit (by July 31, 2024) a Receiving Water Trash Monitoring Plan and QAPP that meet the requirements of provision C.8.e of the MRP.
- The Trash TAG will meet at least two times in WY 2024 to inform updates to the Trash Outfall Monitoring Plan and QAPP and to inform development of the Receiving Water Monitoring Plan and QAPP.
- The BAMSC Trash Monitoring Workgroup will continue to meet, as needed, to facilitate TAG input on monitoring plans, discuss monitoring issues that may arise, and generally support regional trash monitoring consistency across the five participating counties.

5.0 REFERENCES

AMS (Applied Marine Sciences). 2023. Quality Assurance Project Plan. Trash Monitoring Project. July 31, 2023.

BAMSC (Bay Area Municipal Stormwater Collaborative). 2023. Regional Trash Monitoring Plan. Version 1.0. Municipal Stormwater Outfall Monitoring. July 31, 2023.

SFBRWQCB (San Francisco Bay Regional Water Quality Control Board). 2022. San Francisco Region Water Quality Municipal Regional Stormwater NPDES Permit. Order R2-2022-0018, NPDES Permit No. CAS612008.

SWRCB (State Water Resources Control Board). 2015. Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Final Staff Report including the Substitute Environmental Documentation.

Appendix A

Preparation for Trash Outfall Monitoring

Alameda Countywide Clean Water Program (ACCWP)

Contra Costa Clean Water Program (CCCWP)

San Mateo Countywide Clean Water Program (SMCCWP)

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Solano Stormwater Alliance (SSA)

Alameda Countywide Clean Water Program (ACCWP)

<u>Accomplishments During WY 2023</u>

In WY 2023, ACCWP went through a start-up process to support WY 2024 implementation of the outfall trash monitoring component in collaboration with the BAMSC and collaborators and consistent with MRP 3 Provision C.8.e requirements. This effort included a two-step process run concurrently to (1) review potentially viable monitoring technologies, and (2) identify potential monitoring locations.

ACCWP, in conjunction with BAMSC collaborators, reviewed commercially-available trash capture technologies and identified Oldcastle NetTech™ Gross Pollutant Trap systems as the best option to support monitoring efforts. These systems were certified as full trash capture devices by the SWRCB, were able to be secured onto outfalls to capture trash at the catchment scale, and generally met the project timing to allow installation near beginning of WY 2024.

ACCWP next reviewed and identified potential monitoring locations using the criteria developed in conjunction with BAMSC collaborators and compiled within the Outfall Trash Monitoring Plan (BAMSC 2023). As part of this process, ACCWP performed a GIS analysis of catchment areas controlled to a low trash generation rate within the county. Identification of potential outfalls for trash monitoring included desktop analysis and field verification. The desktop analysis incorporated available storm drain information (i.e., pipes, inlets, outfalls), GIS data, satellite imagery, and Google Street View to review hundreds of outfalls countywide.

ACCWP assessed 28 potential outfall locations throughout the county in desktop and/or field reconnaissance. From the 28 locations considered, ACCWP identified priority locations that were viewed as secure, likely feasible to monitor, able to be permitted within the project constraints, and with potential to support future receiving water monitoring efforts. Field visits eliminated all but four outfalls. Eliminated outfalls were removed from the site selection list if they were not accessible to deploy and retrieve nets, determined to contain structures prohibitive of net installation (e.g. flap gate or clamshell check valves), were subject to flooding or located below the adjacent stream's high water mark, posed basic safety risk to field personnel (e.g. steep and loose banks above swift moving water), or were characterized by channel dynamics preventing proper equipment functionality (i.e. inadequate or no surface area landing present for netting devices at steeply sloped or vertical banks). From the list of four candidate sites, ACCWP prioritized the three locations that encompassed a variety of trash capture technologies (a larger hydrodynamic separator (HDS), smaller HDS, and a combination of HDS, catch basin inserts (CBIs), and bioretention features that meet full trash capture design specifications).

ACCWP next conducted outreach to relevant agencies that could potentially require permits or agreements for site access (e.g., encroachment permits) and for potential alterations to habitat that could affect fish and wildlife resources (e.g., Lake and Streambed Alteration Agreements). To secure site access, ACCWP worked with the Zone 7 Water Agency (Zone 7) for encroachment permits to support one-time installation of trash monitoring equipment and provide access for monitoring personnel throughout the year.

Regarding habitat alterations, ACCWP coordinated with the BAMSC trash workgroup, \ Water Board, California Department of Fish and Wildlife (CDFW), and United States Army Corps of Engineers (USACE) permitting staff to determine the need for specific permits. USACE reviewed potential monitoring locations and confirmed that no USACE permits were required at the ACCWP target locations. Zone 7 personnel coordinated with CDFW to confirm that all required site construction and monitoring efforts could be conducted under an existing maintenance agreement between CDFW and Zone 7.

ACCWP next initiated a dual process to procure monitoring equipment and prepare selected outfalls for monitoring equipment installation. The equipment purchasing and preparation process included multiple site visits to each outfall with Oldcastle technical specialists to develop specifications for NetTech inserts and netting devices as well as flow monitoring equipment that was specified and coordinated through Kinnetic Environmental, Inc. (KEI). All equipment was ordered in July and August 2023, but due to supply chain issues was not received until October 2023.

<u>Pre-Monitoring Tasks Planned for Early WY 2024</u>

Early in WY 2024, ACCWP will conduct required construction site work at each of the three outfalls selected for monitoring. Proposed site work will be coordinated with Zone 7 and will involve required concrete removal and rounding out of at least one reinforced concrete pipe outfall pipe to all for installation of the NetTech insert and access by monitoring personnel to areas below grade to facilitate installation and removal of trash nets with each monitored storm event.

Following installation of NetTech inserts, ACCWP will install pressure transducers at each location to support flow monitoring efforts. Once transducers are installed, ACCWP will begin monitoring flow within each outfall pipe at two-minute intervals over the course of the wet season. This data is anticipated to be downloaded on approximately six-week intervals, but this may change based upon battery life and storage capacity. ACCWP will then conduct monitoring activities per the specifications of the Outfall Trash Monitoring Plan (BAMSC 2023). This will encompass a minimum of three monitored storm events at three outfall locations described below.

<u>Planned Refinements to Monitoring Plan</u>

ACCWP will also continue coordination with BAMSC members, Water Board staff, and trash Technical Advisory Group (TAG) to refine and resubmit the Trash Outfall Monitoring Plan and QAPP. Additional anticipated activities include working with municipalities to identify a replacement monitoring location for one of the three WY 2024 monitoring locations to begin outfall trash monitoring efforts in WY 2025. This will involve going through the full site selection, permitting, and construction / equipment installation process for one location geographically removed from the current monitoring locations in Dublin.

<u>Monitoring Site Descriptions</u>

Site AC-OUTBK

Site AC-OUTBK drains an approximately 19-acre catchment area bounded by I-580 and San Ramon Road in the City of Dublin (Figure AC-1). Land use in the catchment area comprises predominantly commercial uses. Baseline trash generation rates are approximately 7% low, 56% moderate, and 36% high by area. There are no sustained homeless encampments in the catchment, but homeless have been observed living in their vehicles periodically on the roadway and camping near the banks of the creek. There are also pockets of accumulated trash often observed in the vegetated areas along the roadway. These appear to be associated with ongoing construction activity, and include both smaller construction-associated materials (wiring, paint, wood scraps) and food and smoking related trash that appear to be related to break areas.

The catchment area is controlled to a low trash designation by use of hydrodynamic separator (HDS) installed just upstream of the outfall. The outfall drains to Dublin Creek approximately 300 meters downstream of the culvert at San Ramon Road. The outfall is a 36-inch RCP that empties onto a concrete apron on the north bank of the creek.

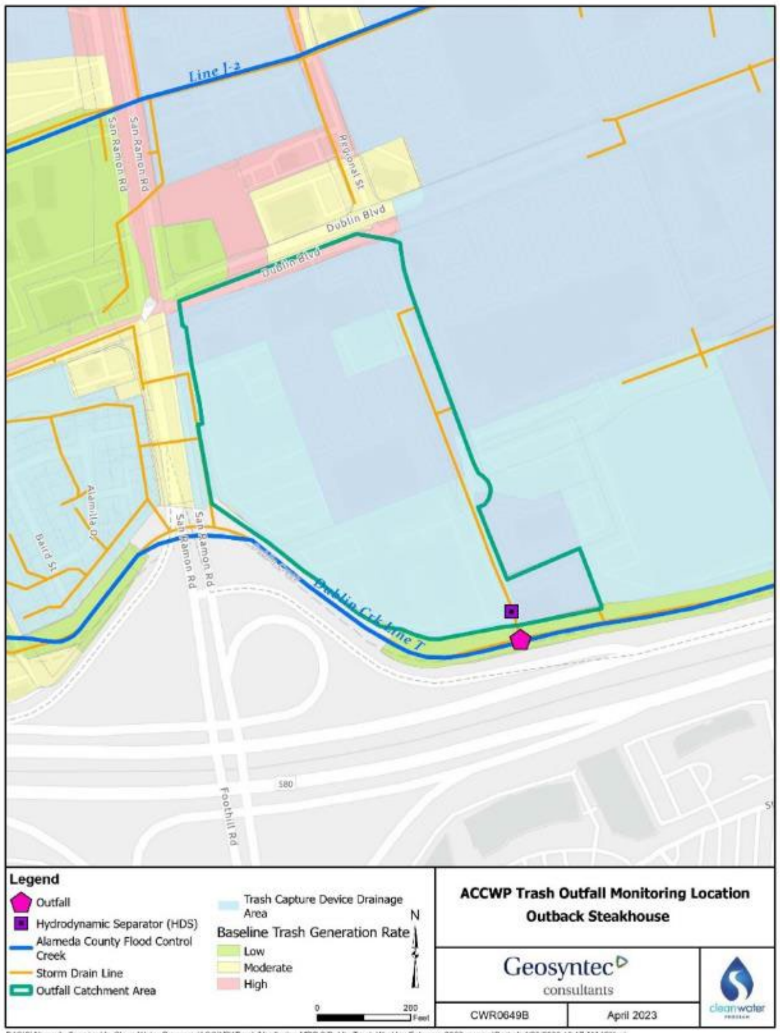

Figure AC-1. Trash monitoring catchment area at Outback Steakhouse in the City of Dublin.

Site AC-CIVIC

Site AC-CIVIC drains an approximately 13-acre catchment area west of the Dublin Civic Center and Public Library in the City of Dublin (Figure AC-2). Land use in the catchment area is predominantly commercial. Baseline trash generation rates for the catchment area were identified as approximately 2% low and 98% moderate by area. There are no homeless encampments in the catchment, but homeless have been observed living in their vehicles periodically in the parking lot near the public library. The majority of trash accumulating in the catchment appears to be generated by patrons of the playing fields and library as well as blown in trash from the adjacent freeway.

The catchment area is controlled to a low trash designation by use of HDS installed just upstream of the outfall. The outfall drains to Alamo Canal approximately 170 meters upstream of I-580. The outfall is a 24-inch RCP that empties onto a concrete apron on the east bank of the creek.

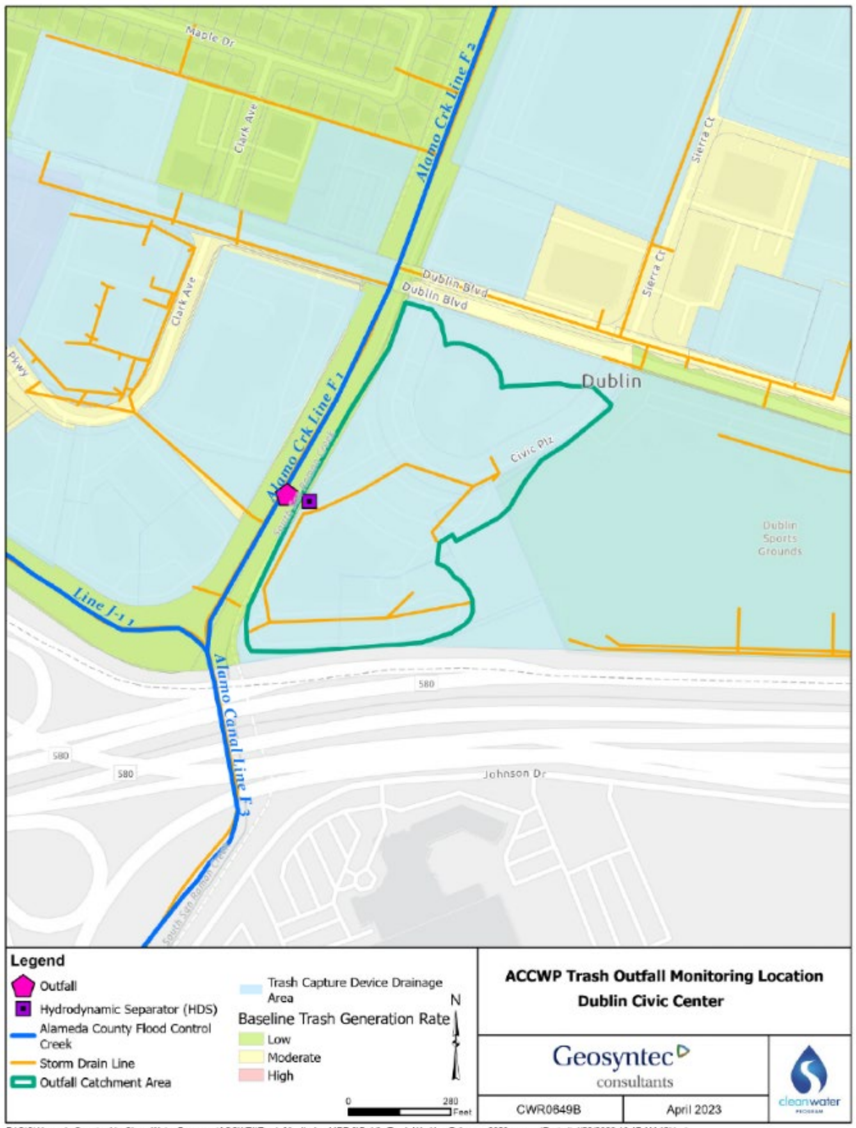

Figure AC-2. Trash monitoring catchment area at Civic Center in the City of Dublin.

Site AC-PUBSAF

Site AC-PUBSAF drains an approximately 11-acre catchment area including the Public Safety Complex in the City of Dublin (Figure AC-3). Land use in the catchment area is predominantly commercial. Baseline trash generation rates for the catchment area were identified as approximately 4% high and 96% moderate by area. No evidence of homeless encampments or significant illegal dumping have been observed in the catchment.

The catchment area is controlled to a low trash designation by a combination of an HDS unit (44%), catch basin inserts (5%), and two Multi-benefit Stormwater Treatment System projects that provide approximately five acres (approximately 48% of the area) of full trash capture treatment. Both projects implemented bioretention treatment measures. The outfall drains to Alamo Canal approximately 140 meters upstream of I-580. The outfall is a 36-inch RCP that empties onto a concrete apron on the west bank of the creek.

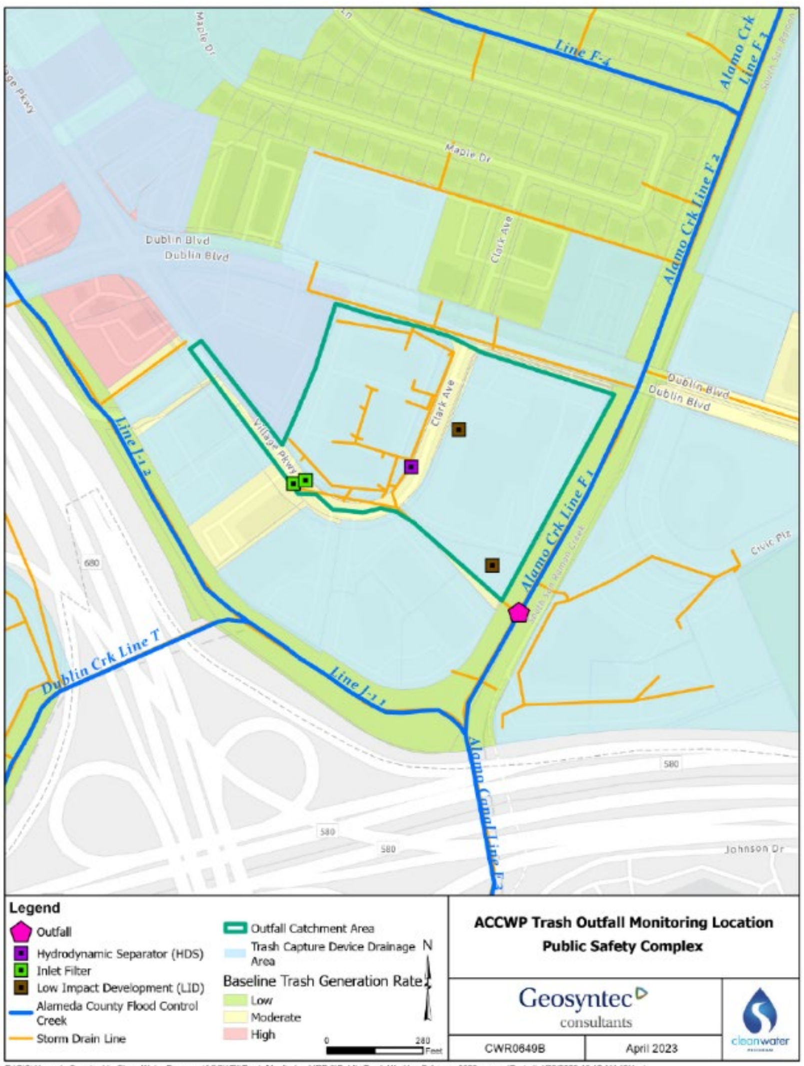

Figure AC-3. Trash monitoring catchment area at the Public Safety Complex in the City of Dublin.

Contra Costa Clean Water Program (CCCWP)

Accomplishments during WY 2023

In collaboration with Permittees and Trash Monitoring Workgroup partners, CCCWP identified criteria for selecting trash outfall locations that could be monitored safely using the methods prescribed in the MRP. Trash monitoring outfall locations were identified by conducting a GIS analysis of baseline and current trash generation rates based on current trash control measure implementation. CCCWP then conducted desktop reconnaissance and field verification of potential outfall locations (CCCWP 2023). By June 2023, CCCWP identified priority trash outfall monitoring locations in the City of Walnut Creek and Unincorporated Contra Costa County (Pacheco).

Following the establishment of priority outfall locations, CCCWP led a multi-agency effort to coordinate with California Department of Fish and Wildlife (CDFW) jurisdictional representatives, the City of Walnut Creek staff, and the Contra Costa County Flood Control District to procure encroachment permits and notify wildlife authorities on project activities in riparian corridors. CCCWP detailed requested modifications to existing county/city infrastructure required by project equipment installation processes and communicated equipment hydraulic and engineering specs in encroachment permit applications. In September of 2023, following a 30-day statutorily required review period, CDFW issued a no agreement needed notice upon reviewing the Lake or Streambed Alteration Notification application for both the Walnut Creek and Pacheco MS4 outfall locations.

After determination by CDFW that no Lake or Streambed Alteration Agreement is needed, CCCWP coordinated with third-party vendors to procure and schedule installation of trash outfall monitoring mesh nets and mounting hardware. An encroachment permit for installation was granted by the City of Walnut Creek in the summer of 2023, with trash net mounting equipment installation completed in early October of 2023. An encroachment permit for installation at the Pacheco outfall was granted by the Contra Costa County Flood Control District in September of 2023, which included approval for construction of a concrete collar around the corrugated metal pipe outfall to maintain structural integrity of the outfall.

Pre-Monitoring Tasks Planned for Early WY 2024

Construction of a new headwall and the installation of the trash net mounting equipment will be completed in early October 2023. Following installation of trash net mounting hardware, CCCWP will install water level loggers to collect flow data as required in the MRP.

In Contra Costa County, two MS4 outfalls were selected for trash monitoring. A discussion on selected locations is provided below, including site overview maps displaying catchment area, type and location of trash capture device(s), and outfall location relative to receiving waters.

Planned Refinements to Monitoring Plan

CCCWP will also continue coordination with BAMSC members, Water Board staff, and trash Technical Advisory Group (TAG) to refine and resubmit the Trash Outfall Monitoring Plan and QAPP.

<u>Monitoring Site Descriptions</u>

Site CC-PCH

Site CC-PCH drains an approximately 3.9-acre catchment area in the census designated place of Pacheco (Figure CC-1). Land use in the catchment area is characterized by retail centers (75%), commercial businesses (24%), and a neighborhood park (1%). Baseline trash generation rates for the catchment area were identified as approximately 25% moderate and 75% high by area. The catchment area is controlled to a low trash designation by use of full trash capture devices installed into catch basins (100%). The outfall is located off Center Avenue near the intersection of Pacheco Boulevard and drains runoff from the catchment area to Grayson Creek (BAMSC 2023). The outfall pipe is an 18-inch corrugated metal pipe (CMP), encased in a concrete collar, that discharges onto a concrete skirt imbedded with small diameter rip rap.

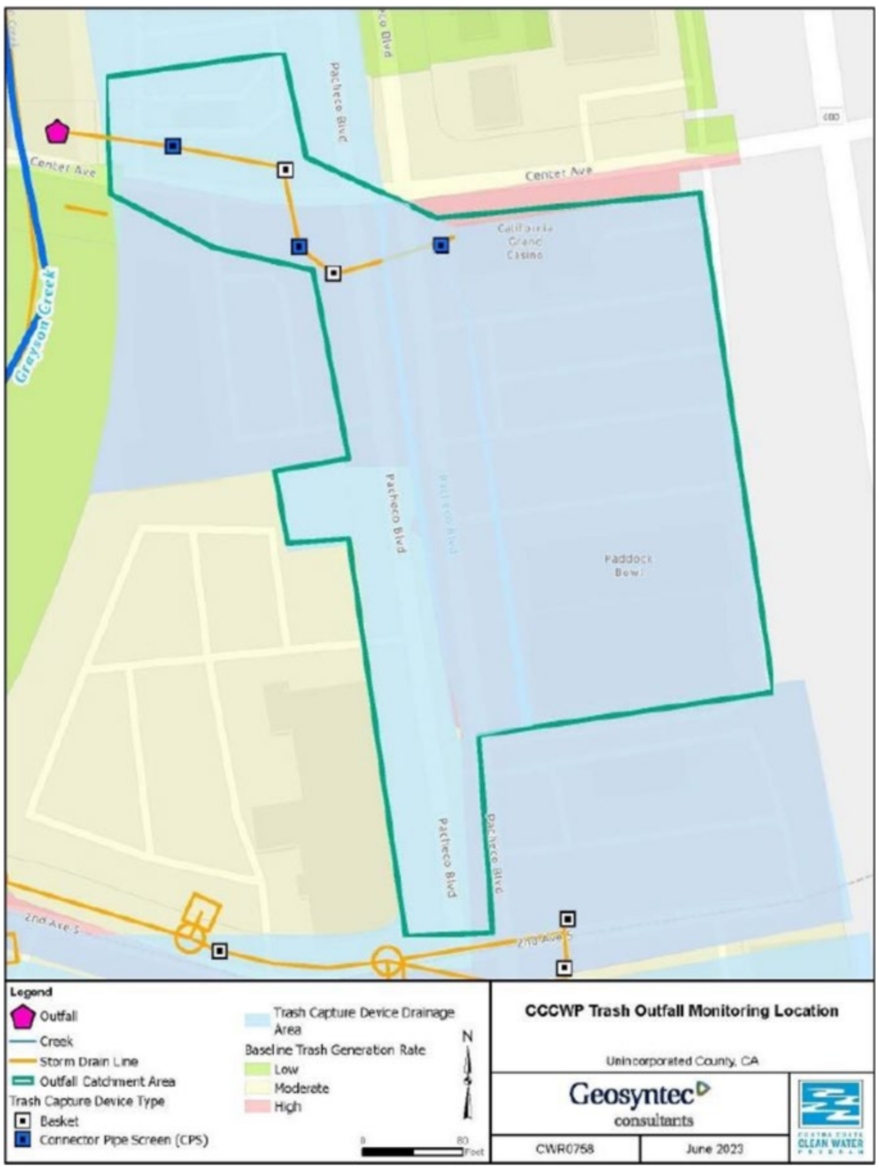

Figure CC-1. Trash monitoring catchment area at Grayson Creek in Pacheco.

Site CC-WC

Site CC-WC drains an approximately 1-acre catchment area in the parking lot of Civic Park in Walnut Creek (Figure CC-2). The baseline trash generation rate for the catchment area was identified as 100% moderate. The catchment area is controlled to a low trash designation by use of a full trash capture device installed within storm drain drop inlet just upgradient of the outfall. The outfall discharges to Walnut Creek approximately 500 meters upstream of Ygnacio Valley Boulevard. The outfall is a 15-inch reinforced concrete pipe that drains onto a natural bank with concrete erosion control at the mouth of the outfall on the west side of the creek (Figure CC-2) (BAMSC 2023).

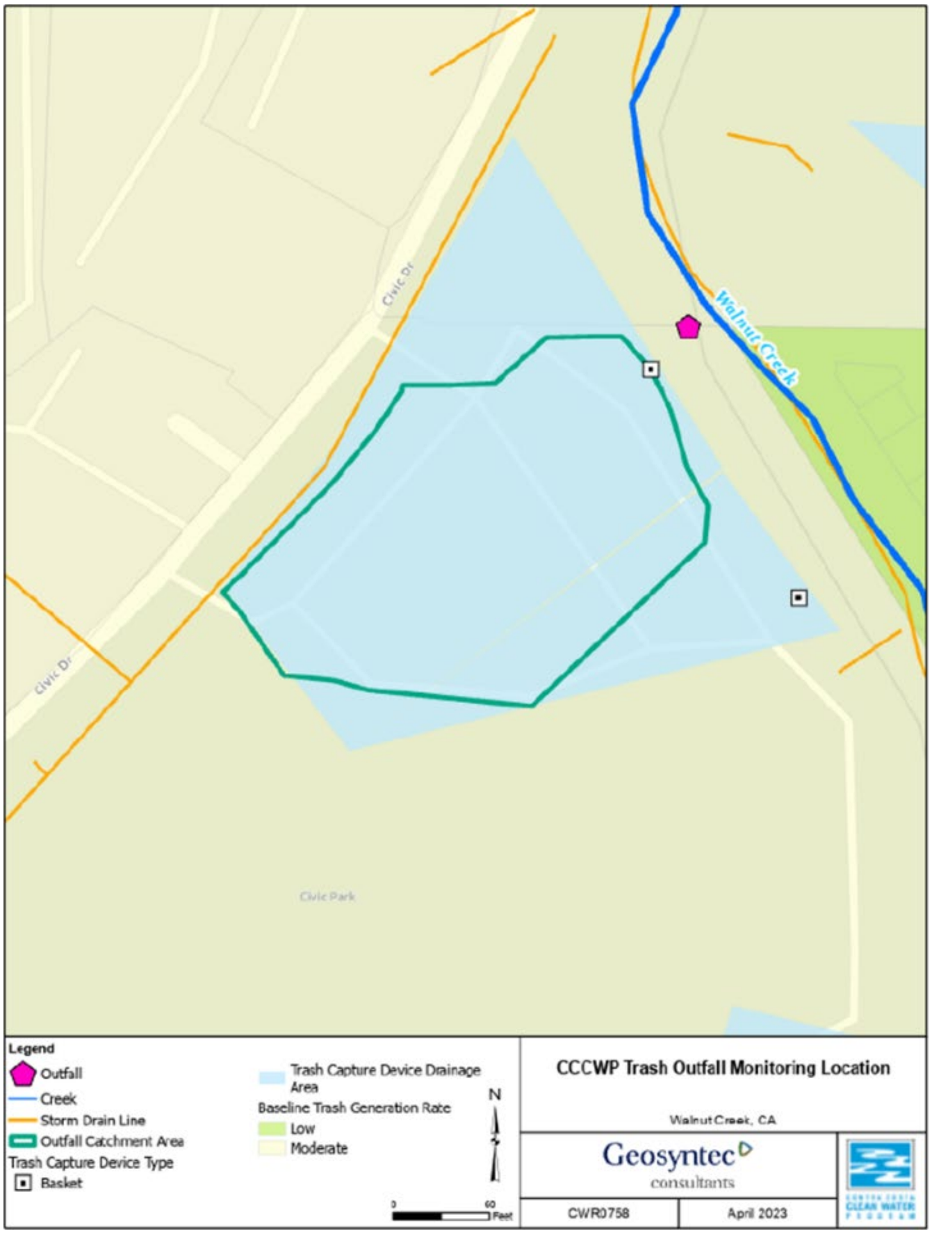

Figure CC-2. Trash monitoring catchment area at Civic Park in Walnut Creek

San Mateo Countywide Clean Water Program (SMCCWP)

Accomplishments During WY 2023

In WY 2023, SMCWPPP initiated tasks in preparation for the implementation of trash outfall monitoring, scheduled to start in October 2024 per MRP 3 Provision C.8.e requirements. These tasks included: 1) select monitoring method/approach; and 2) identify potential monitoring locations. Both tasks were conducted in collaboration with the BAMSC Trash Monitoring Workgroup as part of the development of a regional trash monitoring program.

The BAMSC Trash Monitoring Workgroup selected Oldcastle NetTech™ Gross Pollutant Trap (trash net) to use for monitoring at MS4 outfalls. The trash nets consist of a stainless-steel metal insert that attaches to the inside of the stormdrain pipe (insert design) or to the headwall around the outfall (flange design), depending on the existing construction of the outfall.

To identify potential outfall locations for trash monitoring, SMCWPPP initially performed a GIS analysis of existing catchments within the urban portion of San Mateo County. A total of 87 catchments were identified that met the MRP requirement of being controlled to low trash generation. These catchments have a weighted baseline trash generation > 5 gallons/acre/year and a current trash generation < 5 gallons/acre/year. An additional 20 catchments in unmapped areas were also delineated and subsequently assessed for trash generation.

The outfalls were then evaluated for accessibility and logistics using desktop methods (GIS data, satellite imagery, and/or Google Street View). A majority of these outfalls were eliminated, primarily for unsuitable location for installation of trash nets. Field reconnaissance was then conducted for the remaining 29 outfalls. Most of the 29 outfalls assessed in the field were eliminated due to outfall characteristics not suitable for trash nets (e.g., metal pipe, flapgates), close proximity to the creek (i.e., outfall below high-water mark), not accessible (e.g., dense vegetation, steep banks), or were in areas with illegal encampments.

Only three of the 29 outfalls were feasible for monitoring. One of these outfalls was subsequently eliminated due to the concern that construction of a new headwall, necessary for net installation, would trigger the need for a USACE permit.

Two MS4 outfall locations in San Mateo County were selected for trash outfall monitoring. The first location was at the upstream end of a drainage ditch to Pilarcitos Creek in Half Moon Bay (Site SM-PIL). The second location was at the upstream end of a drainage ditch to Steinberger Slough in City of San Carlos (site SM-SBS). Detailed characteristics of both outfalls and associated catchment area are provided below.

Both outfalls are located in Caltrans right-of-way due to their proximity to freeways. The outfall and downstream ditch in Half Moon Bay are adjacent to Highway 1. The drainage ditch in City of San Carlos is adjacent to a freeway offramp to Highway 101. SMCWPPP obtained encroachment permits from Caltrans for access to both sites. The outfall at the San Carlos site is owned by the City of San Carlos, and as a result, SMCWPPP also obtained an encroachment permit from the City.

The outfall in Half Moon Bay is at the upstream end of the ditch that flows approximately 300 meters south to its confluence at Pilarcitos Creek. Pilarcitos Creek supports steelhead and red-legged frogs, both considered sensitive species by the California Department of Fish and Wildlife (CDFW). During field visits in the spring 2023, the ditch had no flowing water and did not appear to support aquatic habitat for either steelhead or red-legged frogs.

The SMCWPPP submitted a notification to CDFW, indicating the trash monitoring project should have no impact to sensitive species at the site in Half Moon Bay. Ultimately, the CDFW determined that a Stream Alteration Agreement (SAA) Permit would be required with measures to ensure sensitive species would not be impacted. These measures included biological sweeps of the site when nets were installed and retrieved during monitoring events. SMCWPPP staff were required to attend one training session by a certified biologist on how to identify sensitive species and conduct biological sweeps. The measures listed in the SAA permit also required SMCWPPP to stop operations if sensitive species were observed and to immediately notify a certified biologist to safely re-locate species from the work site.

Once encroachment permits were obtained, SMCWPPP procured trash nets from Oldcastle. Both of the outfalls selected for the monitoring project had existing headwalls and thus, trash net devices with the flange design were selected. Two trash nets for each site were obtained.

The trash net equipment was ordered in July 2023. The stainless-steel component of the trash net device was constructed and installed at both outfalls in September 2023. No site preparation was required for the installation. Due to supply chain issues, the trash nets were not expected to be available until mid-October 2023.

SMCWPPP contracted with Revel Environmental (REM) Inc. to implement retrieval, transport and temporary storage of trash nets following each monitoring event.

<u>Monitoring Tasks Planned for WY 2024</u>

SMCWPPP will install pressure transducers at each location and barometric sensors at site SM-PIL to collect flow data as required under the MRP. Once transducers are installed, SMCWPPP will begin monitoring flow within each outfall pipe at two-minute intervals over the course of the wet season.

<u>Planned Refinements to Monitoring Plan</u>

SMCWPPP will also continue coordination with BAMSC members, Water Board staff, and trash Technical Advisory Group (TAG) to refine and resubmit the Trash Outfall Monitoring Plan and QAPP.

<u>Monitoring Site Descriptions</u>

Site SM-PIL

This monitoring location is at a 47-inch-diameter outfall that drains a 86-acre catchment in the City of Half Moon Bay (Figure SM-1). This catchment area consists of a shopping center (17%), a high school (23%), industrial (12%) and a small portion of Highway 1 (2%). Baseline trash generation rates for the catchment were identified as approximately 50% low, 32% moderate and 19% high/very high by area. Ninety-two percent of the catchment is treated with a High-Capacity Treatment System (HDS device). A portion of Highway 1 (that is not treated) drains into the MS4 between the HDS device and the monitoring location at the outfall. Trash management actions in the catchment have resulted in reducing the weighted trash generation rate from 8.1 to 3.0 gallons/acre/year for jurisdictional areas within this catchment.

The outfall at Station SM-PIL is located at the north end of a narrow, manmade concrete-lined ditch that flows south along Highway 1 for approximately 1,150 feet before discharging to Pilarcitos Creek. The outfall and the manmade ditch are owned by Caltrans. The outfall includes an existing concrete headwall and concrete landing area. The banks along the ditch are approximately 4 feet above the channel. Sediment accumulation has allowed the channel bottom to establish dense non-native herbaceous vegetation.

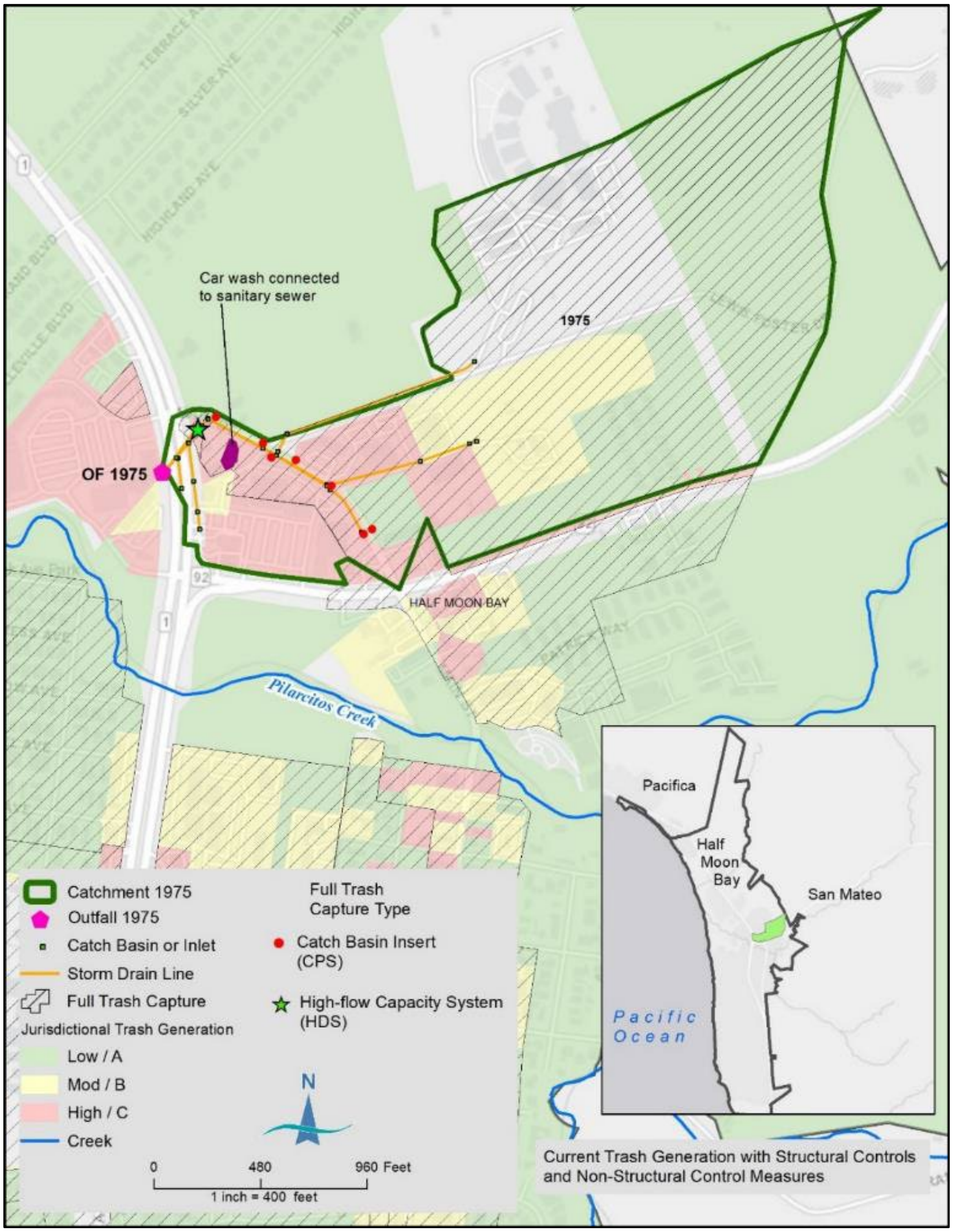

Figure SM-1. Trash monitoring catchment at Pilarcitos Creek (Site SM-PIL)

Site SM-SBS

This monitoring location is at a 30-inch-diameter outfall that drains a 57-acre catchment area in the City of San Carlos (Figure SM-2). This catchment area consists of residential (53%), commercial/retail (18%), and industrial (24%) land uses. Baseline trash generation rates for the catchment were identified as approximately 53% low, 43% moderate and 4% high by area. A total of 31 acres (56%) is treated with Catch Basin Insert Systems (eight connector pipe screen devices) and a private Multi-benefit Stormwater Treatment System (bioretention facility) (7%). Trash management actions in the catchment have reduced the weighted trash generation rate from 5.7 to 4.4 gallons/acre/year.

The outfall at Station SM-SBS is located at the west end of an earthen ditch that flows approximately 1,640 feet northeast toward Highway 1 (Figure SM-5). The ditch flows under the highway and continues for approximately 2,460 feet to the confluence of Steinberger Slough. The banks along the ditch are approximately 4 feet above the channel. The outfall is in a narrow, manmade, earthen ditch situated in an urban area. The ditch bottom is overgrown with cattails, and the banks and surrounding area are ruderal, mowed, and dominated by non-native herbs.

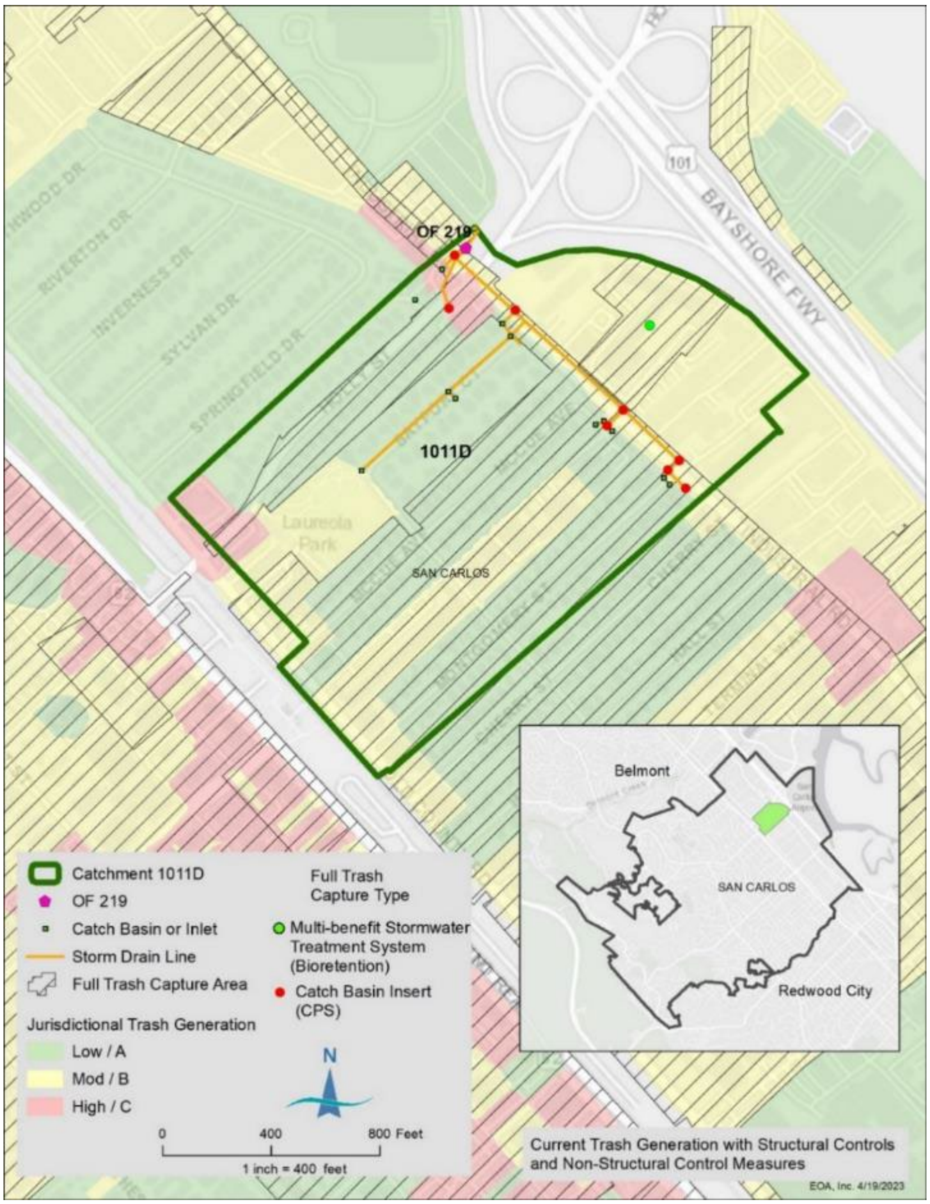

Figure SM-2. Trash monitoring catchment at Steinberger Slough (Site SM-SBS)

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Accomplishments During WY 2023

In WY 2023, SCVURPPP initiated tasks in preparation for the implementation of trash outfall monitoring, scheduled to start in October 2024 per MRP 3 Provision C.8.e requirements. These tasks included: 1) select monitoring method/approach; and 2) identify potential monitoring locations. Both tasks were conducted in collaboration with the BAMSC Trash Monitoring Workgroup as part of the development of a regional trash monitoring program.

The BAMSC Trash Monitoring Workgroup selected Oldcastle NetTech™ Gross Pollutant Trap (trash net) to use for monitoring at MS4 outfalls. The trash nets consist of a stainless-steel metal insert that attaches to the inside of the stormdrain pipe (insert design) or to the headwall around the outfall (flange design), depending on the existing construction of the outfall.

To identify potential outfall locations for trash monitoring, SCVURPPP initially performed a GIS analysis of existing catchments within the urban portion of the Santa Clara Basin. Of the 1,593 MS4 catchments evaluated, 75 met the MRP requirement of being controlled to low trash generation. These catchments have a weighted baseline trash generation > 5 gallons/acre/year and a current trash generation < 5 gallons/acre/year. These outfalls were then evaluated for accessibility and logistics using desktop methods (GIS data, satellite imagery, and/or Google Street View). Most of these outfalls were eliminated, primarily for their unsuitable location for installation of trash nets.

Field reconnaissance was conducted at the remaining 14 outfalls. Most of these outfalls were eliminated due to outfall characteristics not suitable for trash nets (e.g., metal pipe, flapgates), close proximity to the creek (i.e., outfall below high-water mark), not accessible (e.g., dense vegetation, steep banks), or were in areas with illegal encampments. Only two of the 14 outfalls were considered feasible for monitoring.

An additional 82 outfalls were added to the list by revising the GIS screening criteria to include catchments with current trash generation rates < 6.0 gallons/acre/year. If a suitable outfall was identified, additional management actions in the catchment would be needed to reduce trash levels to achieve a low trash generation. Both desktop and field evaluations were conducted at these outfalls. Only one of the 82 outfalls was considered feasible for trash monitoring.

Three MS4 outfalls met the site selection criteria described above. The first location was an outfall to San Francisquito Creek in City of Palo Alto (Site SC-SFC); second outfall was at Stevens Creek in City of Mountain View (site SC-STE); and third outfall was located at Coyote Creek, in Kelly Park, City of San Jose. Detailed characteristics of both outfalls and associated catchment area are provided below.

Encroachment permits and/or Right-to-Enter agreements were obtained from each municipality. All three sites required access for a truck equipped with winch and hydraulic lift to pull nets up the bank and transport them to offsite storage facility. A traffic control plan was required for the encroachment permit issued by the City of Mountain View to obtain vehicle access to the Stevens Creek bike trail during monitoring events.

All three outfalls were in creeks that potentially support steelhead and red-legged frog, both considered sensitive species by the California Department of Fish and Wildlife (CDFW). However, all three outfalls were estimated to be above high-water mark for the intended size of monitored storms and did not appear to support habitat for red-legged frogs. The SCVURPPP submitted a notification to CDFW, indicating the trash monitoring project should have no impact on sensitive species for any of the monitoring locations.

Ultimately, the CDFW determined that a Stream Alteration Agreement (SAA) Permit would be required with measures to ensure sensitive species would not be impacted. These measures included biological sweeps of the site when nets were installed and retrieved during monitoring events. SCVURPPP staff were required to attend one training session by a certified biologist on how to identify sensitive species and conduct biological sweeps. The measures listed in the SAA permit also required SCVURPPP to stop operations if sensitive species were observed and to immediately notify a certified biologist to safely re-locate species from the work site.

Once encroachment permits were obtained, SCVURPPP procured trash nets from Oldcastle. The trash net with flange design was selected for site SC-SFC. The remaining two sites required the insert design. Two trash nets for each site were obtained.

The trash net equipment was ordered in July 2023. The stainless-steel component of the trash net device was constructed and installed at all three outfalls in September 2023. No site preparation was required for the installation. Due to supply chain issues, the trash nets were not expected to be available until mid-October 2023.

SCVURPPP contracted with REM, Inc. to implement retrieval, transport and temporary storage of trash nets following each monitoring event.

Monitoring Tasks Planned for WY 2024

SCVURPPP will install pressure transducers at each location and barometric sensors at sites SC-COY and SC-SFC to collect flow data as required under the MRP. Once transducers are installed, SCVURPPP will begin monitoring flow within each outfall pipe at two-minute intervals over the course of the wet season.

Planned Refinements to Monitoring Plan

SCVURPPP will also continue coordination with BAMSC members, Water Board staff, and trash Technical Advisory Group (TAG) to refine and resubmit the Trash Outfall Monitoring Plan and QAPP.

Site SC-SFC

The trash monitoring location is at a 30-inch-diameter outfall that drains a 60-acre catchment in the City of Palo Alto (Figure SC-1). This catchment area consists of the Stanford Shopping Center and the Hoover Medical Campus. Land use in the catchment area is primarily retail and commercial. Baseline trash generation rates for the catchment were identified as approximately 21% low and 79% moderate by area. There are three Multi-benefit Stormwater Treatment System projects in the catchment that provide approximately seven acres (approximately 11% of the area) of full trash capture treatment. All three projects implemented bioretention treatment measures. Trash reduction from actions equivalent to FTC Systems have been documented at four street locations surrounding the catchment using the On-land Visual Trash Assessment (OVTA) methodology. Following implementation of trash management actions, the weighted trash generation rate for the catchment was reduced from 6.6 (baseline) to 4.95 (current) gallons/acre/year.

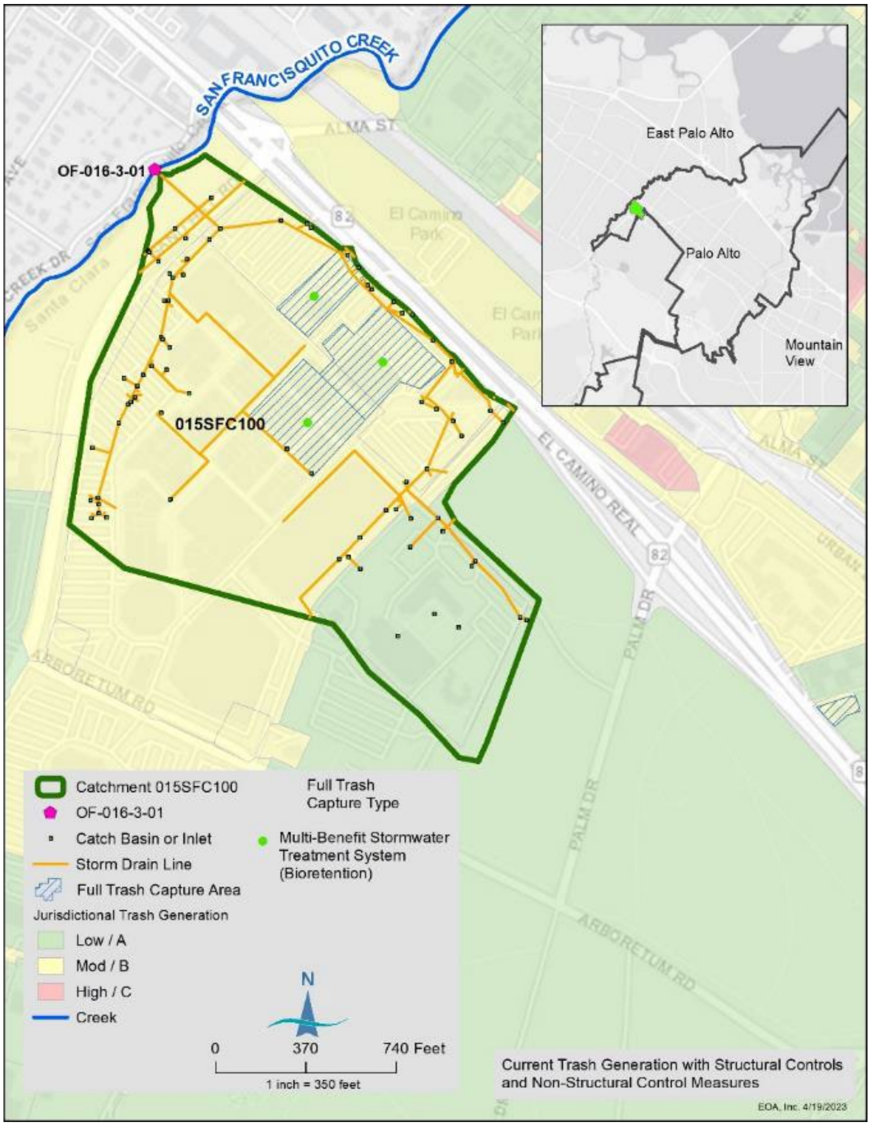

Figure SC-1. Trash monitoring catchment at San Francisquito Creek (Site SC-SFC)

The outfall at Station SC-SFC is located on the eastern bank of San Francisquito Creek on land owned by Stanford University. The outfall has an existing concrete headwall and landing that is approximately 5 feet above the high-water mark and 15 feet below the top of the bank of San Francisquito Creek (Figure SC-4). The outfall is located within a steep embankment that is wooded and has an understory characterized by dense Himalayan blackberry (*Rubus armeniacus*) and non-native herbs. The outfall itself is unvegetated concrete. Site access for maintenance activities is from the top of the bank within a small linear park with a paved foot trail that runs along Sand Hill Road.

Site SC-STE

This monitoring location is at a 54-inch-diameter outfall that drains a 137-acre catchment area in the City of Mountain View (Figure SC-5). This catchment area consists of primarily single/multi-family residential land uses and commercial land uses along El Camino Real. Land use in the catchment area is primarily residential (73%) and retail and commercial (24%). Baseline trash generation rates for the catchment were identified as approximately 74% low,13% moderate and 13% high/very high by area.

The catchment area contains one High-Capacity Flow System (i.e., hydrodynamic separator) and one Multi-benefit Stormwater Treatment System (bioretention) that combine to treat approximately 12 acres (10% of the catchment area). Trash reduction from other actions equivalent to FTC Systems in the watershed has been documented using OVTA survey data. A major management action in the catchment was the relocation of a large homeless community living in recreational vehicles. Large vehicle parking restrictions were added and the MS4 system was flushed. Trash management actions in the catchment have resulted in reducing the weighted trash generation rate from 5.7 to 3.0 gallons/acre/year.

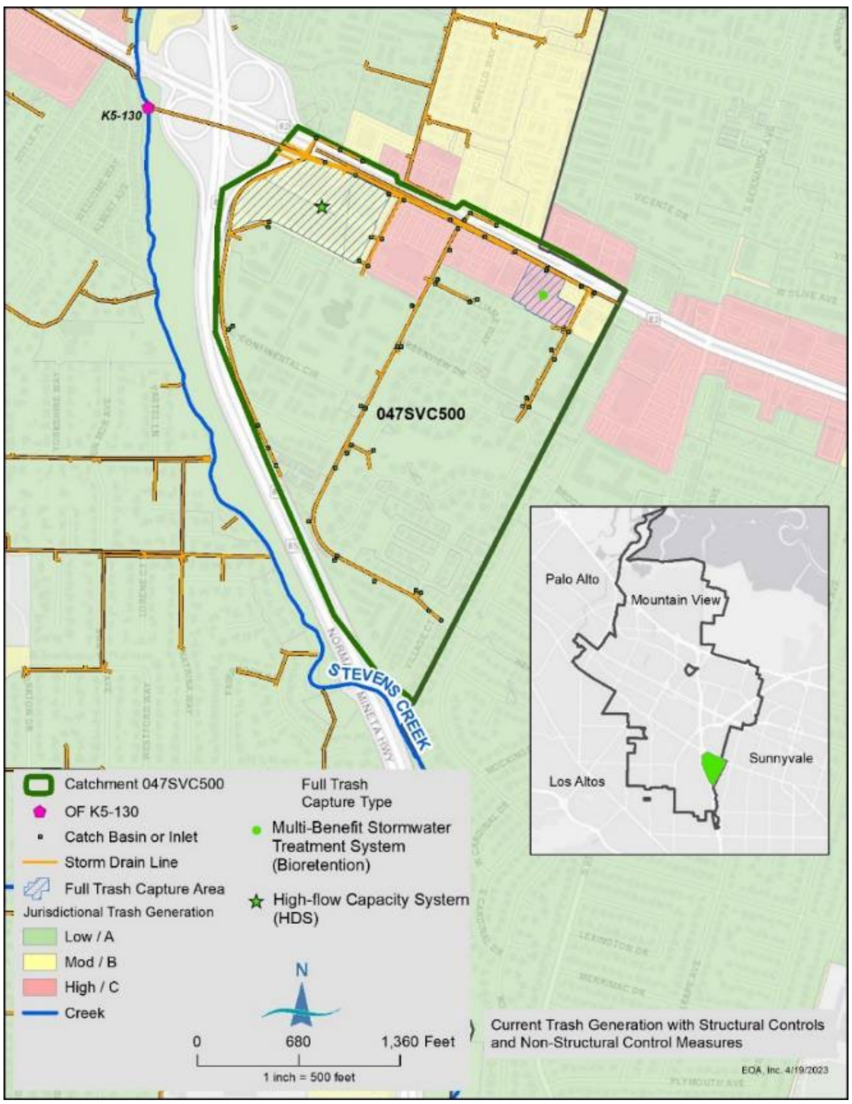

Figure SC-2. Trash monitoring catchment at Stevens Creek (Site SC-STE)

The outfall at Station SC-STE is located on the eastern bank of Stevens Creek, approximately 650 feet south of El Camino Real, on land owned by the City of Mountain View. This outfall does not contain an existing headwall and is approximately 8 feet above the channel high water mark and 10 feet below the top of the bank. The outfall is located within concrete bank armoring (Figure SC-6). A few small trees have established in the armoring, which is otherwise unvegetated. A mix of woody vegetation and non-native herbs are present at the top of the bank, adjacent to the armoring. Site access is from Stevens Creek Trail, a bike/pedestrian path, with vehicle access from El Camino Real.

Site SC-COY

This monitoring location is at a 60-inch-diameter outfall that drains a 450-acre catchment area in the City of San Jose (Figure SC-3). This catchment area consists of primarily industrial (57%), commercial/retail (22%) and park land (6%) uses, including the San Jose Giants stadium complex, City of San Jose Corporation Yard, and recreation uses in Kelley Park. Baseline trash generation rates for the catchment were identified as approximately 22% low, 74% moderate and 4% high by area.

The catchment area contains one High-Capacity Flow System (i.e., hydrodynamic separator) that treats approximately 200 acres (51% of the catchment area). An additional Multi-benefit Stormwater Treatment System (bioretention) is also located in the catchment, although only less than 1% of catchment area. Trash reduction from other actions equivalent to FTC Systems in the watershed has been documented for the remaining 200 acres using OVTA survey data. Trash management actions in the catchment have resulted in reducing the weighted trash generation rate from 7.4 to 5.6 gallons/acre/year. Additional management actions, including installation of Connector Pipe Screens and actions equivalent to FTC systems will be considered prior to the monitoring period to reduce the current trash generation rate to below 5.0 gallons/acre/year if necessary.

The outfall at Station SC-COY is located on the western bank of Coyote Creek, near the Japanese Gardens in Kelley Park, owned by City of San Jose. This outfall does not contain a headwall, but does have a wide landing area consisting of riprap (Figure SC-8). The outfall is approximately 5 feet above the channel high water mark and 5 feet below the top of the bank (Figure SC-6). The outfall is situated in a lower portion of the levee along Coyote Creek. Vegetation in the armoring and below the outfall is sparse, consisting of non-native herbs, and at ordinary high-water mark, three small saplings: arroyo willow (*Salix lasiolepis*), Peruvian peppertree (*Schinus molle*), and Brazilian peppertree (*Schinus terebinthifolius*). Overhanging the outfall is a large box elder (*Acer negundo*) that is rooted on the levee. Site access is from the pedestrian trail in Kelley Park that is adjacent to the creek.

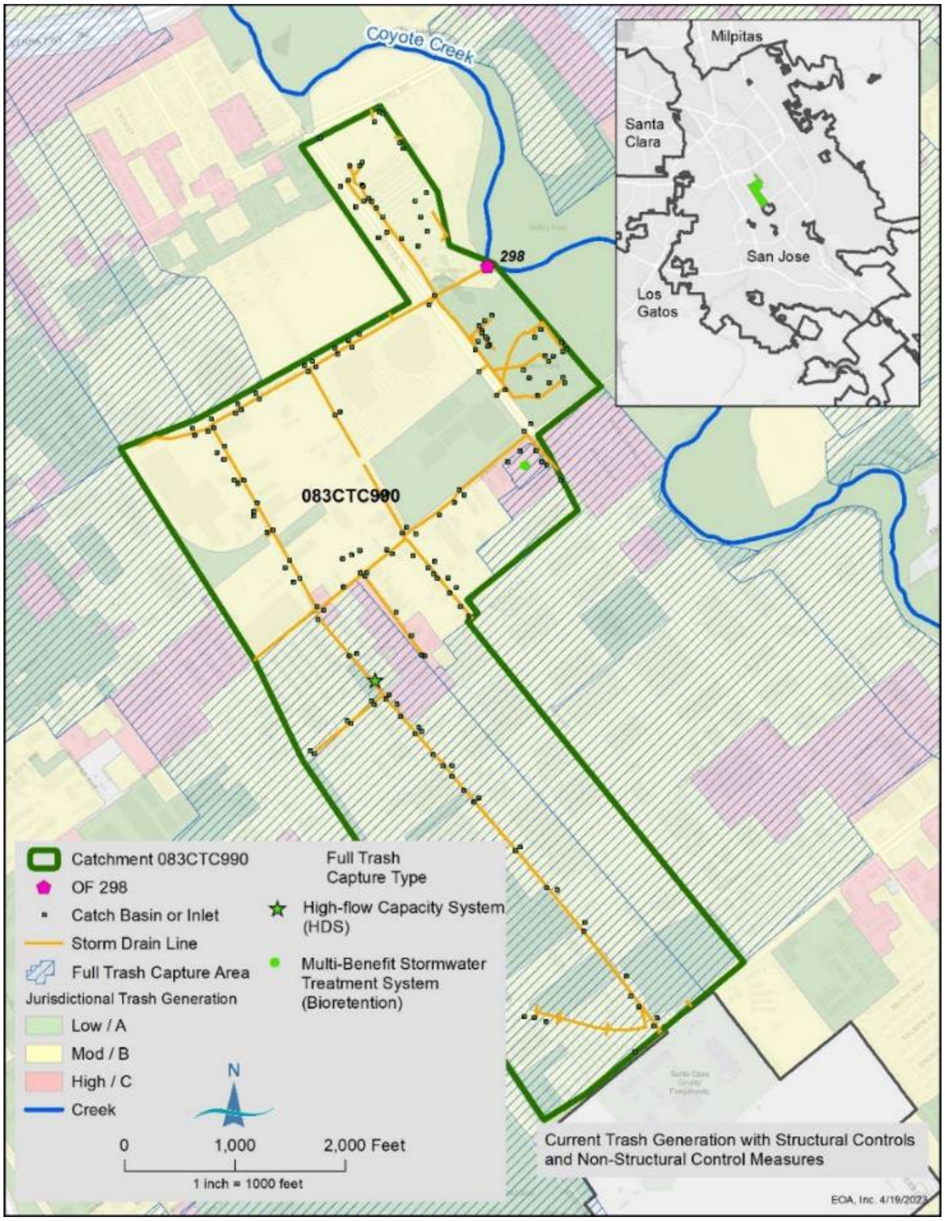

Figure SC-3. Trash monitoring catchment at Coyote Creek (Station SC-COY)

Solano Stormwater Alliance (SSA)

Accomplishments During WY 2023

In WY 2023, SSA went through a start-up process to support WY 2024 implementation of the outfall trash monitoring component in collaboration with participating BAMSC Programs and consistent with MRP 3 Provision C.8.e requirements. This effort included a two-step process run concurrently to (1) review potentially viable monitoring technologies, and (2) identify potential monitoring locations.

SSA, in conjunction with BAMSC collaborators, reviewed commercially-available trash capture technologies and, like other BAMSC Programs, initially identified Oldcastle NetTech™ Gross Pollutant Trap systems as a viable option to support monitoring efforts. These systems were certified as full trash capture devices by the SWRCB[4], were able to be secured onto outfalls to capture trash at the catchment scale, and generally met the project timing to allow installation near beginning of WY 2024.

SSA next reviewed and identified potential monitoring locations using the criteria developed in conjunction with BAMSC collaborators and compiled within the Outfall Trash Monitoring Plan (BAMSC 2023). SSA first performed a desktop review of identified outfalls within the cities of Fairfield, Suisun City and Vallejo for the drainage management area and outfall criteria identified in the Outfall Monitoring Plan. The review identified two potential locations in Fairfield, five in Vallejo, and no potential locations in Suisun City for more in-depth investigation.

After further review and conducting site visits with Oldcastle personnel, none of these potential sites met the criteria identified in the monitoring plan. Prospective outfalls were removed from the site selection for a number of factors, including if they were determined to contain structures prohibitive of net installation (e.g. flap gate), were subject to flooding or located below the adjacent stream's high water mark, or had associated site characteristics that limited equipment functionality (e.g., steeply sloped or vertical banks). The location on Dan Wilson Creek in the City of Fairfield had the most potential, though this site was deemed non-viable due to issues with elevation relative to water line, construction (i.e., tide gate), and permitting (USACE, CDFW), which would likely jeopardize its viability.

SSA then identified an alternate monitoring location at a combination full trash capture and LID feature under design for the Amtrak Park & Ride lot in Suisun City. This multi-benefit stormwater treatment facility was envisioned to manage trash at what was identified as a high trash generating location, but was also designed to incorporate green stormwater infrastructure components for the hydrological and water quality benefits. The proposed treatment retrofit is associated with an existing parking lot located between Lotz Way and Highway 12 in Suisun City. The bioretention feature is sized to meet both the full trash capture (1-hour, 1-year storm event) and water quality (85% annual flow volume). The Amtrak Park & Ride lot is located within Caltrans' right-of-way and the project is intended to be implemented in partnership with Caltrans District 4 through a cooperative implementation agreement.

The monitoring location will be sited within the bioretention overflow, to evaluate the effectiveness of both a new trash capture device, located at a drop inlet prior to highway

[4] List of certified devices available at https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/trash_implementation/certified_fcsdevicelist_16Feb2021.pdf

roadway runoff entering the bioretention and the effectiveness of the bioretention feature to prevent trash from entering downstream waterways up to and including the 1-hour, 1-year storm event). The monitoring will be conducted within an 18” overflow pipe that flows direction into the MS4. A filter bag (Fabco Industries design[5] or equivalent) will be placed within the bioretention overflow to capture any trash that bypasses the trash capture device and the bioretention feature.

The proposed monitoring site, SSA-LOTZ, drains an approximately 4.3-acre catchment within Suisun City (Figure S-1). Land use in the catchment area is identified as 75% commercial and 25% highway, though in practice the area comprises entirely transportation-related uses. Baseline trash generation rates are approximately 25% low and 75% high by area. There are no current homeless encampments identified within the catchment. There are pockets of accumulated trash often observed in the drainage area, assumed to be blown onto the site from the adjacent State Route 12 and also from parking lot users.

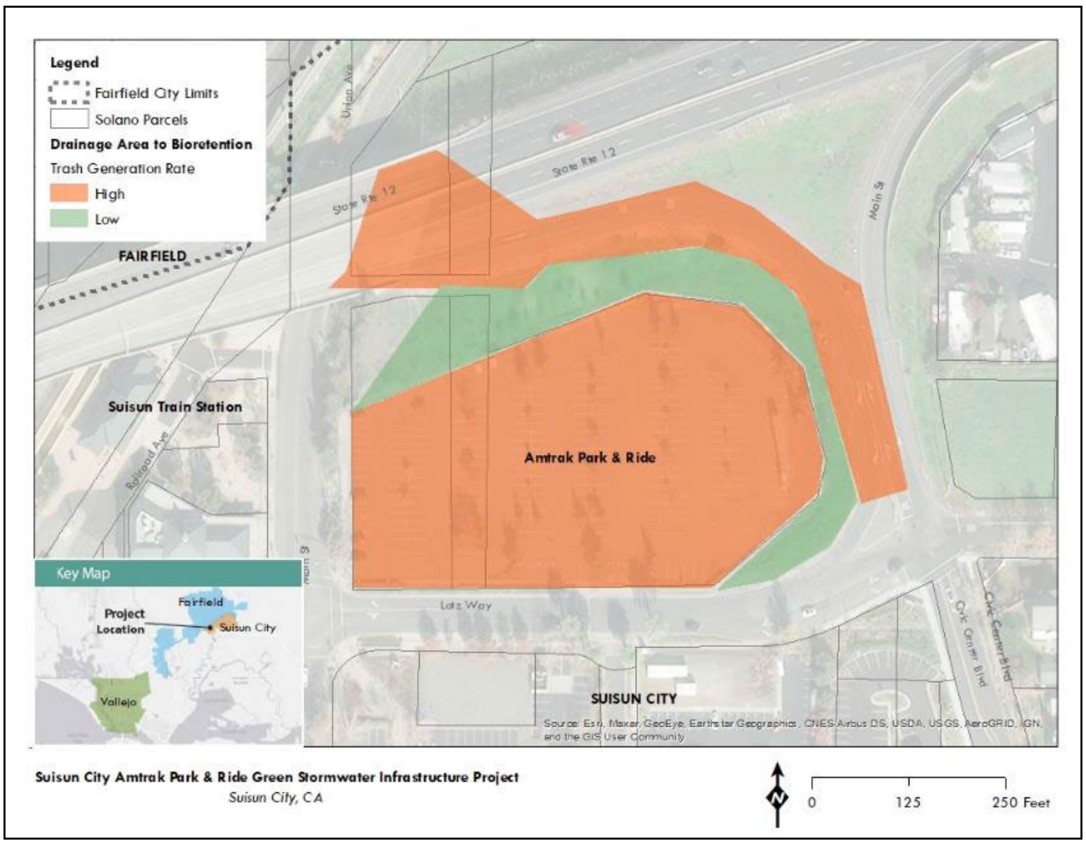

Figure S-1. Trash monitoring catchment at Suisun City (Station SSA-LOTZ)

After site selection was completed, SSA next began preparations for monitoring. This next phase included review of bioretention facility design specifications to ensure that monitoring could be supported, identification of appropriate flow monitoring equipment, negotiation of a maintenance agreement with Caltrans to support overall construction project implementation, and review of permitting implications. As to the permitting, SSA determined that the monitoring site is located in a non-jurisdictional area and the only permit required, as part of project construction, is a Caltrans encroachment permit.

[5] https://fabco-industries.com/beehive-rain-garden-overflow-filter/

Monitoring Tasks Planned for WY 2024

Early in WY 2024, SSA is anticipating that work will proceed on the overall LID construction project. SSA will participate in planning stages to ensure that any design modifications that are required to support outfall monitoring will be incorporated. Following completion of construction phase, SSA will ensure monitoring infrastructure is readied for both trash accumulation and flow monitoring aspects. Once all monitoring equipment is in-place, SSA will begin monitoring overflow from the LID facility at two-minute intervals over the course of the wet season. This data is anticipated to be downloaded at approximately six-week intervals, but this may change based upon battery life and storage capacity. SSA will then conduct monitoring activities per the specifications of the Outfall Trash Monitoring Plan (BAMSC 2023). This will encompass a minimum of three monitored storm events or as many as can be accomplished given potential construction delays or other constraints.

Planned Refinements to Monitoring Plan

SSA will also continue coordination with BAMSC members, Water Board staff, and trash Technical Advisory Group (TAG) to refine and resubmit the Trash Outfall Monitoring Plan and QAPP.

Appendix 3

Pollutants of Concern Monitoring Report: Water Year 2023

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Contra Costa Clean Water Program

Pollutants of Concern Monitoring Report

Submitted to the San Francisco Bay and Central Valley Regional Water Quality Control Boards

In Compliance with NPDES Permit Provision C.8.h.iv.(1)

Municipal Regional Stormwater Permit (Order No. R2-2022-0018)

March 31, 2024

Prepared for

Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

Prepared by

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Contra Costa Clean Water Program

Pollutants of Concern Monitoring Report

March 31, 2024

Prepared for

Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

Contra Costa Clean Water Program Participants

- Cities of: Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek
- Contra Costa County
- Contra Costa County Flood Control & Water Conservation District

Prepared by

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Acronyms and Abbreviations

Bay	San Francisco Bay
CCCWP	Contra Costa Clean Water Program
CCV	continuing calibration verification
CVRWQCB	Central Valley Regional Water Quality Control Board
Delta	Sacramento-San Joaquin River Delta
LCS	laboratory control sample
MeHg	methylmercury
mg/kg	milligrams per kilogram
MRL	method reporting limit
MRP	municipal regional stormwater permit
MS	matrix spike
MSD	matrix spike duplicate
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl congener
POC	pollutant of concern
ppm	parts per million
PR	percent recovery
PSD	particle size distribution
RMP	Regional Monitoring Program for Water Quality in San Francisco Bay
RPD	relative percent difference
RWL	receiving water limitations
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SSC	suspended sediment concentration
SWAMP	Surface Water Ambient Monitoring Program
TMDL	total maximum daily load
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency
WWTP	wastewater treatment plant
WY	water year

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1 Executive Summary

This report summarizes pollutants of concern (POCs) monitoring conducted by Contra Costa Clean Water Program (CCCWP) during water year (WY) 2023 (October 1, 2022-September 30, 2023). This report fulfills Provisions C.8.h.iv.(1) and C.19.d.iii.(3) of the Municipal Regional Stormwater Permit (MRP 3.0), Order R2-2022-0018, effective July 1, 2022, issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB 2022).

POC monitoring is intended to assess inputs of certain pollutants to San Francisco Bay (the Bay) and Sacramento-San Joaquin River Delta (the Delta) from local tributaries and urban runoff, assess compliance with receiving waters limitations, assess progress toward achieving wasteload allocations for TMDLs, and help resolve uncertainties associated with loading estimates for these pollutants.

Under MRP 3.0 Provision C.8.f., POC monitoring addresses six priority information management needs:

1. Source Identification – identifying or confirming which sources or watershed source areas provide the greatest opportunities for reductions of POC in urban stormwater runoff
2. Contributions to Bay Impairment – identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location)
3. Management Action Effectiveness – evaluating the effectiveness or impacts of existing management actions, including compliance with TMDLs and other POC requirements, and providing support for planning future management actions
4. Loads and Status – providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges
5. Trends – evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time
6. Compliance with Receiving Water Limitations – providing information to assess whether receiving water limitations (RWLs) are achieved

Not all the above information need apply to all POCs; MRP 3.0 Tables 8.1 and 8.2 specify the minimum monitoring types (corresponding to the above information needs), methods, and frequencies of monitoring for each countywide stormwater program for the following POC groups:

- Polychlorinated biphenyls (PCBs) and total mercury, for Monitoring Types 1-5
- Copper, for Monitoring Type 4
- Emerging contaminants, for Monitoring Type 4
- Ancillary parameters as necessary for each sample to address management questions for the above POCs (i.e., total organic carbon [TOC] concurrent with PCBs where normalizing concentrations in water or sediment; suspended sediment concentration [SSC] for water samples analyzed for PCBs or mercury for Monitoring Types 3, 4 or 5; and hardness in conjunction with copper samples from fresh water)

- Copper, zinc, fecal indicator bacteria, and additional analytes selected for RWL assessment for Monitoring Type 6

CCCWP Permittees prioritize monitoring pollutants of concern with the goal of identifying reasonable and foreseeable means of achieving load reductions of pollutants required by total maximum daily loads (TMDLs). TMDLs are watershed plans to attain water quality goals developed and established by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). The two most prominent TMDLs for stormwater monitoring, source control, and treatment control projects under MRP 3.0 are the San Francisco Bay Mercury TMDL and the San Francisco Bay PCBs TMDL. In the interest of protecting the beneficial uses of the surface waters for people and wildlife dependent on the Bay for food, these regulatory plans are intended to reduce concentrations of mercury and PCBs in fish within the Bay. MRP Provisions C.11 and C.12 address the mercury and PCBs TMDLs, respectively. Monitoring conducted to address Provision C.8.f Type 1 and Type 2 are also focused on investigating land areas in compliance with MRP Provisions C.11.b and C.12.b. The CCCWP are required to investigate 1,700 acres of likely PCBs or mercury source properties during the permit term.

Mercury and PCBs tend to bind to sediments. The principal means of transport from watersheds is via sediments washed into the Municipal Separate Storm Sewer System (MS4); therefore, an important focus of POC monitoring is identifying the most significant sources of contaminated sediments to the MS4. An additional focus is quantifying the effectiveness of control measures. The highest POC monitoring priorities for Permittees are answering these two basic TMDL implementation questions: where are the most significant sources of pollutants of concern, and what can be done to control them?

During water year 2023, the following monitoring activities were completed:

- PCBs and mercury sediment screening – sampling of street dirt and/or storm drain drop inlet sediment at eight locations adjacent to suspected source properties in old industrial areas throughout the county
- Methylmercury monitoring in Marsh Creek to address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods and under what hydrologic or seasonal circumstances do increased methylmercury concentrations reach the Delta (management questions C.19.ii.(2)(a)-(b) and C.19.ii.(2)(e)).

Monitoring activities were performed in accordance with CCCWP's Pollutants of Concern Sampling and Analysis Plan (ADH and AMS 2020a) and Quality Assurance Project Plan (ADH and AMS 2020b).

The water year 2023 Provision C.8/C.11/C.12 monitoring effort, results, and allocation of effort for water year 2024 are described in Section 2.

Monitoring and assessment activities relevant to Provision C.19 Delta Methylmercury TMDL for East County Permittees are reported in a separate section within this report (Section 3), per Provision C.19.d.iii.(3).

Figure 1 provides the general location of water year 2023 Provisions C.8 and C.19 monitoring sites.

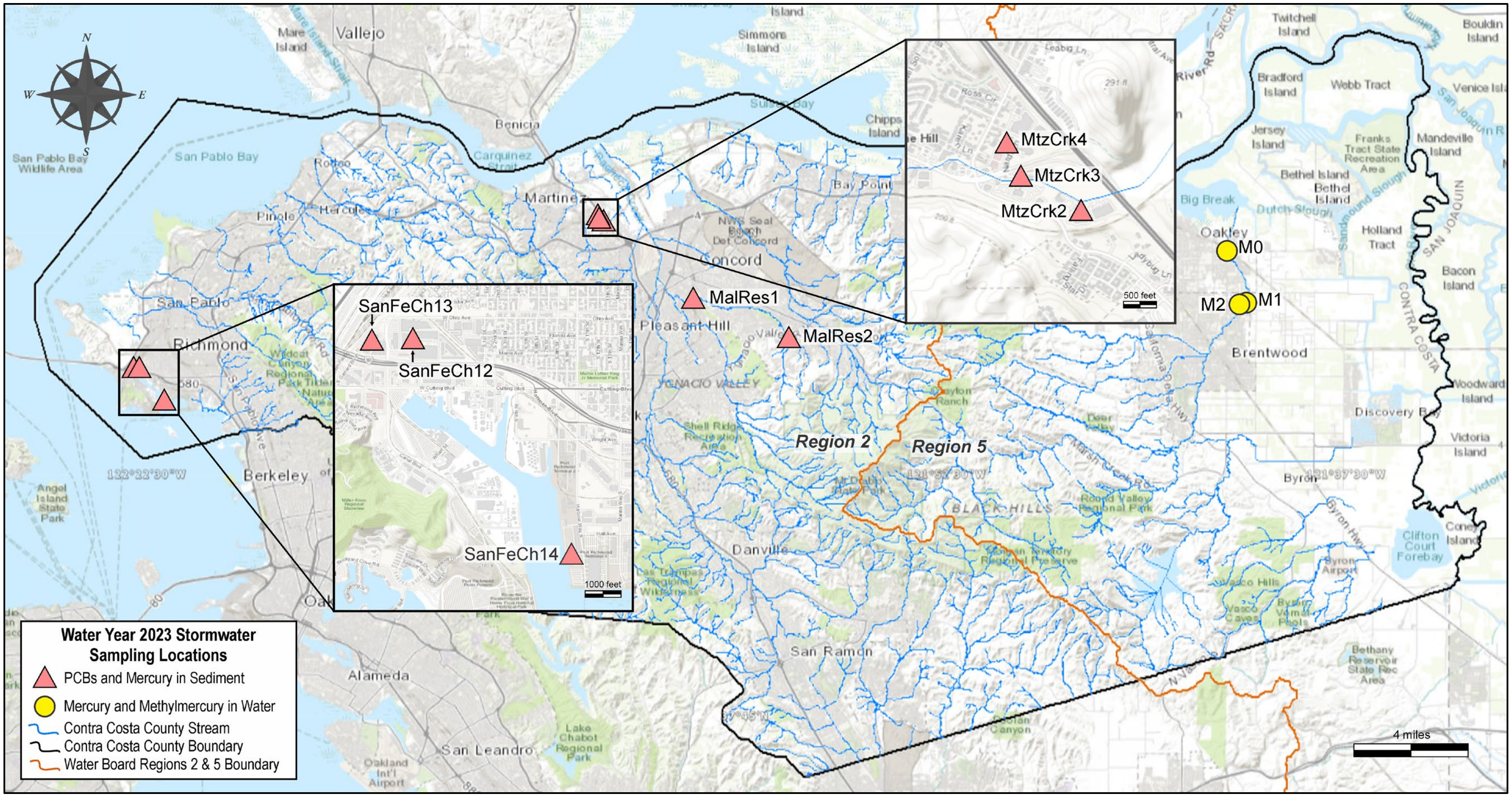

Figure 1. Location of Water Year 2023 Provisions C.8, C.11, C.12, and C.19 Monitoring Activities – County Overview

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2 Provisions C.8, C.11, and C.12 Monitoring

The following subsections summarize water year 2023 monitoring efforts and analytical results in conformance with MRP Provisions C.8, C.11, and C.12 requirements and include a description of the monitoring activities planned for water year 2024.

2.1 PCBs and Mercury Sediment Screening – Street Dirt and Storm Drain Drop Inlet Sampling

Eight composite samples of street dirt and storm drain drop inlet sediment were collected in September 2023. Sampling sites were selected based on a GIS layer prepared by CCCWP's contractor, Geosyntec Consultants. The GIS layer identifies remaining old industrial properties throughout the county that have not been investigated in the past, and that may have the potential to contribute PCBs and/or mercury to the public right-of-way and the MS4. In generating the old industrial property database, careful consideration was given to the historic land use of each property and to results of previous monitoring efforts.

Table 1 provides site IDs, sampling dates, position coordinates, sampling notes, and the monitoring type for each location. Table 2 provides analytical test methods, reporting limits and holding times. Table 3 provides results of PCBs, mercury, total organic carbon (TOC), and particle size distribution (PSD) testing. Refer to Figure 1 for the general locations of the sampling sites.

The concentration of total PCBs was quite low in seven of the eight samples, ranging from 0.003 to 0.042 part per million (ppm) (Table 3). Only one sample, SanFe12, had a total PCBs concentration that was slightly noteworthy since it just met the criterion for a moderate source area (0.205 vs 0.2 ppm).

The concentration of total mercury was low in seven of the eight samples, ranging from 0.066 to 0.236 ppm (Table 3). One sample, MalRes2, had a total mercury concentration that exceeded the criterion for a moderate to high source area by a factor of 25 (7.49 vs. 0.3 ppm). This composite sample comprised six discrete sampling points along Pine Hollow Road and Campus Drive in the City of Concord adjacent to, and including trackout from, a PG&E facility. This single result from MalRes2 suggests the PG&E property is a possible source of elevated mercury in sediment. Since the sediment sample was collected from the property ingress/egress point in the public right-of-way and from the nearby municipal curb and gutter, all of which are exposed to wind and rain, the affected sediment is expected to be available for entrainment in stormwater runoff to the local MS4. The intended follow-up action is to confirm this finding through additional sampling in water year 2024.

Table 1. Sediment Screening Sampling Locations and Sampling Notes – Water Year 2023

Site ID [1]	Date Sampled	Latitude[2]	Longitude[2]	City/Town	Sampling Notes	Monitoring Types
MalRes1	09/15/23	37.96467	-122.02885	Concord	Parcel is new urban development (e.g. new asphalt pavement, recently constructed multi-family homes, medical center). Nine individual sampling points comprise the composite sample. Sampled locations include sediment by MS4 along System Drive, unpaved lot on trailside circle, undeveloped lot on System Drive, and sediment at fence line where fence posts exposed soil.	Type 1
MalRes2	09/15/23	37.94419	-121.96931	Concord	PG&E facility. Six individual sampling points compose the composite sample. Four samples collected along unpaved, single vehicle ingress/egress point to the property. Additional samples collected in curb/gutter along Pine Hollow Road and Campus Drive.	Type 1
MtzCrk2	09/15/23	38.00531	-121.08505	Concord	Composite sample comprises seven individual points along property fence line and curb/gutter of Pacheco Blvd. Three samples taken where sediment accumulation was present around drop inlet grates within parcel source property boundary.	Type 1
MtzCrk3	09/15/23	38.00674	-122.08816	Martinez	Composite sample comprises six individual points along unpaved ingress/egress point to property. Light track-out visible from property. Sampled along fence line and driveway up to SR-680 SB on-ramp.	Type 1
MtzCrk4	09/15/23	38.00819	-122.08889	Martinez	Composite sample comprises six individual locations along Nardi Lane. Sample locations include track-out from unpaved driveway near residential property, unpaved lot, and general depression points in roadway where sediment accumulation was visible.	Type 1
SanFeCh12	09/08/23	37.92884	-122.37578	Richmond	Composite sample comprises six individual locations along Canal Blvd. Track-out from ingress/egress point visible. Property is private, gated, with no access to the public. Sampled locations include exposed sediment along landscaped perimeter and fence line, curb/gutter along Canal Boulevard, and swept areas around Canal Boulevard drop inlets.	Type 1
SanFeCh13	09/08/23	37.92882	-122.37974	Richmond	Composite sample comprises four individual locations in curb/gutter and cul-de-sac off S Garrard Boulevard, swept sediment at drop inlet in cul-de-sac and sediment track-out from source property.	Type 1

Table 1. Sediment Screening Sampling Locations and Sampling Notes – Water Year 2023

Site ID [1]	Date Sampled	Latitude[2]	Longitude[2]	City/Town	Sampling Notes	Monitoring Types
SanFeCh14	09/08/23	37.91210	-122.36055	Richmond	Composite sample comprises five sampling locations along S. Harbour Way. Property is operating as construction material stockyard. Sampled track-out from property and depression points along S. Harbour Way where sediment accumulation was apparent. Sampled property fence line.	Type 1

1 Site ID Key: MalRes = Mallard Reservoir, MtzCrk = Martinez Creek, SanFeCh = Santa Fe Channel
2 Referenced to North American Datum of 1983

Table 2. Sediment Screening Analytical Tests, Methods, Reporting Limits, and Holding Times

Sediment Analytical Test	Method	Target Reporting Limit	Holding Time
Total PCBs (RMP 40 congeners)[1]	USEPA 8082A	0.5 µg/kg	1 year
Total Mercury	USEPA 7471B	5 µg/kg	1 year
Total Organic Carbon	ASTM D4129-05M	0.05%	28 days
Particle Size Distribution[2]	ASTM D422M	0.01%	28 days

1 San Francisco Bay 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.
2 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns.
RMP Regional Monitoring Program for Water Quality in San Francisco Bay

Table 3. Sediment Screening Sampling Results – Water Year 2023

Sample ID	Total PCBs (mg/Kg or ppm) [1,2]	Total Hg (mg/Kg or ppm)[3]	TOC (%)	Particle Size Distribution[4]			
				Clay (%)	Silt (%)	Sand (%)	Gravel (%)
MalRes1	0.003	0.184	4.34	0.76	18.81	69.38	9.69
MalRes2	0.003	***7.49***	1.64	1.13	33.69	52.49	12.18
MtzCrk2	0.013	0.234	3.41	0.96	17.04	69.58	11.02
MtzCrk3	0.011	0.131	2.35	4.03	15.97	65.82	9.97
MtzCrk4	0.006	0.192	3.49	1.18	29.32	52.43	15.98
SanFe12	***0.205***	0.151	7.75	1.09	15.84	69.10	11.75
SanFe13	0.042	0.236	6.82	1.63	14.45	66.81	14.32
SanFe14	0.011	0.066	2.50	1.47	9.71	75.81	11.32

1 Sum of RMP 40 congeners
2 Values in bold italics indicate a moderate to high source area for PCBs (>0.2 ppm) per MRP Provision C.11.c and C.12.c
3 Values in bold italics indicate a moderate to high source area for mercury (>0.3 ppm)
4 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns
ppm parts per million
RMP Regional Monitoring Program for Water Quality in San Francisco Bay

2.2 Quality Assurance / Quality Control Analysis

Project staff performed verification and validation of laboratory data per the project quality assurance project plan (ADH and AMS 2020b) and consistent with California Surface Water Ambient Monitoring Program measurement quality objectives (SWAMP 2022).

Samples for all analyses met laboratory quality control objectives, except for minor instances detailed in Table 4 below. Given that the quality control issues described in Table 4 show the issues were of relatively minor consequence, 100% of the data from these samples are of acceptable quality and are included in the dataset for this report.

Table 4. Quality Control Issues and Analysis in the Water Year 2023 Project Data Set

Sample ID / Type	Issue	Analysis
SanFe12/PCB matrix spike/matrix spike duplicate	For PCB 201 congener, the RPD of the MS/MSD was greater than the 40% control limit (55%).	PCB 201 was not detected in the original sample. The MS recovery that led to the elevated RPD indicated a low bias, but the MSD recovery was within acceptable limits.
SanFe12/PCB matrix spike/matrix spike duplicate	For several PCB congeners, PR of the MS/MSD was above the 50-150% limit specified in the QAPP [PCB 101 (212%), PCB 110 (251%), PCB 132 (155% / 212%), PCB 138 (208% / 195%), PCB 105 (186% / 170%, PCB 60 (168%)].	Recoveries for PCB 101, 110, 132,138, 105 and 60 exceeded the upper control limit, indicating a possible high bias.
SanFe12/PCB matrix spike/matrix spike duplicate	For two PCB congeners, PR of the MS/MSD was below the 50-150% limit specified in the QAPP [PCB 141 (37% / 30%), PCB 201 (47%)].	Recoveries for PCB 141 and PCB 201 were below limits, indicating a possible low bias.
MalRes1/Particle size distribution field duplicate	RPD of field duplicate for clay (64%) and medium gravel (41%) were outside of precision control limits (25%).	Precision outside of control limits for particle size is not uncommon in field duplicate samples due to sample heterogeneity.
MalRes1/Mercury field duplicate	RPD of field duplicate for mercury was 41%, which was outside the precision control limits (<25%).	Particle size heterogeneity of this sample likely influenced the precision of the mercury field duplicate.
Method 8082A, PCB congeners: surrogates	On 10/25/2023, the lower control criterion was exceeded for Tetrachloro-m-xylene in continuing calibration verification (CCV).	This analyte is a surrogate, not an analyte, in the field samples. The result indicates a potential slight negative bias. The data quality was not significantly affected, and no further corrective action was required.
Method 8082A, PCB congeners: LCS	On 10/25/2023, the PR of PCB 141 in a LCS was 65%, which is outside the control limits listed in the results summary (70%-130%).	Based on the method and historic data, the recoveries observed were in the range expected for this procedure. Due to the low MS and LCS recovery a "VLB" qualifier was added to PCB 141 in sample SanFe12, indicating the result should be viewed as an estimate potentially biased low.
Method 8082A, PCB congeners: MS/MSD	On 10/25/2023, the PR of some analytes in MS/MSD were outside the control limits listed in the quality control summary.	Based on the method and historic data, the recoveries observed were in the range expected for this procedure. No further corrective action was required.

CCV Continuing Calibration Verification
LCS laboratory control sample
MS matrix spike
MSD matrix spike duplicate
PR percent recovery
RPD relative percent difference

2.3 Summary of Monitoring Completed in Water Year 2023

Water year 2023 monitoring is summarized in Tables 5 and 6. The tables list the total number of tests completed for each pollutant class and analyte, the corresponding monitoring type addressed, and the target number of analytical laboratory tests outlined in MRP 3.0. The number of samples collected and analyzed in water year 2023 met the minimum annual requirements of the MRP in all pollutant categories.

The Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) conducted two water sampling events during WY 2023 in Contra Costa County. Water sampling was conducted in Walnut Creek on January 9, 2023 and March 9, 2023. A total of 12 mercury and 13 PCBs samples were collected, along with SSC. In WY 2022, the RMP collected one mercury and one PCBs sample in Meeker Slough and Santa Fe Channel (in November 2021). These samples are considered Type 4.

2.4 Monitoring Planned for Water Year 2024

POC monitoring in water year 2024 will continue to investigate mercury and PCBs source properties and areas, as required by MRP Provision C.11.b/C.12.b (Monitoring Types 1, 2, and 5). Sediment investigation of remaining old industrial source properties and areas for PCBs and mercury will take place at locations identified through ongoing desktop research and field surveys. Sites which may be added to the sampling list include locations of interest due to historic or present-day land use, lack of adequate source control, and reoccurring accumulation of sediment within the right-of-way. POC monitoring in water year 2024 will meet or exceed the annual minimum number of samples required for PCBs and mercury (eight each).

Management action effectiveness (Type 3) will be studied through low impact development monitoring that is conducted per MRP Provision C.8.d.

Additional monitoring locations will be revisited to evaluate trends in POC loading to the Bay and/or local tributaries over time (Monitoring Types 4 and 5) and to confirm ongoing moderate or high levels of PCBs in areas identified in the Old Industrial Area Control Measure Plan (MRP Provisions C.11.c and C.12.c).

Receiving water limitations monitoring (Type 6) will be conducted per the conditionally approved Receiving Water Limitations Monitoring Plan and Addendum (see Appendix 4).

Table 5. Summary of Provision C.8 Monitoring Completed in WY 2023 by Pollutant Class, Analyte, Monitoring Type, and MRP Targets

Pollutant Class / Type of Monitoring	Analyte									Monitoring Types						Samples Collected and Analyzed in WY 2023	Cumulative Samples Collected and Analyzed Under MRP 3	Total Samples Required by MRP 3 (and Annual Minimum Requirement)
	PCBs	Mercury	Methylmercury	SSC	PSD	TOC	Copper [1]	Hardness	RWL Analytes [2]	(1) Source ID	(2) Bay Impairment	(3) Management Action	(4) Loads & Status	(5) Trends	(6) Receiving Water Limits			
PCBs - sediment	✓				✓	✓				✓						8 [a]	33	65 (8)
PCBs - water	✓			✓									✓			13 [b]		
Mercury – sediment		✓			✓					✓						8 [a]	22	50 (8)
Mercury – water		✓		✓									✓			12 [b]		
Copper[1] - water																0	0	5
Emerging Contaminants [3]																NA	NA	NA
Receiving Water Limitations [2]																0	0	5

1 Total and dissolved fractions of copper
2 Receiving water limitations analytes include: dissolved copper, zinc, and lead, hardness, *E. coli*, total nitrogen, total phosphorus, ammonia, polyaromatic hydrocarbons, temperature, pH, and specific conductance
3 CCCWP is satisfying this permit requirement through augmentation of the RMP Emerging Contaminates Monitoring Strategy
a Sediment screening adjacent to old industrial source properties in high opportunity areas
b Water samples collected by the RMP in Contra Costa County
NA Not applicable
PSD particle size distribution
RMP Regional Monitoring Program for Water Quality in San Francisco Bay
RWL receiving water limitations
SSC suspended sediment concentration
TOC total organic carbon

Table 6. Summary of Provision C.8 Monitoring Completed Toward MRP Targets Since the Effective Date of MRP 3.0 on July 1, 2022

Pollutant Class by Water Year		Number of Samples Collected and Analyzed per Management Information Need						Annual Number of Samples Collected and Analyzed	
		Type 1: Source ID	Type 2: Bay Impairment	Type 3: Management Action	Type 4: Loads & Status	Type 5: Trends	Type 6: RWL	Actual	Required by MRP
2022	PCBs – sediment	7				3		10	8
	PCBs – water				2			2	
	Mercury – sediment	7				3		10	8
	Mercury – water				2			2	
	Copper[1] - water								NA
	Receiving Water Limitations[2]								NA
2023	PCBs – sediment	8						8	8
	PCBs – water				13			13	
	Mercury – sediment	8						8	8
	Mercury – water				12			12	
	Copper[1] - water								NA
	Receiving Water Limitations[2]								NA

WY 2022-2023 Totals / Required Number by End of Permit Term	Type 1: Source ID	Type 2: Bay Impairment	Type 3: Management Action	Type 4: Loads & Status	Type 5: Trends	Type 6: RWL	WY 2022-2023 Totals	Requirement for 5-Year Permit Term
PCBs	15 / 8	0 / 8	0 / 8	15 / 16	3 / 16	NA	33	65
Mercury	15 / 8	0 / 8	0 / 8	14 / 8	3 / 8	NA	32	50
Copper[1]	NA	NA	NA	0 / 5	NA	NA	0	5
Receiving Water Limitations[2]	NA	NA	NA	NA	NA	0 / 5	0	5

RWL receiving water limitations
1 Total and dissolved fractions of copper
2 Receiving water limitations analytes include: dissolved copper, zinc, and lead, hardness, *E. coli*, total nitrogen, total phosphorus, ammonia, polyaromatic hydrocarbons, temperature, pH, and specific conductance
NA not applicable; no MRP requirement applies

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3 Provision C.19 Monitoring

The following subsections summarize water year 2023 monitoring efforts and analytical results in conformance with MRP Provision C.19 requirements and include a description of the monitoring activities planned for water year 2024. For a detailed description of water year 2023 monitoring results, refer to the 2023 Annual Mercury Monitoring Report (CCCWP 2023).

3.1 Summary of Monitoring Completed in Water Year 2023

A total of nine aqueous methylmercury samples were collected in water year 2023 which exceeded the annual requirement of eight samples per Provision C.19.d.ii.(2). These nine samples will count toward the requirement of 50 aqueous methylmercury to be collected by the end of the permit term.

To determine whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods, three sampling locations were selected and targeted for sampling in the dry season of water year 2023. To investigate under what hydrologic or seasonal circumstances increased methylmercury concentrations reach the Delta, CCCWP targeted the same three locations for two wet weather events of water year 2023 where specific hydrologic conditions (reservoir overflow), or prolonged antecedent dry periods (first flush) were present. Sampling locations are presented in Table 7.

At all three locations, two wet weather and one dry weather event were successfully sampled water year 2023, for a total of nine samples. Sampling results are presented in Tables 8 and 9. Table 10 presents analytes, methods, reporting limits and holding times for samples collected.

Table 7. Methylmercury Monitoring Locations, Site Coordinates, and Location Descriptions

Site ID[1]	Latitude	Longitude	Site Description
544MSHM2	37.96264	-121.68786	Site located upstream of Brentwood WWTP
544MSHM1	37.96393	-121.68375	Site located downstream of Brentwood WWTP
544MSHM0	37.99036	-121.69591	Site located upstream of tidal boundary

1 Stations are presented in order from upstream to downstream most locations.
WWTP Brentwood wastewater treatment plant

Table 8. Wet Weather Methylmercury Monitoring Results in Marsh Creek

Site ID[1]	Date	Time	SSC (mg/L)	Total Hg (ng/L)	Total MeHg (ng/L)	MeHg to Hg Ratio (%)
544MSHM2	11/08/22	08:47	108	15	***0.22***	1.5
	02/27/23	13:30	107	21	***0.25***	1.2
544MSHM1	11/08/22	09:00	128	17	***0.25***	1.5
	02/27/23	14:00	85	17	***0.20***	1.1
544MSHM0	11/08/22	09:35	914	64	***0.57***	0.9
	02/27/23	14:24	99	26	***0.26***	1.0

Values in ***bold italics*** exceed the Delta TMDL for methylmercury of 0.06 ng/L.
1 Sites are presented in order from upstream to downstream location.
Hg mercury
MeHg methylmercury
SSC suspended sediment concentration
Note: Field measurements for dissolved oxygen were not recorded during wet weather monitoring.

Table 9. Dry Weather Methylmercury Monitoring Results in Marsh Creek

Site ID[1]	Date	Time	SSC (mg/L)	Total Hg (ng/L)	Total MeHg (ng/L)	MeHg to Hg Ratio (%)	Dissolved Oxygen (mg/l) [2]
544MSHM2	06/22/23	08:20	< 2	1.0	***0.37***	***37***	6.44
544MSHM1	06/22/23	08:35	< 2	1.0	***0.25***	***25***	6.56
544MSHM0	06/22/23	08:55	< 2	0.89	***0.22***	***25***	6.73

Values in ***bold italics*** exceed the Delta TMDL for methylmercury of 0.06 ng/L or indicate an elevated methylation ratio.
1 Sites are presented in order from upstream to downstream location
2 Dissolved oxygen values recorded as instantaneous field measurement at time of sample
Hg mercury
MeHg methylmercury
SSC suspended sediment concentration
< Analyte not detected at or above the MDL; numeric value following the "<" symbol is the associated MDL value

Table 10. Analytes, Methods, Reporting Limits, and Holding Times

Analyte	Method	Reporting Limit	Holding Time
Total (Unfiltered) Mercury	EPA 1631E	0.5 ng/L	90 days
Total (Unfiltered) Methylmercury	EPA 1630	0.05 ng/L	90 days
Suspended Sediment Concentration	ASTM D3977-97B	3 mg/L	7 days

Wet weather results from the November 8, 2022 and February 27, 2023 sampling events indicate normal mercury methylation ratios, ranging from 0.9 to 1.5 percent. Although these methylation ratios are in the normal range and do not indicate enhanced methylation, the methylmercury values which ranged from 0.20 to 0.57 ng/L were elevated above the Delta TMDL value of 0.06 ng/L at all three stations during both sampling events.

Dry weather results from the June 22, 2023 sampling event (after eutrophication set in) indicate elevated mercury methylation ratios, ranging from 25 to 37 percent. These high methylation ratios suggest eutrophication contributes to elevated methylmercury concentrations. Methylmercury concentrations at all three monitoring stations ranged from 0.22 to 0.37 ng/L and exceeded the Delta TMDL of 0.06 ng/L.

3.2 Monitoring Planned for Water Year 2024

MRP Provision C.19.d.ii.(2)(e) states the following:

> *By January 1, 2024, address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March and mid-November), and, if so:*
>
> *(i) Under what hydrologic or seasonal circumstances do increased methylmercury concentrations reach the Delta?*
>
> *(ii) Are there reasonable and foreseeable management actions to ameliorate increased methylmercury concentrations?*

As flow conditions required to fulfill data gaps to address these monitoring questions were not present during water year 2023, CCCWP will target another round of dry weather sampling in Marsh Creek in the spring of 2024. As this sample date falls after the proposed deadline of January 1, 2024, CCCWP will prioritize this sampling and report results with the 2024 Annual Mercury Monitoring Report.

Additionally, beginning in water year 2024, CCCWP will commence mercury and methylmercury monitoring in the West Delta and Central Delta subareas to address the monitoring questions in MRP 3.0 Provisions C.19.d.ii.(2)(a)-(b), as detailed in the Annual Mercury Monitoring Plan prepared for the CVRWQCB (Appendix 6).

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4 References

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Appendix 4

Pollutants of Concern Receiving Water Limitations Monitoring Plan Addendum

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Receiving Water Limitations Assessment Report Addendum

Demonstration of the Representativeness of the Selected Monitoring Locations

Submitted in compliance with Provision C.8.h.iv of National Pollutant Discharge Elimination System (NPDES) Permit No. CAS612008, Order No. R2-2022-0018

Submitted by

Alameda Countywide Clean Water Program (ACCWP)
Contra Costa Clean Water Program (CCCWP)
Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)

March 31, 2024

FINAL

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
CCCWP	Contra Costa Clean Water Program
MP	Monitoring plan
MRP	Municipal Regional Stormwater Permit
NPDES	National Pollutant Discharge Elimination System
PAH	Polycyclic aromatic hydrocarbon
RWL	Receiving water limitations
RWL MP	Receiving Water Limitations Monitoring Plan
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program

1. INTRODUCTION

This *Receiving Water Limitations Assessment Report – Demonstration of the Representativeness of the Selected Monitoring Locations* was prepared collaboratively by the Alameda Countywide Clean Water Program (ACCWP), the Contra Costa Clean Water Program (CCCWP), the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (Water Board; Order No. R2-2022-0018)[1].

MRP Permittees are required to develop and implement a plan for monitoring receiving waters (creeks and rivers that flow to San Francisco Bay) to provide information to assess whether receiving water limitations (RWLs) are achieved. Per MRP Provisions C.8.f and C.8.h.iv, the monitoring program should assess "the potential that discharges of these analytes may result in levels in receiving waters approaching or exceeding water quality objectives and the basis of the determination." The RWL monitoring methods must include the following attributes:

- Collection and analysis of analytes during the wet season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by urban stormwater runoff.
- Collection and analysis of analytes during the dry season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by dry season urban runoff.
- Sampling locations for RWLs assessment monitoring shall be spatially and temporally representative of the sampled waterbody. Sampled waterbodies shall be representative of the range of receiving waterbody types.

The MRP Permittees collectively developed and submitted a Receiving Water Limitations Assessment Report on March 31, 2023, as required by Provision C.8.h.iv.(2) of the MRP. The Receiving Water Limitations Assessment Report, herein referred to as the RWL Monitoring Plan (MP or RWL MP), provided the following information:

- Relevant water quality objectives against which to compare monitoring data;
- Analytes in addition to those listed in MRP Provision C.8 Table 8.2 to monitor based on assessment of the potential that discharges of these analytes may result in levels in receiving waters approaching or exceeding water quality objectives and the basis of the determination;

[1] SFBRWQCB. 2022. San Francisco Region Water Quality Municipal Regional Stormwater NPDES Permit. Order R2-2022-0018, NPDES Permit No. CAS612008

- Identification of waterbodies to be sampled, sampling locations within those waterbodies, and the basis for which those waterbodies were selected (i.e., watershed size, percent impervious watershed area, percent developed, presence of upstream impoundment, availability of prior water quality monitoring data); and
- Sampling schedule consistent with the requirements in MRP Tables 8.1 and 8.2.

On June 12, 2023, the SFBRWQCB Executive Officer issued a letter of Conditional Approval of the RWL MP (Conditional Approval Letter). The Conditional Approval Letter stated that approval of the RWL MP is subject to two conditions:

1. Inclusion of polycyclic aromatic hydrocarbons (PAHs) in the analyte list, and
2. Demonstration of the representativeness of the selected monitoring locations submitted with the March 2024 Urban Creeks Monitoring Report.

To address the first condition, MRP Permittees have augmented the analyte list to include PAHs. This change will be reflected in the Pollutants of Concern Monitoring Reports submitted annually with the Urban Creeks Monitoring Reports on March 31. To address the second condition, MRP Permittees identified and characterized watersheds in Alameda, Contra Costa, San Mateo, and Santa Clara counties that drain to San Francisco Bay and compared them to the selected monitoring locations. The purpose of this report addendum is to present this watershed characterization approach and results and to demonstrate the representativeness of the four selected monitoring locations.

2. BACKGROUND

Table 8.1 of MRP Provision C.8.f requires Permittees to choose "sampling locations for RWLs assessment monitoring spatially and temporally representative of the sampled waterbody. Sampled waterbodies shall be representative of the range of receiving waterbody types." As explained in the RWL MP, each of the four Countywide Stormwater Programs selected a single sampling location for RWL monitoring within their respective county, for a total of four sites. The proposed receiving water bodies include Castro Valley Creek, Walnut Creek, San Mateo Creek, and Saratoga Creek. These sites were selected as representative based on a combination of watershed size, percent developed, percent imperviousness, and channel type. Additional considerations included the existence of upstream impoundments, the availability of existing monitoring data, and the presence of flow gauges within the watershed.

The site selection process involved identification of potential sites within each County that were safe, feasible, and accessible to monitor under high and low flow conditions. The candidate sites were then sorted into a 2x2 matrix showing watershed size and percent developed so that a variety of watershed types were represented regionally. Watershed size and percent developed were based on USGS StreamStats[2] delineations, which was based on the 2011 suite of the National Land Cover Database (NLCD) products[3]. Table 1 shows the matrix with selected sites indicated in red font.

Table 1. RWL Monitoring Site Selection Matrix

	Watershed Size (sq mi)	
% Developed	**<25 sq mi**	**>25 sq mi**
≤50%	Alhambra Creek	Arroyo Mocho
	Crow Creek	Coyote Creek
	Rodeo Creek	Mt. Diablo Creek
	Saratoga Creek	San Francisquito Creek (lower)
	Stevens Creek	San Francisquito Creek (upper)
	Wildcat Creek	San Lorenzo Creek
		San Mateo Creek
		San Pablo Creek
>50%	Castro Valley Creek	Guadalupe River
	Cerrito Creek	Lower Silver Creek
	Colma Creek	San Ramon Creek
	Grayson Creek	Walnut Creek
	Kirker Creek	
	Line A - Hayward Industrial Storm Drain	

The Conditional Approval Letter asserted that the "representativeness of the four proposed creeks is questionable since they have predominately suburban watersheds with low to moderate percent impervious area."

In meetings held in December 2023, and January 2024, Countywide Stormwater Program and Permittee representatives and Water Board staff agreed upon a method to conduct the watershed characterization and evaluate representativeness. The following subsections describe the approach and the results of this regional and countywide watershed analysis, including a list of watersheds represented by the selected four monitoring sites and a list of other watersheds not well represented, as required in the Conditional Approval Letter.

3. METHODS

Each Countywide Stormwater Program identified watersheds in their respective counties that drain to San Francisco Bay, herein referred to as the *baseline watersheds*, for a total of 145 watersheds region wide. The watershed data sources for each county are provided in Table 2.

[2] https://www.usgs.gov/streamstats
[3] https://www.usgs.gov/centers/eros/science/national-land-cover-database

As described in the RWL MP, each of the four Countywide Stormwater Programs selected a single sampling location for RWL monitoring within their respective county, for a total of four sites. The catchment areas to the selected monitoring locations, herein referred to as the *monitored watersheds*, were delineated using USGS StreamStats[4]. The baseline and monitored watersheds are shown on Figure 1.

Table 2. Baseline Watershed Data Sources

County	Number of Watersheds	Data Source
Alameda	54	Alameda County Watershed Map, Alameda County Resource Conservation District[1]
Contra Costa	26	Contra Costa County Watershed Atlas, Contra Costa County Public Works[2]
San Mateo	28	County of San Mateo
Santa Clara	37	Valley Water
Total	**145**	

1. https://acrcd.org/projects/alameda-county-watershed-map/
2. https://www.cccleanwater.org/userfiles/kcfinder/files/Watershed%20Atlas.pdf

Collectively, the Countywide Stormwater Programs and Water Board staff agreed that the key watershed attributes to assess representativeness are watershed size, percent developed, and percent impervious. These attributes can be estimated and compared regionally and are likely correlated to water quality in the receiving waters. Percent developed and percent impervious were calculated for the baseline and monitored watersheds using the 2021 suite of the National Land Cover Database (NLCD) products[5]. The results were compared regionally and countywide and are presented in tabular and graphical summaries in the next sections.

[4] https://streamstats.usgs.gov/ss/
[5] https://www.usgs.gov/centers/eros/science/national-land-cover-database

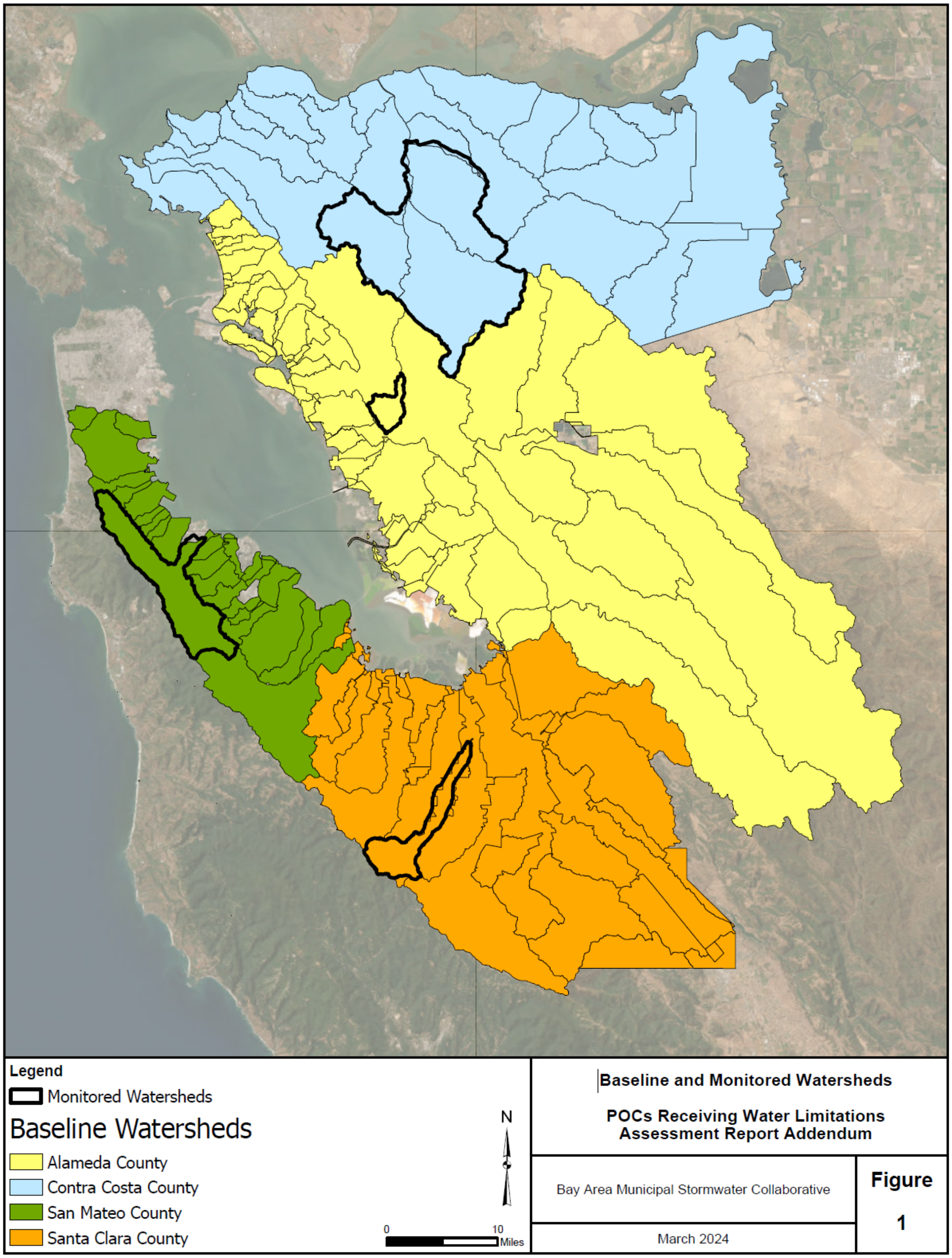


Figure 1. Baseline and Monitored Watersheds in Alameda, Conta Costa, San Mateo, and Santa Clara Counties

4. RESULTS

4.1 Watershed Characteristics

4.1.1 Baseline Watersheds

Summary statistics for the baseline watersheds are provided in Table 3 and Table 4, respectively, for the four counties collectively and individually.

Table 3. Baseline Watershed Characteristics for Alameda, Conta Costa, San Mateo, and Santa Clara Counties Combined

Attribute	Min	25th Percentile	Median	75th Percentile	Max
Watershed Size (sq mi)	0.03	2.1	5.7	21.2	167.8
Developed (%)	0.0	42.4	80.6	97.4	100
Impervious (%)	0.04	17.6	37.7	56.5	90.9

Table 4. Baseline Watershed Characteristics by Individual County

Attribute	Min	25th Percentile	Median	75th Percentile	Max
ALAMEDA COUNTY					
Watershed Size (sq mi)	0.05	1.7	3.5	15.3	167.8
Developed (%)	0.15	46.9	92.5	98.9	100
Impervious (%)	0.04	24.1	52.2	67.7	90.9
CONTRA COSTA COUNTY					
Watershed Size (sq mi)	2.8	10.4	17.9	38.2	87.9
Developed (%)	2.5	25.2	47.9	77.3	95.4
Impervious (%)	0.35	9.2	20.4	37.9	58.8
SAN MATEO COUNTY					
Watershed Size (sq mi)	0.24	1.4	3.3	5.1	45.5
Developed (%)	0.0	65.2	87.7	94.6	99.4
Impervious (%)	0.77	27.9	39.4	53.5	64.4
SANTA CLARA COUNTY					
Watershed Size (sq mi)	0.03	1.2	8.9	21.9	55.0
Developed (%)	3.1	42.5	72.6	95.4	99.6
Impervious (%)	0.42	19.7	33.1	50.6	67.4

4.1.2 Monitored Watersheds

A summary of the size, percent developed, and percent impervious for the monitored watersheds is provided in Table 5.

Table 5. Monitored Watershed and Associated Characteristics

County	Creek Name	Watershed Size (sq mi)	Developed (%)	Impervious (%)
Alameda	Castro Valley Creek	5.5	90.2	49.3
Contra Costa	Walnut Creek	116.6	53.8	18.7
San Mateo	San Mateo Creek	33.3	20.6	6.6
Santa Clara	Saratoga Creek	16.7	49.4	22.5

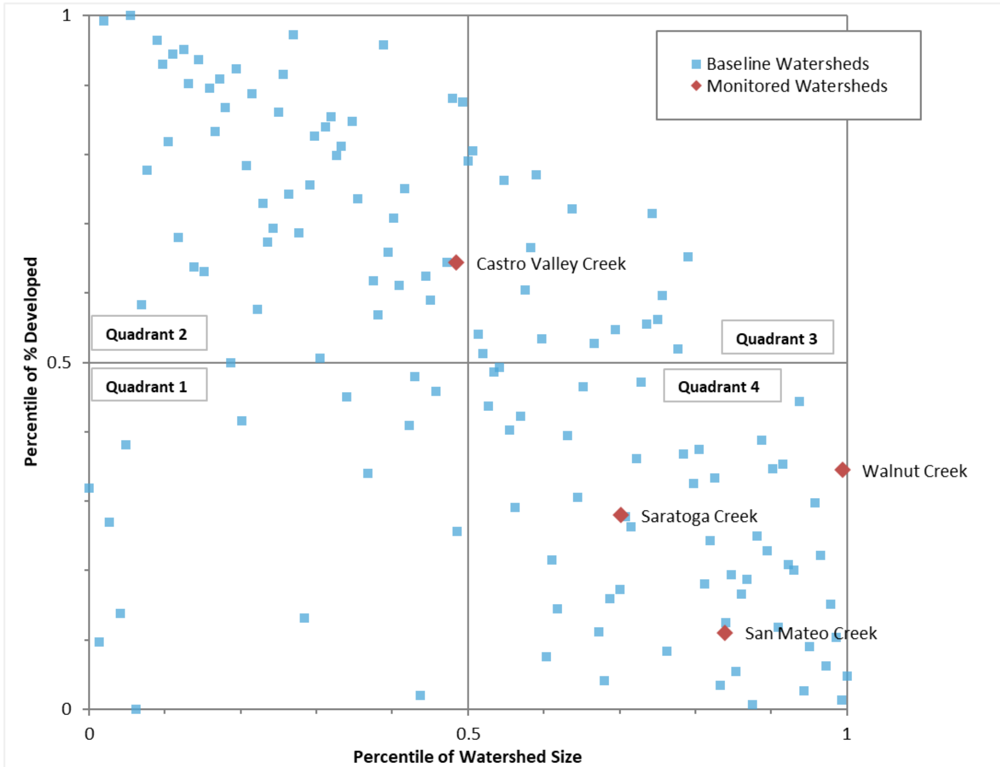
4.2 Regional Comparison

This section presents a regional comparison of the monitored watersheds to the baseline watersheds for the three selected attributes. A scatterplot showing the relationship between watershed size versus percent developed and watershed size versus percent impervious for the baseline and monitored watersheds is shown in Figure 2. To standardize the comparison, the percentile, rather than the value, is plotted. The median value (see Table 3 for the median values) for each attribute is used to group the data into quadrants.

A description of the quadrants of the number of baseline watersheds in each quadrant is summarized in Table 6. The comparison shows a negative association between watershed size versus percent developed and percent impervious (i.e., more watersheds are in Quadrants 2 and 4 compared to Quadrants 1 and 3). This negative relationship is expected since larger watersheds typically include more undeveloped areas in the upper reaches of the watershed. Three of the four monitored watersheds are also in Quadrant 4. Only Castro Valley Creek is in Quadrant 2.

Table 6. Summary of Watershed Grouping for Alameda, Conta Costa, San Mateo, and Santa Clara Counties Combined

Quadrant No.	Quadrant Description (median values from Table 2)		Number of Baseline Watersheds	
	Watershed Size	Percent Developed or Percent Impervious	Watershed Size vs. Percent Developed	Watershed Size vs. Percent Impervious
1	< 5.7 sq mi	< 81% developed or 38% impervious	18	18
2	< 5.7 sq mi	> 81% developed or 38% impervious	55	55
3	> 5.7 sq mi	> 81% developed or 38% impervious	17	17
4	> 5.7 sq mi	< 81% developed or 38% impervious	55	55



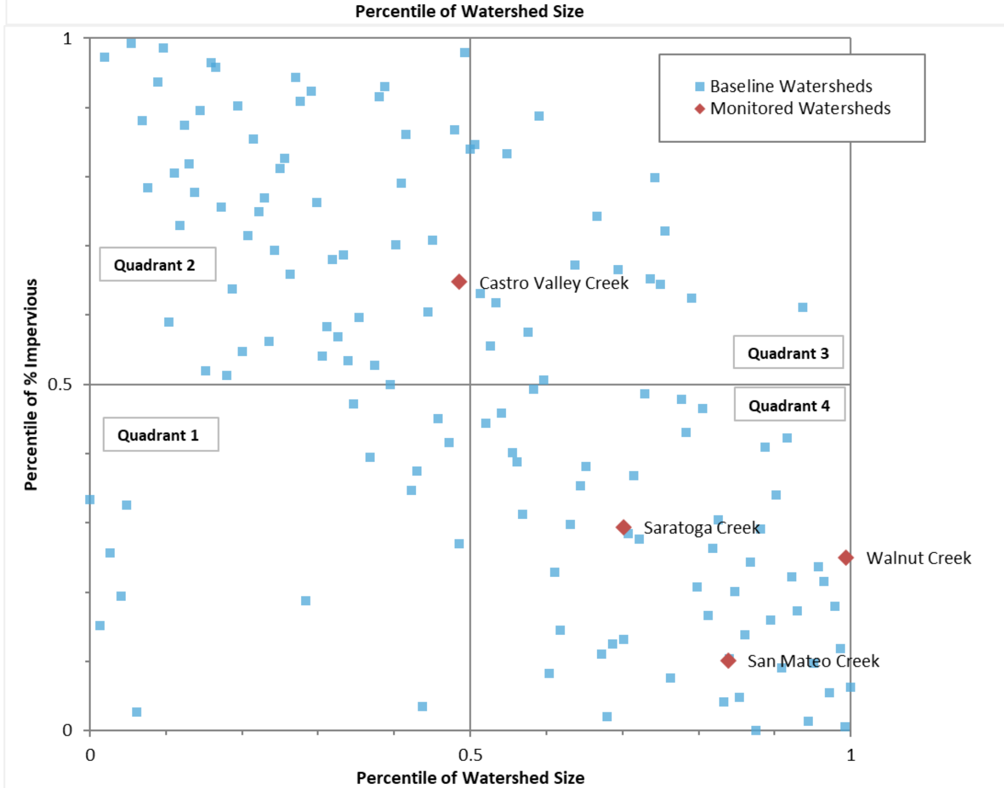


Figure 2. Regional Comparison of Watershed Size vs Percent Developed (top) and Percent Impervious (bottom)

4.3 Countywide Comparison

This section presents the countywide comparison of the monitored watershed to the baseline watersheds within each of the individual four counties. Scatterplots showing the relationship between watershed size versus percent developed and watershed size versus percent impervious are shown in Figures 3 to 6. Like the regional comparison, the percentile, rather than the value, is plotted. The median value for each attribute is used to group the data into quadrants.

A description of the quadrants and the number of baseline watersheds in each quadrant is summarized in Table 7. The comparison shows a negative association between watershed size versus percent developed and percent impervious from some counties (e.g., Alameda County) but not others (e.g., San Mateo). Each of the monitored watersheds fall within Quadrant 4 of their respective counties, except for Walnut Creek in Contra Costa County for watershed size versus percent developed.

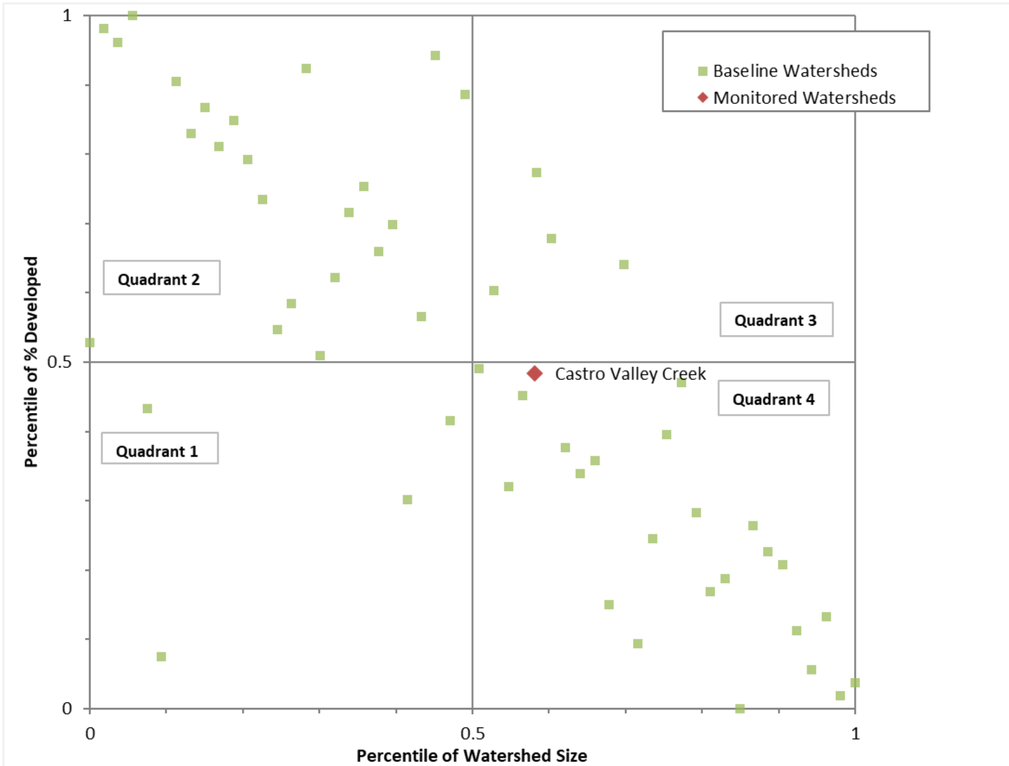
Table 7. Summary of Watershed Grouping by Individual County

Quadrant No.	Quadrant Description (median values from Table 3)		Number of Baseline Watersheds	
	Watershed Size	Percent Developed or Percent Impervious	Watershed Size vs. Percent Developed	Watershed Size vs. Percent Impervious
ALAMEDA COUNTY				
1	< 3.5 sq mi	< 92% developed or 52% impervious	4	7
2	< 3.5 sq mi	> 92% developed or 52% impervious	23	20
3	> 3.5 sq mi	> 92% developed or 52% impervious	4	7
4	> 3.5 sq mi	< 92% developed or 52% impervious	23*	20*
CONTRA COSTA COUNTY				
1	< 17.9 sq mi	< 48% developed or 20% impervious	6	5
2	< 17.9 sq mi	> 48% developed or 20% impervious	7	8
3	> 17.9 sq mi	> 48% developed or 20% impervious	6*	5
4	> 17.9 sq mi	< 48% developed or 20% impervious	7	8*
SAN MATEO COUNTY				
1	< 3.3 sq mi	< 88% developed or 39% impervious	6	5
2	< 3.3 sq mi	> 88% developed or 39% impervious	8	9
3	> 3.3 sq mi	> 88% developed or 39% impervious	6	5
4	> 3.3 sq mi	< 88% developed or 39% impervious	8*	9*

Quadrant No.	Quadrant Description (median values from Table 3)		Number of Baseline Watersheds	
	Watershed Size	Percent Developed or Percent Impervious	Watershed Size vs. Percent Developed	Watershed Size vs. Percent Impervious
SANTA CLARA COUNTY				
1	< 8.9 sq mi	< 73% developed or 33% impervious	7	7
2	< 8.9 sq mi	> 73% developed or 33% impervious	12	12
3	> 8.9 sq mi	> 73% developed or 33% impervious	6	6
4	> 8.9 sq mi	< 73% developed or 33% impervious	12*	12*

Notes:
*Quadrant of the monitored watershed within the county.

A list of the individual watersheds along with the associated attributes and quadrant number is provided for each county in Appendix A. Watersheds in the same quadrant as the monitored watershed may be represented by the monitored watershed. Watersheds in the other three quadrants may not be well represented by the monitored watershed.



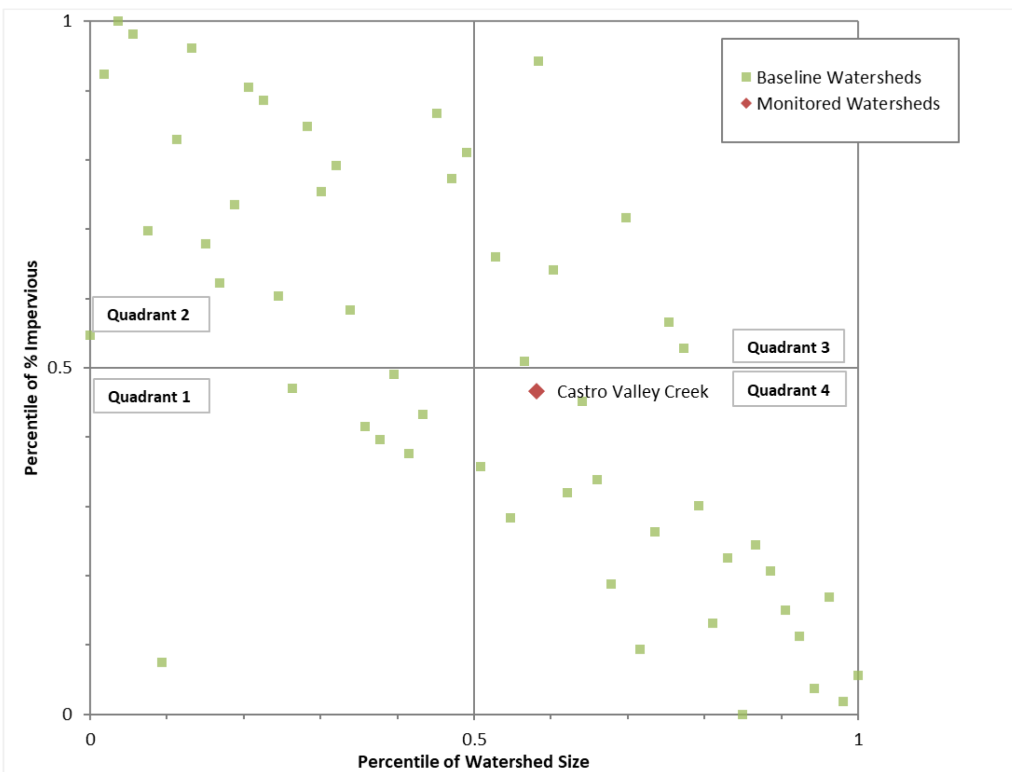
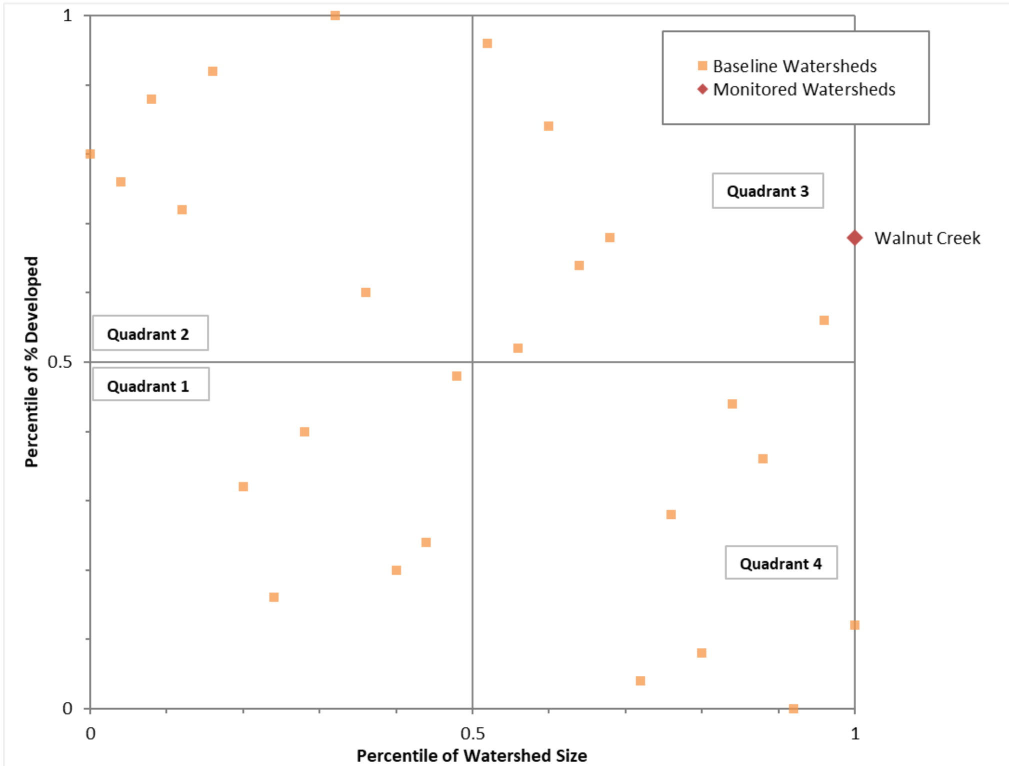


Figure 3. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for Alameda County



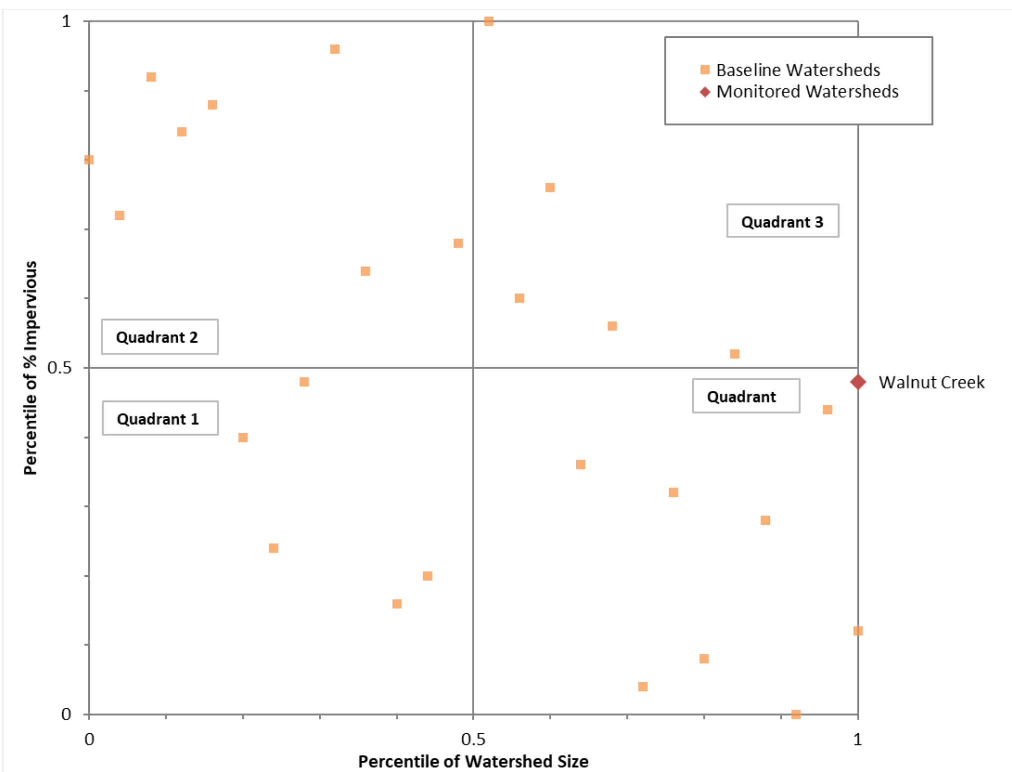


Figure 4. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for Contra Costa County

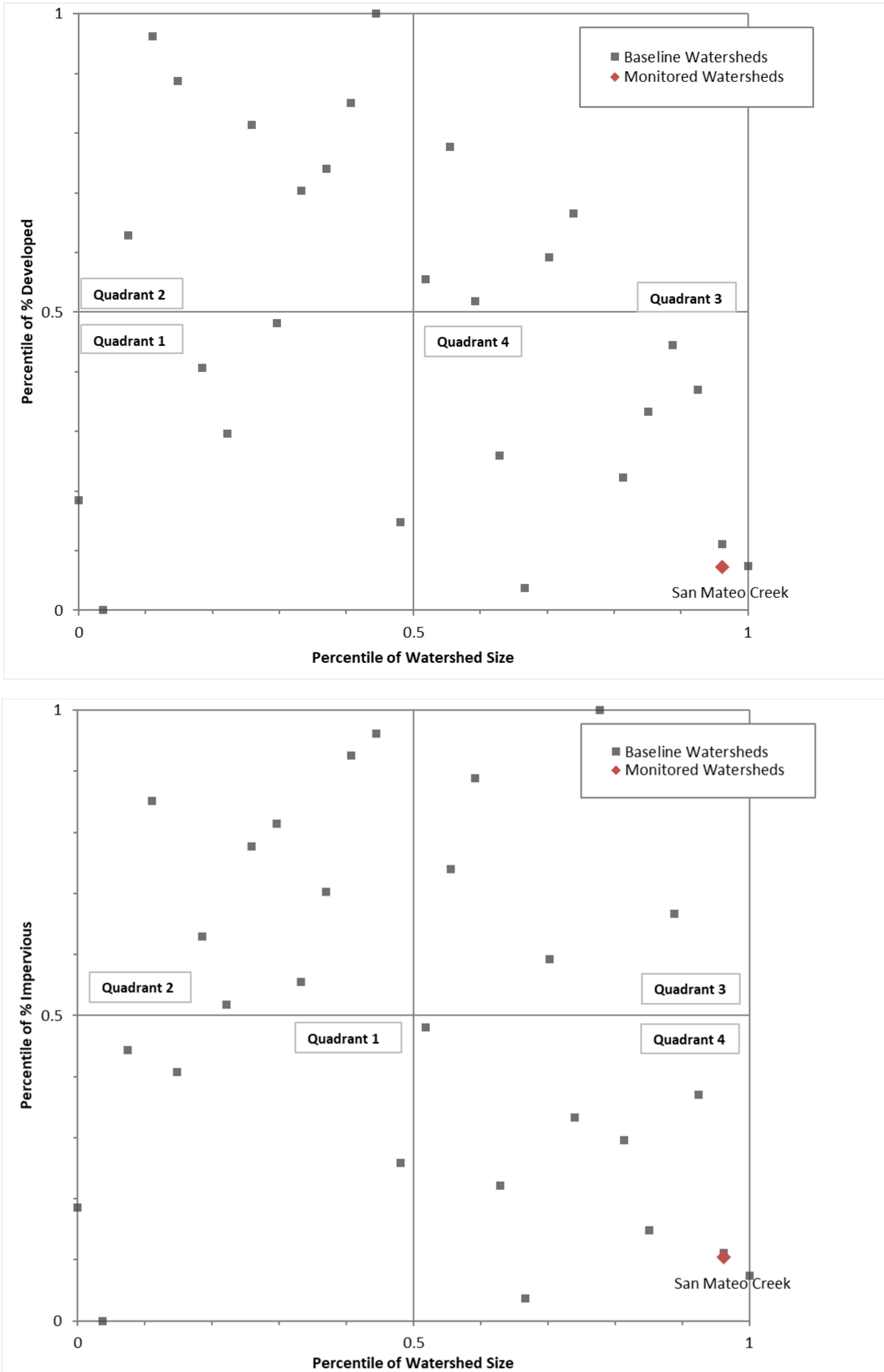
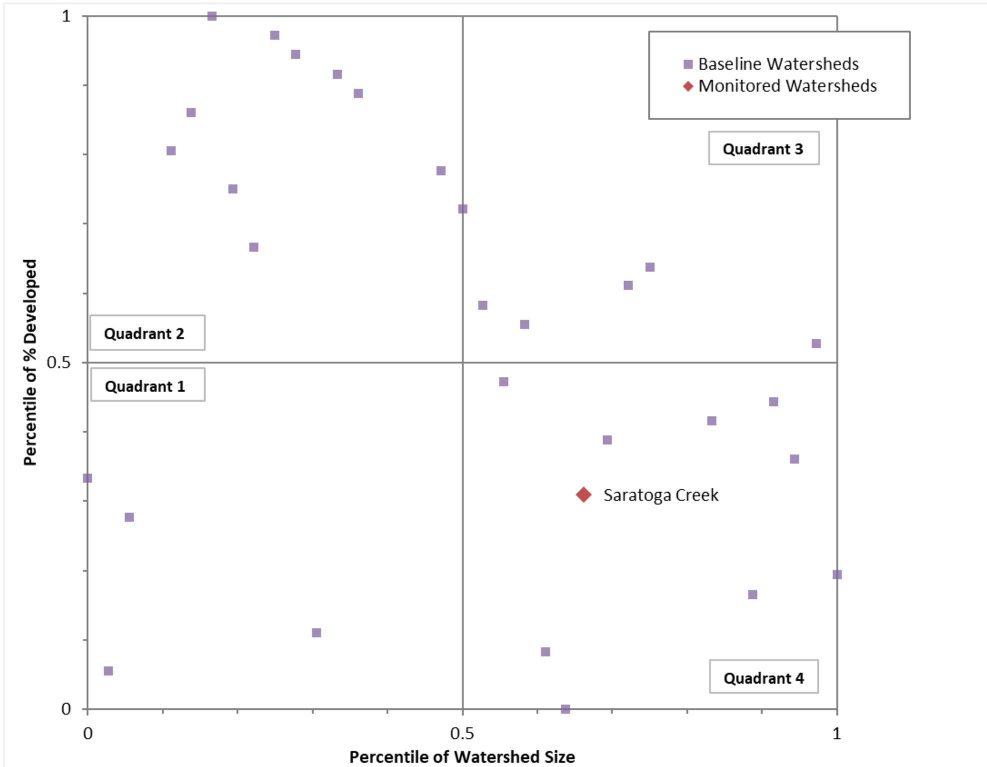


Figure 5. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for San Mateo County



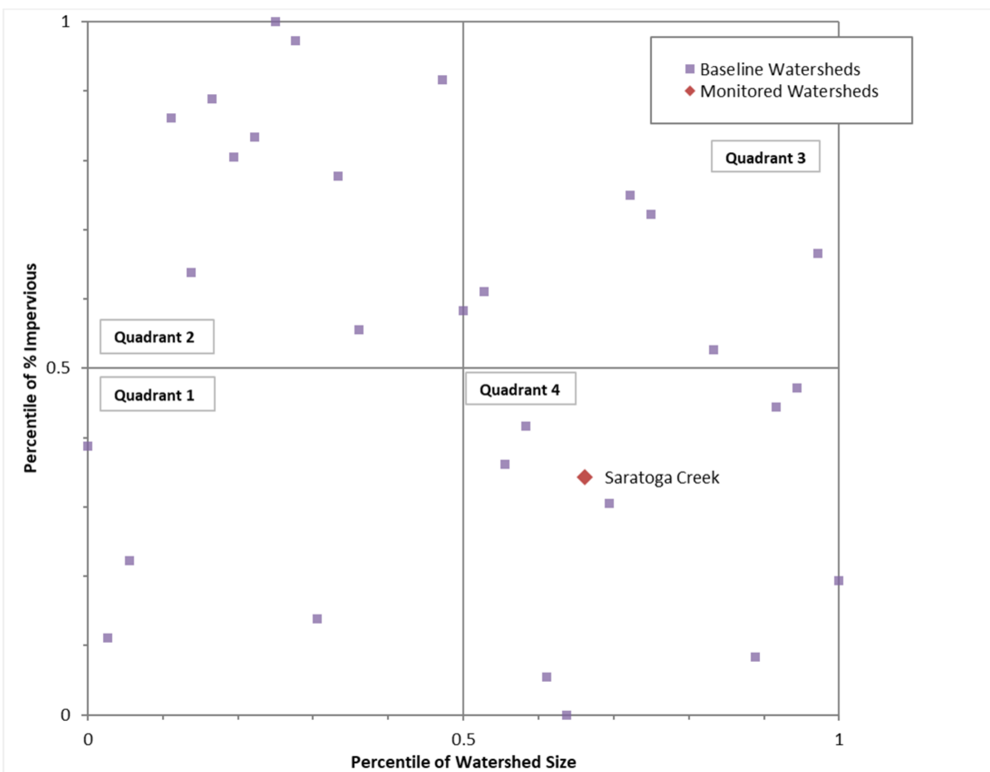


Figure 6. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for Santa Clara County

5. SUMMARY AND NEXT STEPS

The watershed analysis presented herein demonstrates the representativeness of the four selected POCs RWL monitoring locations regionally and within an individual county. The resultant quadrant grouping shown in Figure 2 (regional) and Figures 3 to 6 (countywide) and detailed in Appendix A addresses the requirement to provide a list of creeks that are represented by the chosen four and a list of creeks that are not well represented. Future site selection will consider watersheds that are safe, feasible, and accessible to monitor and will be determined through discussions with the Regional Water Board.

The Countywide Stormwater Programs will continue to conduct POCs RWL monitoring per MRP Provision C.8.f and the RWL MP, through WY2024 and WY2025. The Countywide Stormwater Programs will also work towards meeting the March 31, 2026, reporting requirements specified in the MRP and the Letter of Conditional Approval of the RWL MP:

- MRP Provision C.8.h.iv.(2)(c): *By no later than March 31, 2026, or as part of the Integrated Monitoring Report, Permittees will submit an updated Receiving Water Limitations Assessment Report with proposed monitoring to be conducted during the next permit term*.
- Letter of Conditional Approval of the RWL MP: *Permittees must evaluate the representativeness of the waterbodies included in the Report by including in the March 31, 2026, Integrated Monitoring Report required by Provision C.8.h.iv (2)(c), a statistical evaluation of RWL data. Specifically, Permittees shall compare data collected for all RWL analytes to all available data for the same county and analyte collected during the last 10 years. Data distributions should be presented in tabular (distribution summary statistics like minimum, maximum, mean, median, and percentiles) and graphical form (e.g., data density plots, histograms, box and whisker plots, etc.). Graphical data distributions should indicate (e.g., using color and/or symbol shape) the individual waterbodies and sampling locations so that the RWL data can be clearly discerned in the distributions.*

APPENDIX A
List of Watersheds, Watershed Attributes, and Quadrant Groupings

SUMMARY

Per the Letter of Conditional Approval of the RWL MP, MRP Permittees must provide a list of creeks that are represented by the chosen four monitoring sites and a list of other creeks that are not well represented. To address this requirement, Table A-1 lists the monitored watersheds and resultant quadrant grouping in the regional and countywide comparison; Table A-2 lists the baseline watersheds in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the associated watershed attributes and resultant quadrant grouping in the regional and countywide comparison.

The watershed attributes – size, percent developed, and percent impervious – are shaded to show relative differences. Small, medium, and large sized watersheds, for example, are shaded white, yellow, and green, respectively. Shading is relative to each attribute within the applicable county.

Baseline watersheds in the same quadrant as the monitored watershed are represented by the monitored watershed. Baseline watersheds in the other three quadrants may not be well represented by the monitored watershed. See Figure 2 (regional) Figures 3 to 6 (countywide) in the main report for a graphical representation.

Table A-1. Monitored Watersheds and Resultant Quadrant Grouping

County	Creek Name	Regional Comparison		Countywide Comparison	
		Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
Alameda	Castro Valley Creek	2	2	4	4
Contra Costa	Walnut Creek	4	4	3	4
San Mateo	San Mateo Creek	4	4	4	4
Santa Clara	Saratoga Creek	4	4	4	4

Watershed Name	Size[1] (sq mi)	% Developed[1]	% Impervious[1]	Quadrant Number			
				Regional Comparison		Countywide Comparison	
				Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
ALAMEDA COUNTY							
Agua Fria Watershed (Alameda)	8.1	50.9	29.6	4	4	4	4
Alameda Creek Watershed	11.9	52.0	27.5	4	4	4	4
Alamo Canal Watershed	43.8	53.9	26.7	4	4	4	4
Arroyo de la Laguna Watershed	29.3	28.9	10.9	4	4	4	4
Arroyo del Valle Watershed	167.8	4.5	1.7	4	4	4	4
Arroyo Hondo Watershed	99.2	1.1	0.1	4	4	4	4
Arroyo Las Positas Watershed	80.7	22.8	12.0	4	4	4	4
Arroyo Mocho Canal Watershed	38.9	29.1	16.5	4	4	4	4
Arroyo Mocho Watershed	53.6	13.4	6.3	4	4	4	4
Arroyo Viejo Watershed	6.2	82.7	33.3	3	4	4	4
Bay Farm Island Watershed	3.2	96.5	45.4	2	2	2	1
Bockman Canal Watershed	2.8	98.5	56.8	2	2	2	2
Cerrito Creek Watershed	3.1	98.3	51.2	2	2	2	1
Codornices Creek Watershed	2.9	98.8	44.6	2	2	2	1
Crandall Creek Watershed	6.5	80.0	46.7	4	3	4	4
Dry Creek Watershed	9.9	10.3	5.2	4	4	4	4
Elmhurst Creek Watershed	2.6	100.0	74.3	2	2	2	2
Estudillo Canal Watershed	9.4	97.7	66.9	3	3	3	3
Gilman Street Watershed	0.5	99.9	73.0	2	2	2	2
Glen Echo Creek Watershed	2.6	96.9	50.0	2	2	2	1
Hayward Landing Watershed	3.4	86.0	68.5	2	2	1	2
Indian Gulch/Pleasant Valley Creek Watershed	3.0	98.1	42.7	2	2	2	1
Johnson Landing Watershed	0.3	86.9	65.7	2	2	1	2
Laguna Creek Watershed	25.1	58.3	33.0	4	4	4	4
Line J-2 Watershed	1.8	96.2	57.1	2	2	2	2
Lion Creek Watershed	3.5	91.1	37.7	2	1	4	4
Lower Sulphur Creek Watershed	2.7	97.5	68.9	2	2	2	2
Mowry Slough Watershed	13.0	83.5	55.9	3	3	4	3
Mt Eden Creek Watershed	0.7	99.5	79.1	2	2	2	2
Newark Slough Watershed	4.8	88.1	53.3	2	2	4	3
North Alameda Watershed	3.4	99.8	70.0	2	2	2	2
Oakland Estuary Watershed	5.6	99.1	79.0	2	2	3	3
Old Alameda Creek Watershed	22.0	88.3	54.8	3	3	4	3
Oyster Point Watershed	1.2	99.3	77.1	2	2	2	2
Peralta Creek Watershed	5.7	98.1	62.7	3	3	3	3
Plummer Creek Watershed	2.6	93.8	67.4	2	2	2	2
Point Isabel Watershed	0.1	100.0	77.3	2	2	2	2
Potter and Derby Creeks Watershed	3.9	97.3	63.8	2	2	3	3
Powell Street Watershed	0.2	100.0	81.0	2	2	2	2
San Antonio Creek Watershed	39.5	0.1	0.0	4	4	4	4
San Leandro Bay Watershed	1.3	98.6	76.6	2	2	2	2
San Leandro Creek Watershed	49.4	30.5	12.0	4	4	4	4
San Leandro Marina Watershed	1.2	99.5	67.1	2	2	2	2
San Lorenzo Creek Watershed	48.3	31.7	15.2	4	4	4	4
Sausal Creek Watershed	4.2	79.4	29.2	1	1	4	4
Schoolhouse Creek Watershed	1.0	99.7	65.2	2	2	2	2
Southwest Alameda Watershed	1.0	99.3	61.4	2	2	2	2
Strawberry Creek Watershed	3.1	75.1	39.2	1	2	1	1
Temescal Creek Watershed	6.7	80.3	34.7	4	4	4	4
Upper Alameda Creek Watershed	73.8	4.7	1.6	4	4	4	4
West Albany Hill Watershed	0.1	94.3	55.6	2	2	2	2
West Coyote Hills Watershed	0.4	4.7	2.2	1	1	1	1
West Oakland bayshore Watershed	0.2	100.0	90.9	2	2	2	2
West Oakland Watershed	3.2	100.0	76.5	2	2	2	2

Watershed Name	Size[1] (sq mi)	% Developed[1]	% Impervious[1]	Quadrant Number			
				Regional Comparison		Countywide Comparison	
				Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
CONTRA COSTA COUNTY							
Alhambra Creek	16.70	25.5	8.5	4	4	1	1
Baxter / Cerrito Richmond Drainages	18.49	95.0	58.8	3	3	3	3
Brushy Creek	38.18	4.5	1.6	4	4	4	4
Carquinez Straits Drainages	10.27	32.0	15.8	4	4	1	1
Concord	8.67	89.0	44.4	3	3	2	2
East Antioch Creek	11.35	95.4	50.9	3	3	2	2
East County Delta Drainages	87.90	16.7	8.0	4	4	4	4
Garrity Creek	6.02	85.3	48.0	3	3	2	2
Grayson Creek / Murderers Creek	23.99	83.1	37.2	3	4	3	3
Kellogg Creek	32.61	3.0	0.9	4	4	4	4
Kirker Creek	17.36	45.4	27.7	4	4	1	2
Las Trampas Creek	26.91	53.4	13.7	4	4	3	4
Lower Marsh Creek	42.29	43.5	22.2	4	4	4	3
Mt. Diablo Creek	38.16	29.5	13.1	4	4	4	4
Peyton Slough	6.41	72.7	40.2	4	3	2	2
Pine Creek / Galindo Creek	31.46	53.5	23.8	4	4	3	3
Pinole Creek	15.17	24.2	8.4	4	4	1	1
Refugio Creek	4.87	75.7	33.9	1	1	2	2
Rheem Creek	2.80	82.2	40.2	2	2	2	2
Rodeo Creek	10.40	22.0	9.5	4	4	1	1
San Pablo Creek	43.59	33.0	10.8	4	4	4	4
San Ramon Creek	54.03	51.2	15.8	4	4	3	4
Upper Marsh Creek	51.46	2.5	0.4	4	4	4	4
West Antioch Creek	12.79	52.9	27.7	4	4	2	2
Wildcat Creek	10.97	38.3	18.7	4	4	1	1
Willow Creek and Coastal Drainages	23.58	50.5	25.5	4	4	3	3
SAN MATEO COUNTY							
ATHERTON CHANNEL	8.19	71.7	23.9	4	4	4	4
BAY SLOUGH	0.28	0.0	0.8	1	1	1	1
BELMONT CANAL	1.36	80.6	48.0	1	2	1	2
BELMONT CREEK	3.32	89.4	38.6	2	2	3	4
BELMONT SLOUGH	1.40	69.3	40.2	1	2	1	2
BOREL CREEK	2.23	99.0	60.0	2	2	2	2
BROADMOOR	2.51	99.4	61.5	2	2	2	2
COLMA CREEK	16.49	85.4	50.6	3	3	4	3
CORDILLERAS CREEK	4.04	68.6	27.2	1	1	4	4
EASTON CREEK	1.35	99.0	38.2	2	2	2	1
EL PORTAL CREEK	1.34	99.4	56.7	2	2	2	2
EL ZANJON CREEK	2.03	93.8	51.3	2	2	2	2
GREENWOOD DRAINAGE	1.19	89.8	38.5	2	2	2	1
GUADALUPE VALLEY	3.24	53.7	30.0	1	1	1	1
GUANOLD	0.24	59.9	25.6	1	1	1	1
HIGHLINE CREEK	5.13	99.1	64.4	2	2	3	3
LAUREL CREEK	4.69	89.5	46.5	2	2	3	3
MILLS CREEK	1.43	98.0	53.8	2	2	2	2
PULGAS CREEK	2.02	92.0	42.5	2	2	2	2
RAVENSWOOD SLOUGH	7.47	64.1	30.5	4	4	4	4
REDWOOD CREEK	18.28	78.4	37.3	4	4	4	4
SAN BRUNO CREEK	3.83	89.1	58.7	2	2	3	3
San Francisquito Creek	45.52	20.8	5.3	4	4	4	4
SAN MATEO CREEK	33.49	20.9	6.8	4	4	4	4
SANCHEZ CREEK	5.12	90.2	31.9	2	1	3	4
SEAL CREEK	3.74	94.8	52.9	2	2	3	3
SEAL SLOUGH	1.77	86.3	56.3	2	2	1	2
STEINBERGER SLOUGH	4.41	2.2	0.9	1	1	4	4

Watershed Name	Size[1] (sq mi)	% Developed[1]	% Impervious[1]	Quadrant Number			
				Regional Comparison		Countywide Comparison	
				Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
SANTA CLARA COUNTY							
Adobe Creek Watershed	11.18	61.8	23.1	4	4	4	4
Alamitos Creek Watershed	38.41	24.2	8.7	4	4	4	4
Barron Creek Watershed	3.11	98.9	36.9	2	1	2	2
Calabazas Creek Watershed	20.41	85.7	48.8	3	3	3	3
Canoas Creek Watershed	18.31	85.6	50.0	3	3	3	3
Coast Casey Forebay Watershed	1.39	99.5	67.4	2	2	2	2
Cooley Landing Watershed	0.33	97.8	58.1	2	2	2	2
Coyote Creek Watershed	45.71	56.4	32.6	4	4	4	4
East Palo Alto Watershed	0.85	99.6	58.9	2	2	2	2
Fisher Creek Watershed	14.20	20.8	7.5	4	4	4	4
Fisher/West little Llagas Creek Watershed	0.98	93.2	55.1	2	2	2	2
Flood Slough Watershed	8.87	91.8	37.6	3	4	2	2
Fremont Airport Watershed	0.05	15.7	9.7	1	1	1	1
Golf Course Watershed	0.68	98.4	44.8	2	2	2	2
Guadalupe Creek Watershed	50.72	73.2	46.7	4	3	3	3
Juniper Serra Channel Watershed	1.51	99.3	63.1	2	2	2	2
Llagas Creek Watershed	14.46	3.1	0.4	4	4	4	4
Los Gatos Creek Watershed	54.99	32.1	14.5	4	4	4	4
Lower Penitencia Creek Watershed	28.85	59.6	35.8	4	4	4	3
Lower Silver Creek Watershed	43.36	61.2	31.6	4	4	4	4
Lucy Evans Bayland Watershed	0.03	53.3	26.5	1	1	1	1
Mallard Slough Watershed	2.60	21.5	12.4	1	1	1	1
Matadero Creek Watershed	11.96	76.0	29.4	4	4	3	4
Moffett Channel Watershed	7.20	97.6	61.7	3	3	2	2
Moffett Field Watershed	1.06	90.2	57.3	2	2	2	2
Permanente Creek Watershed	17.51	56.7	21.7	4	4	4	4
Ravenswood Point Watershed	0.14	45.5	19.2	1	1	1	1
Ravenswood Slough Watershed	2.90	98.9	51.2	2	2	2	2
Ross Creek Watershed	9.65	84.7	38.0	3	3	3	3
San Tomas Aquino Creek Watershed	26.90	90.4	46.7	3	3	3	3
Saratoga Creek	17.16	48.4	22.2	4	4	4	4
Stevens Creek Watershed	30.58	41.3	20.2	4	4	4	4
Sunnyvale East Channel Watershed	5.66	98.0	62.2	2	2	2	2
Treatment Plant Watershed	0.24	21.7	12.4	1	1	1	1
Upper Penitencia Creek Watershed	23.43	10.4	4.5	4	4	4	4
Upper Silver Creek Watershed	5.54	43.6	21.4	1	1	1	1
West Little Llagas Creek Watershed	5.03	72.6	33.1	1	1	1	1

Notes:

1 The shading shows relative magnitude of the corresponding watershed attributes (size, percent developed, or percent impervious) within the applicable county. The color scale transforms from white to yellow to green, where the larger values are shown in darker green and smaller values are shown in light yellow/white. For example, small, medium, and large sized watersheds are shaded white, yellow, and green, respectively.

Appendix 5

Pesticides and Toxicity Monitoring Status Report: Water Year 2023

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Contra Costa Clean Water Program

Pesticides and Toxicity Monitoring Report: Water Year 2023

Submitted to the San Francisco Bay and Central Valley Regional Water Quality Control Boards

In Compliance with NPDES Permit Provision C.8.h.iii.(3)
Municipal Regional Stormwater Permit (Order No. R2-2022-0018)

March 31, 2024

Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

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Contra Costa Clean Water Program

Pesticides and Toxicity Monitoring Report: Water Year 2023

March 31, 2024

Submitted to

San Francisco Bay and Central Valley Regional Water Quality Control Boards
in Compliance with NPDES Permit Provision C.8.h.iii.(3)
Municipal Regional Stormwater Permit (Order No. R2-2022-0018)

Prepared for

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- Contra Costa County
- Contra Costa County Flood Control & Water Conservation District

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Acronyms and Abbreviations

BAMSC	Bay Area Municipal Stormwater Collaborative
BASMAA	Bay Area Stormwater Management Agencies
CCCWP	Contra Costa Clean Water Program
CGU	concentration goal units
CVRWQCB	California Regional Water Quality Control Board, Central Valley Region
DOC	dissolved total organic carbon
DPR	California Department of Pesticide Regulations
MDL	method detection limit
MQO	measurement quality objectives
MRP	Municipal Regional Stormwater Permit
MS4	Municipal Separate Storm Sewer System
ng/L	nanograms per liter
NorCal	Northern California
NPDES	National Pollutant Discharge Elimination System
PAH	polycyclic aromatic hydrocarbons
PEC	probable effects concentrations
POC	pollutants of concern
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
RL	reporting limit
RMC	Regional Monitoring Coalition
RPD	relative percent difference
SFBRWQCB	California Regional Water Quality Control Board, San Francisco Bay
SoCal	Southern California
SOP	standard operating procedures
SWAMP	Surface Water Ambient Monitoring Program
TEC	threshold effects concentration
TMDL	Total Maximum Daily Load
TOC	total organic carbon
TU	toxic unit
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WY	water year

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Executive Summary

Responding to the ongoing issue of pesticide-related pollution in Bay Area receiving waters and related total maximum daily load (TMDL) implementation requirements, the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP) contains requirements for pesticides and toxicity monitoring in urban creeks (SFBRWQCB 2022). This report documents monitoring and reporting conducted by Contra Costa Clean Water Program (CCCWP) in compliance with those requirements.

MRP Provision C.8.g. (Pesticides and Toxicity Monitoring) contains the following elements designed to assess potential pesticides contamination and associated toxicity in urban creeks:

- Wet weather pesticides and toxicity monitoring (water column)
- Toxicity in water column – dry weather
- Toxicity, pesticides, and other pollutants in sediment – dry weather

The monitoring described in this report is responsive to the monitoring requirements of MRP Provision C.8.g., as well as follow-up notification requirements specified in MRP Provision C.8.g.iv and reporting requirements specified in Provision C.8.h.

Wet Weather Pesticides and Toxicity Monitoring (Water Column)

In Contra Costa County, wet weather samples were collected from Walnut Creek at Concord Avenue (site ID 207R02615) and Pinole Creek (site ID 206PNL010). The samples were tested for toxicity to several different aquatic species and analyzed for a suite of pesticide compounds, as required by the MRP.

Both the Walnut Creek (site ID 207R02615) and Pinole Creek (site ID 206PNL010) November 8, 2022 stormwater samples were toxic to *Hyalella azteca*. The toxic effect in the Walnut Creek sample was equal to 50% of the lab control; therefore, the *Hyalella azteca* test required retesting with sample water collected during wet weather from the Walnut Creek site.

Samples were collected for the retest from the Walnut Creek site during a storm event on January 10, 2023. In the retest, the sample was again toxic to *Hyalella azteca*, but at a toxic effect less than 50%.

Measured pyrethroid concentrations were sufficient to cause the toxicity observed in both the Walnut Creek (site ID 207R02615) and Pinole Creek (site ID 206PNL010) November 8, 2022 stormwater samples, as well as in the Walnut Creek January 10, 2023 retest sample, due to elevated concentrations of bifenthrin, cyhalothrin/lambda, and deltamethrin.

Dry Weather Sediment Chemistry and Toxicity (Water and Sediment)

Dry weather water and sediment samples were collected on July 18, 2023 from Walnut Creek at Concord Avenue (site ID 207R02615), the same site used for the pollutants of concern (POC) receiving water limitations monitoring in Contra Costa County, and one of the sites monitored in the water year 2023 wet weather monitoring.

The dry weather water sample test for the aquatic invertebrate *Chironomus dilutus* (midge) was determined to be toxic, but at a relatively low effect level (15%). No other water sample test results (for

other species) were toxic. Neither of the sediment sample tests (for the aquatic invertebrates *Hyalella azteca* and *Chironomus dilutus*) were toxic.

Five pyrethroid pesticides were detected in sediments in the water year 2023 dry weather monitoring, but none of the concentrations were particularly high in comparison to other samples in prior years, and the calculated toxic unit (TU) equivalent sum of 0.50 is less than what might be expected to cause a toxic response. This corresponds to the lack of toxicity in the sediment toxicity test samples.

Because water chemistry data are not available for the dry weather samples, the cause of the toxicity seen in the *Chironomus dilutus* water same test is unknown, though the presence of pesticides in the water column would be a likely possibility to explain the relatively low level of toxicity observed in this water column sample.

Data Analysis and Follow-up

The findings presented in this report are reflective of prior conditions in urban creeks within Contra Costa County, the San Francisco Bay Area, and throughout California generally. As documented in numerous monitoring studies and reports over the past three decades (e.g., SFBRWQCB 2005, Ensminger et al. 2013, Ruby 2013, CCCWP 2020), contamination of urban creeks by current-use pesticides – and associated toxicity to aquatic invertebrates – has been and continues to be a common occurrence.

The determinations of toxicity to aquatic invertebrates documented in this report represent apparent violations of the narrative toxicity water quality objective in the San Francisco Bay Basin Plan (SFBRWQCB 2023), which states:

> "All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms."

This is supported by the clear language of the Basin Plan Amendment implementing the "Water Quality Attainment Strategy and TMDL for Diazinon and Pesticide-Related Toxicity in Urban Creeks":

> "When pesticide-related toxicity occurs in urban creek water, creeks do not meet the narrative toxicity objective. When pesticide-related toxicity occurs in sediment, the creeks also do not meet the narrative sediment objective. Likewise, when creek water or sediment is toxic, creeks do not meet the narrative population and community ecology objective. Urban creek waters that fail to meet these objectives are not protective of cold and warm freshwater habitats." (Basin Plan Ch. 7, SFRWQCB 2023)

The Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL aims to protect aquatic organisms generally and "ensure that urban creeks meet applicable water quality standards established to protect and support beneficial uses" (SFBRWQCB 2005).

The findings of toxicity presented in this report also arguably represent exceedances of the TMDL's numeric target for pesticide-related toxicity, as it is clear from the chemistry data that pesticides likely "cause or contribute to the toxicity."

CCCWP will continue to address the issues of pesticide contamination in urban creeks and pesticide-caused toxicity to aquatic organisms through ongoing implementation of the Pesticides Toxicity Control Program per MRP Provision C.9.

1 Introduction

1.1 Overview

Pesticides are widely used for pest control in urban areas, and can be transported in urban runoff from their application sites via urban storm drainage systems (municipal separate storm sewer systems, or MS4s) to urban creeks and other receiving waters, where they may cause toxicity to aquatic life (see e.g., Ensminger et al. 2013, Ruby 2013, USEPA 2016).

Both the San Francisco Bay and Central Valley Regional Water Quality Control Boards have adopted total maximum daily load (TMDL) regulations to address this problem (SFBRWQCB 2005, CVRWQCB 2017). Both TMDLs have been adopted as Basin Plan Amendments within their respective Basin Plans (SFBRWQCB 2023, CVRWQCB 2019).

Responding to the ongoing issue of pesticide-related pollution in Bay Area receiving waters and related TMDL implementation requirements, the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP) contains requirements for pesticides and toxicity monitoring in urban creeks (SFBRWQCB 2022). This report documents monitoring and reporting conducted by Contra Costa Clean Water Program (CCCWP) in compliance with those requirements.

1.2 Regulatory Context and Report Organization

MRP Provision C.8.g. (Pesticides and Toxicity Monitoring) contains the following elements designed to assess potential pesticides contamination and associated toxicity in urban creeks:

- Wet weather pesticides and toxicity monitoring (water column)
- Toxicity in water column – dry weather
- Toxicity, pesticides, and other pollutants in sediment – dry weather

The monitoring described in this report is responsive to the monitoring requirements of MRP Provision C.8.g., as well as follow-up notification requirements specified in MRP Provision C.8.g.iv and reporting requirements specified in Provision C.8.h.

The following MRP reporting requirements, specific to pesticides and toxicity monitoring per Provision C.8.h.iii.(3), are addressed within this report:

- A complete water year summary table that lists the monitoring sites and location information, with a row for each site, showing the parameters monitored at that site. (Section 2.1)
- A statement of the data quality (Section 3.1) and an analysis of the data (Sections 3.2, 3.3), including:
  - Discussion of monitoring data relative to prior conditions (Section 3.5), beneficial uses (Section 3.6) and applicable water quality standards (Section 3.7), as described in the Basin Plan, Ocean Plan, California Toxics Rule, and other applicable water quality control plans;
  - Where appropriate, development of hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness (Section 3.8);
  - Identification and prioritization of water quality impairments (Section 3.8);

- Identification and discussion of potential sources (and actual, if known) of water quality impairments, and provide sufficient justification for those potential sources (Section 3.8);
- Description of follow-up actions (Section 3.8);
- Evaluation of the effectiveness of existing management actions (Section 3.8); and
- Identification of additional management actions needed to address water quality impairments (Section 3.8).

The standard reporting requirements defined in Provision C.8.h.vii also are addressed in this report as follows:

1. The purpose of the monitoring and brief description of the study design rationale (Sections 1.1 and 1.2);
2. Quality assurance/quality control summaries for sample collection and analytical methods, including a discussion of any limitations of the data (Section 3.1);
3. Brief descriptions of sampling protocols and analytical methods (Section 2.2);
4. Sample location description, including water body name and segment and latitude and longitude coordinates (Section 2.1);
5. Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue) (Section 2.1);
6. Concentrations detected, measurement units, and detection limits (Sections 3.2 and 3.3);
7. Assessment, analysis, and interpretation of the data for each monitoring program component (Sections 3.2-3.8);
8. A listing of volunteer and other non-Permittee entities whose data are included in the report (Section 3.4); and
9. Assessment of compliance with applicable water quality standards (Section 3.7).

2 Methods

2.1 Site Selection

Walnut Creek at Concord Avenue (site ID 207R02615) was selected as the dry weather monitoring site and one of the two wet weather monitoring sites for pesticides and toxicity monitoring. This site was also selected for pollutants of concern (POCs) receiving water limitations monitoring, per MRP Provision C.8.f. Site selection criteria for this site are detailed in the receiving water limitations monitoring plan (BAMSC 2023).

Pinole Creek (site ID 206PNL010) was selected as the second wet weather monitoring site. The site selection rationale involved the opportunity to newly characterize pesticides and toxicity conditions in a watershed not previously monitored by CCCWP for these parameters. Land use is principally urban, with 31% agricultural land use. Pinole Creek maintains one of the few active steelhead trout runs throughout Contra Costa County.

The locations of the two selected sites are shown in Table 1.

Table 1 Contra Costa County Pesticides and Toxicity Monitoring Locations – Water Year 2023

Site ID	Creek Name	Latitude	Longitude	Permittee Jurisdiction	Dry Weather Water Column Toxicity (Acute and Chronic)	Dry Weather Sediment Toxicity (Acute and Chronic)	Dry Weather Sediment Chemistry	Wet Weather Water Column Toxicity (Acute and Chronic)	Wet Weather Water Chemistry
206PNL010	Pinole Creek	38.00675	-122.28974	Pinole				X	X
207R02615	Walnut Creek	37.98041	-122.05169	Concord	X	X	X	X	X

Dry weather sample collection date: July 18, 2023
Wet weather sample collection date: November 8, 2022
Wet weather toxicity retest sample collection date: January 10, 2023 (Walnut Creek site only)

2.2 Monitoring Methods

The monitoring performed by CCCWP for compliance with MRP Provision C.8.g requirements conforms with the Standard Monitoring Provisions (MRP Attachment D) and California Surface Water Ambient Monitoring Program (SWAMP) protocols (SWRCB 2022).

The Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC), the predecessor to the Bay Area Municipal Stormwater Collaborative (BAMSC) workgroup, developed detailed standard operating procedures (SOPs) and a state-approved Quality Assurance Project Plan (QAPP) to address similar monitoring requirements in previous versions of the MRP. Those protocols and procedures remain relevant for monitoring performed under the current MRP.

2.2.1 Field Sampling and Data Collection Methods

Water and sediment samples were collected in accordance with existing SWAMP-comparable methods and procedures, as described in the RMC QAPP (BASMAA 2020) and the associated SOPs (BASMAA 2016). The SOPs were developed using a standard format describing health and safety cautions and considerations, relevant training, site selection, and sampling methods and procedures.

Sampling methods and procedures described in the RMC SOPs include pre-fieldwork mobilization activities, equipment preparation, field collection of samples, sample preservation and transport, and demobilization activities, including procedures to prevent transporting invasive species between creeks. The SOPs relevant to the monitoring discussed in this report are listed in Table 2.

Table 2 RMC Standard Operating Procedures Pertaining to Pesticides and Toxicity Monitoring

SOP	Procedure
FS-2	Water quality sampling for chemical analysis, pathogen indicators, and toxicity testing
FS-3	Field measurements, manual
FS-6	Collection of bedded sediment samples
FS-7	Field equipment cleaning procedures
FS-8	Field equipment decontamination procedures
FS-9	Sample container, handling, and chain-of-custody procedures
FS-10	Completion and processing of field data sheets
FS-11	Site and sample naming convention
FS-12	Ambient creek status monitoring site evaluation
FS-13	Quality assurance and quality control (QA/QC) data review

Water Toxicity Sample Collection

Samples were collected for water toxicity using the standard grab sample collection method described above, filling the required number of labeled 3.7-liter amber glass bottles with ambient water, putting them on ice to cool to 4° C ± 2° C, and delivered to the laboratory within the required hold time. The laboratory was notified of the impending sample delivery to ensure meeting the 24-hour sample delivery time requirement. Procedures used for sample collection and transport are described in SOP FS-2 (BASMAA 2016).

Sediment Chemistry and Sediment Toxicity Sample Collection

In cases where sediment samples and water samples were collected at the same event, sediment samples were collected after water samples were collected. Before conducting sediment sampling, field personnel surveyed the proposed sampling area to identify appropriate fine-sediment depositional areas and to avoid disturbing possible sediment collection sub-sites. Personnel carefully entered the stream and began sampling at the closest appropriate reach, continuing upstream. Sediment samples were collected from the top 2 cm of sediment in a compositing container, thoroughly homogenized, and then aliquoted into separate jars for chemical and toxicological analysis using standard clean sampling techniques (see SOP FS-6, BASMAA 2016). Sample containers were submitted to the respective laboratories per SOP FS-9 (BASMAA 2016).

2.2.2 Laboratory Analysis Methods

BAMSC participants agreed to use the same set of analytical laboratories for pesticides analysis and toxicity testing, developed standards for contracting with the labs, and coordinated quality assurance issues. All samples collected by BAMSC participants and sent to laboratories for analysis were analyzed and reported per SWAMP-comparable methods, as described in the RMC QAPP (BASMAA 2020). The following analytical laboratory contractors were used for chemical and toxicological analysis:

Caltest Analytical Laboratory, Inc. – Water and sediment chemistry

Upon receipt at the laboratory, samples were immediately logged and preserved as necessary. U.S. Environmental Protection Agency (USEPA) approved testing protocols were then applied for analysis of water and sediment samples, in accordance with the methods specified in MRP Table 8.5.

Pacific EcoRisk, Inc. – Water and sediment toxicity

Testing of water and sediment samples was performed per species-specific protocols published by USEPA, in accordance with the methods specified in MRP Table 8.4.

2.3 Quality Assurance/Quality Control

Pesticides and toxicity monitoring is coordinated among the responsible MRP permittees through BASMC. Data quality assurance and quality control (QA/QC) procedures are described in detail in the BASMAA RMC QAPP (BASMAA 2020) and in RMC SOP FS-13 (QA/QC Data Review) (BASMAA 2016).

Per agreement of the members of the BAMSC Workgroup, field duplicate samples were collected at a CCCWP site (Walnut Creek at Concord Avenue, site ID 207R02615) in water year 2023 for both wet weather water chemistry (during storm event of November 8, 2022) and dry weather sediment chemistry (July 18, 2023).

Data quality objectives were established to ensure the data collected are of sufficient quality for the intended use. Data quality objectives include both quantitative and qualitative assessment of the acceptability of data. The qualitative goals include representativeness and comparability. The quantitative goals include completeness, sensitivity (detection and quantitation limits), precision, accuracy, and contamination. To ensure consistent and comparable field techniques, pre-monitoring field training and *in situ* field assessments were conducted.

Data were collected per the procedures described in the relevant SOPs (BASMAA 2016), including appropriate documentation of data sheets and samples, and sample handling and custody. Laboratories providing analytical support to the RMC were selected based on demonstrated capability to adhere to specified protocols.

All data were thoroughly reviewed by the programs responsible for collecting them. Data were checked for conformance with QAPP requirements and field procedures were reviewed for compliance with the methods specified in the relevant SOPs. Data review was performed per protocols defined in RMC SOP FS13 (QA/QC Data Review) (BASMAA 2016). Data quality was assessed and qualifiers were assigned as necessary, in accordance with SWAMP requirements.

2.4 Data Analysis

For both water and sediment pesticides chemistry data, toxic unit (TU) equivalents are computed for the individual pesticides detected in each sample. The TU calculations are based on published literature acute toxicity (LC_{50}) values for freshwater invertebrates (LC_{50} is the concentration of a chemical which is lethal on average to 50% of test organisms), where available (see USEPA 2016 for LC_{50} values for pyrethroids in water). USEPA aquatic life benchmarks are substituted where LC_{50} values are not available.[1] The results for the individual pesticides are then summed to produce a TU equivalent value for the sample. The chemistry results are indicative of potential pesticide-caused toxicity in samples where TU >1.

Because organic carbon mitigates the toxicity of pyrethroid pesticides in sediments, for sediment pesticides the LC_{50} values were derived based on organic carbon-normalized pyrethroid concentrations (Weston et al. 2013). Therefore, the RMC pyrethroid concentrations reported by the lab also were divided by the measured total organic compound (TOC) concentration at each site (as a percentage), and the TOC-normalized concentrations were then used to compute TU equivalents for each pyrethroid.

When possible, pyrethroid concentration goal units (CGUs) also are calculated for water samples, as specified in the Central Valley Pyrethroid Pesticides TMDL (CVRWQCB 2017). The CGU calculations involve an estimate of the fraction of the pesticide concentration present in the freely dissolved (and most biologically available) form, and require TOC and dissolved total organic carbon (DOC) data in addition to pyrethroids pesticides concentrations. The calculated dissolved-phase pyrethroid pesticide concentrations are compared to acute and chronic criteria established in the TMDL to produce the acute and chronic CGU values for each pesticide. The individual pesticide CGUs are then summed to produce an additive CGU for the sample. CGU values >1.0 indicate an exceedance for water bodies regulated by the TMDL in Central Valley Region 5.

As noted in MRP Provision C.8.g.iv.(3), for sediment chemistry data, in the absence of applicable water quality standards, comparisons to threshold effects concentrations (TECs) and probable effects concentrations (PECs) are calculated as defined in MacDonald et al. (2000). For each constituent for which there is a published TEC or PEC value, the ratio of the measured concentration to the respective TEC or PEC value was computed as the TEC or PEC quotient, respectively. All results where a TEC quotient was equal to or greater than 1.0 were identified. For each site, the mean PEC quotient was then computed, and any sites where mean PEC quotient was equal to or greater than 0.5 were identified.

1 USPEA Aquatic Life Benchmarks for Pesticides: https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk

3 Results and Data Analysis

3.1 Statement of Data Quality

A comprehensive QA/QC program was implemented by CCCWP, following protocols as required by the MRP and as defined in the RMC QAPP (BASMAA 2020) and SOPs (BASMAA 2016). In general, QA/QC procedures were implemented as specified in the RMC QAPP (BASMAA 2020), and monitoring was performed per protocols specified in the RMC SOPs (BASMAA 2016) and in conformity with SWAMP protocols. QA/QC issues noted by the laboratories and/or field crews or discovered during the course of data review are summarized below.

3.1.1 Chemistry

Field duplicate samples were collected on behalf of the BAMSC collaborating programs at a CCCWP site (Walnut Creek at Concord Avenue, site ID 207R02615) in water year 2023 for both wet weather water chemistry (storm event of November 8, 2022) and dry weather sediment chemistry (July 18, 2023).

Relative percent difference (RPD) between duplicate pairs was calculated for all field duplicate sample results to evaluate precision, and compared to project measurement quality objectives (MQOs), as specified in the RMC QAPP.

Field duplicate RPDs were generally within acceptable ranges, with the notable exception of the sediment PAH results, as noted below.

Water Samples

In the analysis of the initial wet weather samples (collected November 8, 2022), the laboratory reported low matrix spike recoveries for two of the fipronil compounds, and RPDs exceeding control limits for matrix spike duplicates for four pyrethroid pesticides, in both cases likely due to matrix interference in the sample. The batch QC results were accepted by the lab based on other internal accuracy and precision measures.

No laboratory qualifiers were reported for the analysis of the retest sample collected during the storm event on January 10, 2023.

Sediment Samples

The laboratory reported minor matrix spike recovery issues exceeding acceptable recovery percentages in the QA/QC analysis for chromium, copper, and zinc in the Walnut Creek sediment samples; the results were accepted by the lab based on other internal accuracy measures.

The laboratory diluted the sediment samples for the analysis of pesticides and PAHs to reduce matrix interference in the samples; this had the effect of raising the method detection limits (MDLs) and reporting limits (RLs) for those constituents.

Field duplicate RPDs were outside acceptable ranges and exceeded project MQOs (RPD <25%) for the sediment PAH results. Including j-flagged (estimated) data, 10 PAHs were detected in the duplicate sample, while only five were detected in the primary sample. In all cases, the duplicate sample concentrations were higher than the primary sample concentrations, typically by a factor of about three.

In the three samples for which both samples had detected results that were not j-flagged, the RPDs were 99%, 44% and 98%. Although the MQO for precision does not apply to j-flagged data, for the two PAHs for which the primary sample had a j-flagged result and the duplicate sample was detected without a flag, the RPDs were 109% and 100%.

Given the unusual nature of this discrepancy, the decision was made to calculate the average concentrations from the duplicate pair for PAHs with detected results, and present those results in the report. This calculation was done for all PAHs for which either sample had a detected result, including j-flagged results. For cases in which only the duplicate sample had a detected result, a value of one-half the MDL was substituted in the calculation for the non-detect in the primary sample. These calculations resulted in some PAH results lower than the RL; those results are marked with brackets in the sediment chemistry results table (Table 7).

3.1.2 Toxicity

No QA/QC issues were reported by the laboratory for the three sets of samples submitted for testing. The mean percent survival for the lab control for the *Chironomus dilutus* sediment test (July 18, 2023 sample) was low, at 72.5% (environmental sample percent survival was 77.5%), but this result is within test acceptability criteria.

3.2 Wet Weather Water Chemistry and Toxicity

MRP permittees are required to conduct wet weather monitoring in urban creeks, involving toxicity testing of water samples for several test species and chemical analysis for pesticides, including several pyrethroids, fipronil and its degradates, and imidacloprid, a neonicotinoid.

MRP Provision C.8.g.iv.(1) is interpreted to mean that any toxicity test producing a toxic effect of 50% or more requires a retest. Retest samples are collected at a later date from the same monitoring location.

Wet weather water samples were collected from urban creeks in the MRP region during an early season storm event on November 8, 2022. Per MRP Provision C.8.g.iii.(3), if the wet weather monitoring "is conducted by the RMC on behalf of all Permittees, a total of ten (10) samples shall be collected over the Permit term." The BAMSC Workgroup coordinated sample collection during the November 8 storm event and testing and analysis of 10 samples regionwide, thereby fulfilling the MRP 3 wet weather monitoring requirement. By agreement of the BAMSC workgroup, the regional distribution of wet weather samples included three samples each from the Alameda and Santa Clara countywide programs, and two samples each from the Contra Costa and San Mateo countywide programs.

In Contra Costa County, wet weather samples were collected from Walnut Creek at Concord Avenue (site ID 207R02615) and Pinole Creek (site ID 206PNL010). The samples were tested for toxicity to several different aquatic species and analyzed for a suite of pesticide compounds, as required by the MRP.

Both the Walnut Creek (site ID 207R02615) and Pinole Creek (site ID 206PNL010) November 8, 2022 stormwater samples were toxic to *Hyalella azteca*. The toxic effect in the Walnut Creek sample was equal to 50 percent of the lab control; therefore, the *Hyalella azteca* test required retesting with sample water collected during wet weather from the Walnut Creek site.

Samples were collected for the retest from the Walnut Creek site during a storm event on January 10, 2023. In the retest, the sample was again toxic to *Hyalella azteca*, but at a toxic effect less than 50%.

The wet weather water toxicity test results are shown in Table 3.

Table 3 Wet Weather Toxicity Testing Results – Water Year 2023

Sample Date/Test Species	Test Endpoint(s)	Lab Control	Pinole Creek Site 206PNL010	Walnut Creek Site 207R02615
Stormwater Samples (11/08/2022)				
Selenastrum capricornutum (Green Algae)	Growth (cells/mL x 106)	3.18	7.25	6.81
Ceriodaphnia dubia (Freshwater Crustacean)	Survival (%)	100	100	100
	Reproduction (#neonates/female)	44.6	39.9	46.7
Chironomus dilutus (Midge)	Survival (%)	100	100	92.5
Hyalella azteca (Freshwater Amphipod)	Survival (%)	96	**74***	**48****
Pimephales promelas (Fathead Minnow)	Larval Survival (%)	97.5	95	100
	Growth (biomass, mg)	0.86	0.84	0.91
Stormwater Sample Retest (01/10/2023)				
Hyalella azteca (Freshwater Amphipod)	Survival (%)	100		**82***

* Sample test result was significantly less than the lab control treatment; sample was determined to be toxic

** Sample test result was significantly less than the lab control treatment; sample was determined to be toxic, and the test result met the MRP aquatic toxicity threshold for follow-up testing (> 50 percent effect)

Stormwater sample retest on 01/10/2023 was for Walnut Creek site, *Hyalella azteca* test only

As an aid in interpretation of the pesticides chemistry results, toxic unit (TU) equivalents are computed for the individual pesticides detected in each sample, based on published acute toxicity (LC_{50}) values for freshwater invertebrates, where available, and using USEPA aquatic life benchmarks where LC_{50} values are not available. The results for the individual pesticides are then summed to produce a TU equivalent value for the sample, indicating potential pesticide-caused toxicity in samples where TU $\geq$1.

When possible, pyrethroid CGUs also are calculated for water samples, as specified in the Central Valley Pyrethroid Pesticides TMDL (CVRWQCB 2017). The CGU calculations involve an estimate of the fraction of the pesticide concentration present in the freely dissolved (and most biologically available) form, and require TOC and DOC data in addition to pyrethroids pesticides concentrations. The calculated dissolved-phase pyrethroid pesticide concentrations are compared to acute and chronic criteria established in the TMDL to produce acute and chronic CGU values for each pesticide. The individual pesticide CGUs are then summed to produce an additive CGU for the sample. CGU values >1.0 indicate an exceedance of the TMDL for water bodies regulated by the TMDL in Central Valley Region 5.

TOC and DOC data were available for the January 10, 2023 retest of the Walnut Creek (site ID 207R02615) sample, so CGUs also were calculated for that sample from the pyrethroids concentration data.

The chemistry analytical results and associated metrics are shown in Table 4 for the November 8, 2022 storm event and Table 5 for the January 10, 2023 retest.

As shown in Tables 4 and 5, measured pyrethroid concentrations were sufficient to cause the toxicity observed in both the Walnut Creek (site ID 207R02615) and Pinole Creek (site ID 206PNL010) November 8, 2022 stormwater samples, as well as in the Walnut Creek January 10, 2023 retest sample, due to elevated concentrations of bifenthrin, cyhalothrin/lambda, and deltamethrin. At 0.9, the chronic

CGU value also nearly exceeded the TMDL chronic numeric trigger for the freely dissolved pyrethroids fraction.

Table 4 Wet Weather Chemistry Monitoring Results – Stormwater Samples Collected 11/08/2022

Pesticides/Toxic Reference Levels		Walnut Creek Site 207R02615		Pinole Creek Site 206PNL010	
Pyrethroid Pesticides	**LC_{50} (ng/L)**	**Sample (ng/L)**	**TU Equivalent**	**Sample (ng/L)**	**TU Equivalent**
Bifenthrin	0.493	5.3	10.75	4.1	8.32
Cyfluthrin	25	0.6	0.02	0.4	0.02
Cyhalothrin, lambda	0.08	0.6	7.50	ND	
Cypermethrin	0.56	0.4	0.71	ND	
Deltamethrin*	0.2	0.9	4.50	1.8	9.00
Esfenvalerate**	0.8	ND		ND	
Permethrin	6.6	ND		ND	
	Sum (Pyrethroid TUs		23.5		17.3
Fipronil and Degradates, etc.	**EPA Acute Benchmark (ng/L)**	**Sample (ng/L)**	**TU Equivalent**	**Sample (ng/L)**	**TU Equivalent**
Fipronil	110	7.7	0.07	6.7	0.06
Fipronil Desulfinyl	177500	2.8	0.000	2.2	0.000
Fipronil Sulfide	50000	0.6	0.00	0.5	0.00
Fipronil Sulfone	14500	5.9	0.00	4.9	0.00
Imidacloprid	385	ND		ND	
	Sum (Fipronil etc. TUs)		0.1		0.1
	Sample TU		**23.6**		**17.4**

* Analyzed as deltamethrin + tralomethrin
** Analyzed as esfenvalerate + fenvalerate
ND = not detected
TU equivalents are not calculated when sample result is ND

Table 5 Wet Weather Chemistry Monitoring Results – Stormwater Samples Collected 01/10/2023

Pesticides/Toxic Reference Levels		Walnut Creek Site 207R02615			
Pyrethroid Pesticides	**LC_{50} (ng/L)**	**Sample (ng/L)**	**TU Equivalent**	**Acute CGU**	**Chronic CGU**
Bifenthrin	0.493	1.3	2.64	0.11	0.90
Cyfluthrin	25	ND		0.0	0.0
Cyhalothrin, lambda	0.08	ND		0.0	0.0
Cypermethrin	0.56	ND		0.0	0.0
Deltamethrin*	0.2	0.9	4.50		
Esfenvalerate**	0.8	ND		0.0	0.0
Permethrin	6.6	ND		0.0	0.0
Sum (Pyrethroid TUs/CGUs)			7.1	0.11	0.90
Fipronil and Degradates, etc.	**EPA Benchmark**	**Sample (ng/L)**	**TU Equivalent**		
Fipronil	110	7.1	0.06		
Fipronil Desulfinyl	177500	0.5	0.000		
Fipronil Sulfide	50000	0.5	0.00		
Fipronil Sulfone	14500	2.8	0.00		
Imidacloprid	385	ND			
Sum (Fipronil etc. TUs)			0.1		
Sample TU			7.2		

* Analyzed as deltamethrin + tralomethrin
** Analyzed as esfenvalerate + fenvalerate
ND = not detected
TU equivalents and CGUs are not calculated when sample result is ND
CGU equations are not available for deltamethrin or other, non-pyrethroid pesticides

3.3 Dry Weather Sediment Chemistry and Toxicity (Water and Sediment)

In dry weather, the CCCWP Permittees are collectively required to collect water and sediment samples from one site annually, and perform the following tests and analyses:

- Water sample toxicity testing for the same set of test species as were required for the wet weather monitoring, as listed in MRP Table 8.4
- Sediment sample toxicity testing for *Hyalella azteca* and *Chironomus dilutus* (survival endpoints)
- Sediment chemical analysis for pyrethroid pesticides, fipronil and degradates, PAHS, metals, TOC, and grain size, with comparisons of results to water quality objectives or other comparative metrics, including PEC or TEC from MacDonald et al. (2000), as has been done for previous MRP monitoring

Dry weather water and sediment samples were collected on July 18, 2023 from Walnut Creek at Concord Avenue (site ID 207R02615), the same site used for the POC receiving water limitations monitoring in Contra Costa County, and also one of the sites monitored in the water year 2023 wet weather monitoring.

The dry weather toxicity testing results are presented in Table 6. The water sample test for the aquatic invertebrate *Chironomus dilutus* (midge) was determined to be toxic, but at a relatively low effect level (15%). No other water sample test results (for other species) were toxic. Neither of the sediment sample tests (for the aquatic invertebrates *Hyalella azteca* and *Chironomus dilutus*) were toxic.

Table 6 Dry Weather Toxicity Testing Results – Water Year 2023

Matrix/Test Species	Test Endpoint(s)	Lab Control	Walnut Creek Site 207R02615
Water Samples (07/18/2023)			
Selenastrum capricornutum (Green Algae)	Growth (cells/mL x 106)	2.50	5.50
Ceriodaphnia dubia (Freshwater Crustacean)	Survival (%)	90.0	100
	Reproduction (#neonates/female)	32.0	40.1
Chironomus dilutus (Midge)	Survival (%)	97.5	**82.5***
Hyalella azteca (Freshwater Amphipod)	Survival (%)	98.0	100
Pimephales promelas (Fathead Minnow)	Larval Survival (%)	95.0	97.5
	Growth (biomass, mg)	0.82	0.77
Sediment Samples (07/18/2023)			
Chironomus dilutus (Midge)	Survival (%)	72.5	77.5
Hyalella azteca (Freshwater Amphipod)	Survival (%)	93.8	95.0

* Sample test result was significantly less than the lab control treatment; sample was determined to be toxic

The dry weather sediment chemistry analytical results are presented in Table 7.

The metals and selected PAHs were compared to PECs and TECs from MacDonald et al. (2000), as specified per MRP Provision C.8.g.iv.(3). Those results are shown in Table 8. As in previous years, only nickel exhibited a TEC ratio greater than 1.0.

Several PAH compounds were detected in the Walnut Creek sediment sample. As noted in the QA/QC data review (Section 3.1.1), there were unusually high discrepancies in the RPDs between the duplicate sediment sample results for PAHs. For that reason, the unusual step was taken to calculate detected concentrations as the average of primary and duplicate sample results for PAHs only. Those calculated concentrations are shown in Table 7, and included in the results of the PEC/TEC analysis shown in Table 8.

Sediment TU equivalents were calculated for the pyrethroid pesticides for which there are published LC_{50} levels, and a sum of the calculated TU equivalents was computed for the dry season sediment chemistry results from the monitored site (Table 9). Because organic carbon mitigates the toxicity of pyrethroid pesticides in sediments, the LC_{50} values are based on organic carbon-normalized pyrethroid concentrations. Therefore, the pyrethroid concentrations as reported by the lab were divided by the measured TOC concentration (as a percentage) at each site, and the TOC-normalized concentrations were then used to compute TU equivalents for each pyrethroid.

Five pyrethroid pesticides were detected in sediments in the water year 2023 dry weather monitoring, but none of the concentrations were particularly high in comparison to other samples in prior years, and the calculated TU equivalent sum of 0.50 is less than what might be expected to cause a toxic response. This corresponds to the lack of toxicity in the sediment toxicity test samples.

Because water chemistry data are not available for the dry weather samples, the cause of the toxicity seen in the *Chironomus dilutus* water same test is unknown, though the presence of pesticides in the water column would be a likely possibility to explain the relatively low level of toxicity observed in this water column sample.

Table 7 Dry Weather Sediment Chemistry Monitoring Results – Water Year 2023

Analyte	Units [1]	Walnut Creek Site 207R02615		
		Result	MDL	RL
Metals				
Arsenic	mg/Kg	3.4	0.12	0.51
Cadmium	mg/Kg	0.30	0.0041	0.041
Chromium	mg/Kg	26	0.12	0.51
Copper	mg/Kg	20	0.060	0.21
Lead	mg/Kg	11	0.038	0.041
Nickel	mg/Kg	31	0.062	0.082
Zinc	mg/Kg	73	0.36	0.41
Polycyclic Aromatic Hydrocarbons (PAHs) [2]				
Acenaphthene	ng/g	ND	6.2	18
Acenaphthylene	ng/g	ND	5.7	18
Anthracene	ng/g	ND	4.7	18
Benz(a)anthracene	ng/g	[17.5]	4.2	18
Benzo(a)pyrene	ng/g	[17.6]	6.2	18
Benzo(b)fluoranthene	ng/g	27.8	7.2	18
Benzo(e)pyrene	ng/g	[17.1]	6.2	18
Benzo(g,h,i)perylene	ng/g	ND	5.7	18
Benzo(k)fluoranthene	ng/g	[11.7]	6.7	18
Biphenyl	ng/g	ND	5.7	18
Chrysene	ng/g	36	5.7	18
Dibenz(a,h)anthracene	ng/g	ND	4.7	18
Dibenzothiophene	ng/g	ND	6.2	18
Dimethylnaphthalene, 2,6-	ng/g	ND	6.2	18
Fluoranthene	ng/g	44	5.7	18
Fluorene	ng/g	ND	5.7	18
Indeno(1,2,3-c,d)pyrene	ng/g	[16.4]	5.7	18
Methylnaphthalene, 1-	ng/g	ND	6.2	18
Methylnaphthalene, 2-	ng/g	ND	4.9	18
Methylphenanthrene, 1-	ng/g	ND	4.8	18
Naphthalene	ng/g	ND	5.7	18
Perylene	ng/g	[7.9]	7.7	18
Phenanthrene	ng/g	27	4.8	18
Pyrene	ng/g	43	4.0	18

Table 7 Dry Weather Sediment Chemistry Monitoring Results – Water Year 2023

Analyte	Units [1]	Walnut Creek Site 207R02615		
		Result	MDL	RL
Trimethylnaphthalene, 2,3,5-	ng/g	ND	7.2	18
Pyrethroid Pesticides				
Bifenthrin	ng/g	1.6	0.21	1.0
Cyfluthrin	ng/g	J 0.16	0.082	1.0
Cyhalothrin, Total lambda-	ng/g	J 0.22	0.082	1.0
Cypermethrin	ng/g	J 0.25	0.12	1.0
Deltamethrin/Tralomethrin	ng/g	J 0.46	0.21	1.0
Esfenvalerate/Fenvalerate	ng/g	ND	0.33	1.0
Permethrin	ng/g	ND	0.74	1.0
Other Pesticides				
Fipronil	ng/g	ND	0.12	1.0
Fipronil Desulfinyl	ng/g	ND	0.16	1.0
Fipronil Sulfide	ng/g	ND	0.16	1.0
Fipronil Sulfone	ng/g	ND	0.41	1.0
Organic Carbon				
Total Organic Carbon	%	0.99	0.039	0.039

1 All measurements reported as dry weight

2 For PAHs, detected concentrations were calculated as the average of primary and duplicate sample results due to issues with field duplicate sample RPDs. This resulted in some calculated results lower than the RL; those results are marked with [brackets]. See explanation in Section 3.1.1 of this report.

ND not detected

Table 8 **Threshold Effect Concentration (TEC) and Probable Effect Concentration (PEC) Quotients for Sediment Chemistry Constituents – Water Year 2023**

	Sample Units [1]	Walnut Creek Site 207R02615		
		Sample	TEC Ratio	PEC Ratio
Metals				
Arsenic	mg/Kg	3.4	0.35	0.10
Cadmium	mg/Kg	0.3	0.30	0.06
Chromium	mg/Kg	26	0.60	0.23
Copper	mg/Kg	20	0.63	0.13
Lead	mg/Kg	11	0.31	0.09
Nickel	mg/Kg	31	**1.37**	0.64
Zinc	mg/Kg	73	0.60	0.16
Polycyclic Aromatic Hydrocarbons (PAHs)				
Anthracene	ng/g	ND		
Fluorene	ng/g	ND		
Naphthalene	ng/g	ND		
Phenanthrene	ng/g	27	0.132	0.0231
Benz(a)anthracene	ng/g	17.5	0.162	0.0167
Benzo(a)pyrene	ng/g	ND		
Chrysene	ng/g	36	0.217	0.0279
Fluoranthene	ng/g	44	0.104	0.0197
Pyrene	ng/g	43	0.221	0.0283
Total PAHs[1]	ng/g	306	0.190	0.0134
		Number with TEC > 1.0	1	
		Combined TEC Ratio	5.18	
		Average TEC Ratio	0.47	
		Combined PEC Ratio		1.54
		Average PEC Ratio		0.12

Note: All measurements reported as dry weight. TECs and PECs per MacDonald et al. (2000).
Bold TEC or PEC ratio exceeds 1.0
ND = not detected
TEC and PEC ratios are not calculated when sample result is ND
1 Total PAHs include 25 individual PAH compounds; NDs were substituted at 1/2 MDL to compute total PAHs, and detected concentrations were calculated as average of primary and duplicate sample results (see explanation in Section 3.1.1)

Table 9 Calculated Pyrethroid Toxic Unit Equivalents for Sediment Chemistry Data – Water Year 2023

Pyrethroid Pesticides	LC_{50} (µg/g organic carbon)	Walnut Creek Site 207R02615		
		Sample (ng/g)	Sample (µg/g organic carbon)	TU Equivalents[1]
Bifenthrin	0.52	1.6	0.16	0.31
Cyfluthrin	1.08	0.16	0.016	0.01
Cyhalothrin, lambda	0.45	0.22	0.022	0.05
Cypermethrin	0.38	0.25	0.025	0.07
Deltamethrin/Tralomethrin	0.79	0.46	0.046	0.06
Esfenvalerate/Fenvalerate	1.54	ND		
Permethrin	10.8	ND		
			Sum (Pyrethroid TUs)	0.50

Note: All sample measurements reported as dry weight.
ND not detected
TU equivalents are not calculated when sample result is ND
1 Toxic unit equivalents (TU) are calculated as ratios of organic carbon-normalized pyrethroid sample concentrations to published *H. azteca* LC_{50} values (Weston et al. 2013)

3.4 Non-Permittee Monitoring Data

Relevant data have been generated in recent years by other statewide and regional monitoring programs. These include:

- Department of Pesticide Regulation, Northern California (NorCal) Urban Surface Water Monitoring (Alvarado 2023)
- Department of Pesticide Regulation, Southern California (SoCal) Urban Surface Water Monitoring (Budd 2023)
- U.S. Geological Survey, California Stream Quality Assessment (CSQA) (Sandstrom et al. 2022)
- San Francisco Estuary Institute, San Francisco Bay Margins Study (Heberger et al. 2020)

Pyrethroid pesticides, fipronil and imidacloprid have been commonly detected in urban surface water samples in all these programs, with some concentrations exceeding corresponding aquatic life benchmarks.

CCCWP collected creek samples for California Department of Pesticide Regulations (DPR) from the Walnut Creek site (ID 207R02615) during the November 8, 2022 storm event, alongside the required MRP samples. This sample collection was done in support of DPR's NorCal Urban Surface Water Monitoring program, per DPR's request via outreach to BAMSC. The data are not yet available from the DPR analysis.

3.5 Prior Conditions and Trends

The findings presented in this report are reflective of prior conditions in urban creeks within Contra Costa County, the San Francisco Bay Area, and throughout California generally. As documented in numerous monitoring studies and reports over the past three decades (see e.g., SFBRWQCB 2005, Ensminger et al. 2013, Ruby 2013, CCCWP 2020), contamination of urban creeks by current-use pesticides – and associated toxicity to aquatic invertebrates – has been and continues to be a common occurrence.

Throughout the 1990s and continuing through the early 2000s, Bay Area urban creeks were frequently found to be contaminated with the organophosphate pesticides diazinon and chlorpyrifos, as thoroughly documented in the Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL (SFBRWQCB 2005).

After USEPA imposed substantial restrictions on uses of those pesticides in urban areas, manufacturers replaced the organophosphates with other insecticide active ingredients for urban uses, notably pyrethroids and, in particular, bifenthrin. Those current-use pesticides were then found in monitoring of urban creeks, and often in sediments as well as water column samples (Ensminger et al. 2013). As studies accumulated documenting contamination of urban creeks by pyrethroids, manufacturers began to release products containing other insecticide active ingredients, such as fipronil and imidacloprid.

As early as the mid-to-late 2000s, pyrethroids and fipronil – and associated toxicity to aquatic invertebrates – were widely found in California urban creeks, including in the Bay Area and Contra Costa County (Ruby 2013). Similar findings have continued to accrue annually in limited monitoring by CCCWP under the MRP (CCCWP 2020).

3.6 Beneficial Uses

Beneficial uses designated within the San Francisco Bay Basin Plan (SFBRWQCB 2023) for both Pinole Creek and Walnut Creek include wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), fish spawning (SPWN), and preservation of rare and endangered species (RARE).

While these designations are generally aimed at protecting fish, the aquatic invertebrates that are most directly affected by pesticide-caused toxicity form essential links in the aquatic food web, and at lower trophic levels, provide necessary resources to support fish-related beneficial uses.

The designated beneficial uses are not supported by the continued contamination of urban creeks by current-use pesticides and associated pesticide-caused toxicity, as documented in this and prior reports and studies.

3.7 Comparisons to Water Quality Standards

The determinations of toxicity to aquatic invertebrates documented in this report represent apparent violations of the narrative toxicity water quality objective in the San Francisco Bay Basin Plan (SFBRWQCB 2023), which states:

> "All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms."

This is supported by the clear language of the Basin Plan Amendment implementing the "Water Quality Attainment Strategy and TMDL for Diazinon and Pesticide-Related Toxicity in Urban Creeks":

> "When pesticide-related toxicity occurs in urban creek water, creeks do not meet the narrative toxicity objective. When pesticide-related toxicity occurs in sediment, the creeks also do not meet the narrative sediment objective. Likewise, when creek water or sediment is toxic, creeks do not meet the narrative population and community ecology

> objective. Urban creek waters that fail to meet these objectives are not protective of cold and warm freshwater habitats." (Basin Plan Ch. 7, SFRWQCB 2023)

The Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL aims to protect aquatic organisms generally and "ensure that urban creeks meet applicable water quality standards established to protect and support beneficial uses" (SFBRWQCB 2005).

The statistically significant findings of toxicity presented above also arguably represent exceedances of the TMDL's numeric target for pesticide-related toxicity, as it is clear from the chemistry data that pesticides likely "cause or contribute to the toxicity."

These exceedances do not, however, trigger notification to the SFBRWQCB per MRP Provision C.8.h.i, because they are both "continuing or recurring exceedances of water quality standards previously reported to the Water Board" and "exceedances of pollutants that are addressed pursuant to Provisions C.9 (et al.)…"

CCCWP will continue to address the issues of pesticide contamination in urban creeks and pesticide-caused toxicity to aquatic organisms through ongoing implementation of the Pesticides Toxicity Control Program per MRP Provision C.9.

3.8 Impairments, Sources, and Follow-up

Water quality impairment of urban creeks resulting from pesticide contamination and pesticide-caused toxicity is a systemic problem in Contra Costa County and throughout the Bay Area (SFBRWQCB 2005, Ruby 2013).

The sources of these impairments are applications of legally registered pesticides by certified professional pest control operators and uses of over-the-counter products by individual residents and business proprietors. As noted in the TMDL:

> "Urban runoff contains pesticides as a result of pesticides being manufactured, formulated into products, and sold through distributors and retailers to businesses and individuals who apply them for structural pest control, landscape maintenance, agricultural, and other pest management purposes." (SFBRWQCB 2005)

The process of addressing the known water quality impairments and sources of pesticide contamination is ongoing through implementation of the Pesticides Toxicity Control Program per MRP Provision C.9; that program represents the essential follow-up on a continuing basis to the findings presented in this report.

Over the course of 2024, CCCWP will evaluate the effectiveness of existing management actions and identify additional management actions needed to address water quality impairments, as required by MRP Provisions C.8.h.iii.(3)(a)(vi) and (vii). This evaluation will be conducted in fulfilment of the more detailed requirements of Provision C.9.g (Evaluate Implementation of Pesticide Source Control Actions), and the results will be reported in the 2025 Annual Report.

During this evaluation, hypotheses may be developed along with possible studies to further investigate ways of improving control program effectiveness.

4 Conclusions and Recommendations

4.1 Conclusions

4.1.1 Wet Weather Pesticides and Toxicity Monitoring

Wet weather monitoring was conducted for pesticides and toxicity with samples collected during a storm event on November 8, 2022 from Walnut Creek at Concord Avenue (site ID 207R02615) and Pinole Creek (site ID 206PNL010). The wet weather monitoring was coordinated by the BAMSC collaborating partners, each of which collected samples during the November 8, 2022 storm event.

Both the Walnut Creek (site ID 207R02615) and Pinole Creek (site ID 206PNL010) stormwater samples were toxic to *Hyalella azteca*. The toxic effect in the Walnut Creek sample was equal to 50% of the lab control; therefore, the *Hyalella azteca* test required retesting.

Samples were collected for the retest from the Walnut Creek site during a storm event on January 10, 2023. In the retest, the sample was again toxic to *Hyalella azteca*, but at a toxic effect less than 50%.

Measured pyrethroid pesticide concentrations were sufficient to cause the toxicity observed in both the Walnut Creek (site ID 207R02615) and Pinole Creek (site ID 206PNL010) November 8, 2022 stormwater samples, as well as in the Walnut Creek January 10, 2023 retest sample, due to elevated concentrations of bifenthrin, cyhalothrin/lambda, and deltamethrin.

4.1.2 Dry Weather Pesticides and Toxicity Monitoring

Dry weather water and sediment samples were collected on July 18, 2023 from Walnut Creek at Concord Avenue (site ID 207R02615), the same site used for the POC receiving water limitations monitoring in Contra Costa County, and one of the sites monitored in the water year 2023 wet weather pesticides and toxicity monitoring.

The water sample test for the aquatic invertebrate *Chironomus dilutus* (midge) was determined to be toxic, but at a relatively low effect level (15%). No other water sample test results were toxic. Neither of the sediment sample tests were toxic to the aquatic invertebrates tested.

4.2 Comparisons to Prior Conditions

The results indicating toxicity to aquatic invertebrates, with accompanying chemistry data showing elevated concentrations of current-use pesticides, continue a long-standing trend in Bay Area urban creeks, as documented by past CCCWP monitoring reports (see e.g., CCCWP 2020) and the Bay Area Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL (SFBRWQCB 2005).

4.3 Comparisons to Water Quality Standards

The determinations of toxicity to aquatic invertebrates documented in this report represent apparent violations of the narrative toxicity water quality standard in the San Francisco Bay Basin Plan (SFBRWQCB 2023), as well as the narrative sediment objective and the narrative population and community ecology objective.

The Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL aims to protect aquatic organisms generally and "ensure that urban creeks meet applicable water quality standards established to protect and support beneficial uses" (SFBRWQCB 2005).

The statistically significant findings of toxicity presented above also arguably represent exceedances of the TMDL's numeric target for pesticide-related toxicity, as it is clear from the chemistry data that pesticides likely "cause or contribute to the toxicity."

As stated in the TMDL, "Urban creek waters that fail to meet these objectives are not protective of cold and warm freshwater habitats" (Basin Plan Ch. 7, SFRWQCB 2023).

4.4 Impairments and Sources

Impairments of the waters of Walnut Creek and Pinole Creek are potentially indicated by the results of the toxicity testing documented in this report, and the likely sources of the impairments are applications of pyrethroid and other pesticides within the respective watersheds.

4.5 Recommendations for Follow-up Actions

Continued implementation of CCCWP's Pesticides Toxicity Control program as defined in MRP Provision C.9, including the planned activities for fiscal year 2023/24 as listed in the CCCWP Annual Report for Fiscal Year 2022/23 (CCCWP 2023), is recommended.

A thorough evaluation of the effectiveness of existing management actions and the potential need for additional management actions or other program improvements will be undertaken during 2024 in fulfilment of the requirements of MRP Provision C.9.g (Evaluate Implementation of Pesticide Source Control Actions), and the results will be reported in the 2025 annual report.

5 References

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Appendix 6

East County Annual Mercury Monitoring Plan: Water Year 2025

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Contra Costa Clean Water Program

East County Annual Mercury Monitoring Plan: Water Year 2025

Submitted to the San Francisco Bay and Central Valley Regional Water Quality Control Boards

In Compliance with NPDES Permit Provision C.19.d.iii.(1)
Municipal Regional Stormwater Permit (Order No. R2-2022-0018)

March 31, 2024

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255 Glacier Drive
Martinez, California 94553

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Contra Costa Clean Water Program

East County Annual Mercury Monitoring Plan: Water Year 2025

March 31, 2024

Submitted to

San Francisco Bay and Central Valley Regional Water Quality Control Boards
in Compliance with NPDES Permit Provision C.19.d.iii.(1)
Municipal Regional Stormwater Permit (Order No. R2-2022-0018)

Prepared for

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Contra Costa Clean Water Program Participants

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Acronyms and Abbreviations

CCCWP	Contra Costa Clean Water Program
CCCDD	Contra Costa County Community Development Department
CVRWQCB	Central Valley Regional Water Quality Control Board
Delta	Sacramento-San Joaquin River Delta
MeHg	methylmercury
MRP	Municipal Regional Stormwater Permit
monitoring plan	Annual Mercury Monitoring Plan
MS4	Municipal Separate Storm Sewer System
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
QA/QC	quality assurance/quality control
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SSC	suspended sediment concentration
SWAMP	Surface Water Ambient Monitoring Program
TMDL	Total Maximum Daily Load
WWTP	wastewater treatment plan
WY	water year

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1 Introduction

The Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP) (SFBRWQCB 2022) requires East County Permittees to prepare an annual mercury monitoring plan to propose sampling locations, methodologies, and strategies for methylmercury monitoring required under Provision C.19.d.ii.(2) in Contra Costa County. Sampling locations can include, but are not limited to, Marsh Creek (downstream of the Reservoir), Central Delta, and West Delta Subarea tributaries within the MS4 permit boundary.

1.1 MRP Provision

Contra Costa County lies within the jurisdictions of both the San Francisco Bay (Region 2) and Central Valley (Region 5) Regional Water Quality Control Boards (SFBRWQCB and CVRWQCB, respectively). Municipal stormwater discharges in Contra Costa County are regulated by the requirements of MRP 3.0 for urban stormwater in Region 2 (Order No. R2-2022-0018), which incorporates the eastern portion of Contra Costa County within the requirements of the Region 2 MRP. The East County Annual Mercury Monitoring Plan is submitted in compliance with reporting requirements specified in Provision C.19.d.iii.(1) of MRP 3.0, as issued by SFBRWQCB Order No. R2-2022-0018.

Each year, as part of the Urban Creeks Monitoring Report, East County Permittees are required to submit a monitoring plan to address questions presented in Provision C.19.d.ii.(2).

Monitoring questions presented in Provision C.19.d.ii.(2) include:

a) *What are the annual methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?*
b) *Do methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?*
c) *Are there any MS4 design features that increase mercury methylation in the discharge?*
d) *What MS4 water quality controls have been implemented or are planned to be implemented to reduce methylmercury production and transport in the MS4 discharge?*
e) *By January 1, 2024, address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March and mid-November), and, if so:*
    i) *Under what hydrologic or seasonal circumstances do increased methylmercury concentrations reach the Delta?*
    ii) *Are there reasonable and foreseeable management actions to ameliorate increased methylmercury concentrations?*

As discussed in the Annual Mercury Monitoring Plan for water year 2024 (CCCWP 2023a), sampling efforts to address monitoring questions presented in Provision C.19.d.ii.(2)(a)-(b) are currently underway. In water year 2025, CCCWP plans to continue data collection to expand on baseline datasets in the West and Central Delta subareas. As presented in the Annual Mercury Monitoring Report for fiscal year 2023-2024 (CCCWP 2023b), sampling conditions to address the monitoring question in Provision C.19.d.ii.(2)€ by Jan. 1, 2024, were not present in water year 2023, so are again being targeted in water year 2024.

2 Delta Methylmercury TMDL and CCCWP Study Area

The CVRWQCB established methylmercury wasteload allocations for all dischargers to the Sacramento-San Joaquin River Delta (Delta) through the Delta Methylmercury Total Maximum Daily Load (Delta Methylmercury TMDL) management tool. The goal of the Delta Mercury TMDL is to bring methylmercury concentrations in fish down to levels considered to be protective of people and wildlife who consume fish from the Delta. The Delta Methylmercury TMDL translates desired levels of mercury in fish to a water column target of 0.06 ng unfiltered methylmercury per liter of water (0.06 ng/L). The concept behind this TMDL policy is that if all waters of the Delta were to attain a concentration of 0.06 ng/L, fish within the Delta would then attain desired levels of methylmercury (CVRWQCB 2010).

Motivation for monitoring is driven by determination from the CVRWQCB that mercury concentrations in fish species found in the Delta exceed acceptable levels for protection of human health and wildlife that depend on fish for food (CVRWQCB 2010). The root causes of elevated levels of mercury are legacy mining and old industrial sources, along with global atmospheric sources and smaller contributions from urban stormwater sources (CCCWP 2013). Methylmercury is a form of mercury of heightened environmental concern because it binds to proteins and, therefore, bioaccumulates in organisms and biomagnifies at successively higher levels of the food chain.

The Delta Methylmercury TMDL identifies eight geographic subareas for monitoring (Figure 1). Of these eight geographic subareas, the West Delta, Central Delta, and Marsh Creek subareas are in Contra Costa County. Discharges into these subareas are regulated by Provision C.19.d of MRP 3.0 in accordance with the Delta Methylmercury TMDL. The three geographic subareas located within CCCWP jurisdiction are presented below.

2.1 West Delta Subarea

The West Delta subarea includes the watersheds of West Antioch Creek and East Antioch Creek (Figure 2). Both watersheds are in the northeastern part of Contra Costa County and are part of a creek system that drains from the hills south of Antioch to the Delta. The main stem of West Antioch Creek flows from its headwaters on East Bay Regional Parks District Land, toward its confluence with Markley Canyon Creek just north of Highway 4. While channelized in much of its lower half, West Antioch Creek remains natural for most of its length. Many of the tributaries that make up the watershed are routed underground to provide flood protection and drainage through the more developed areas. Flowing for 6.24 miles, West Antioch Creek joins these tributaries in a channelized section of stream surrounded by urban development in the City of Antioch before passing through the Dow Wetlands Preserve and discharging into the Delta (CCCDD 2003).

The East Antioch Creek watershed begins at low elevation headwaters near Lone Tree Way in the City of Antioch by the border with the City of Brentwood. The watershed contains one primary stream branch (East Antioch Creek) and no tributaries. Trending in a northwest direction, East Antioch Creek flows 7.87 miles prior to joining the Delta. Except for a 1-mile underground stretch south of Highway 4, much of the creek is an aboveground earthen channel. Several detention basins and levees have been constructed along East Antioch Creek to contain storm flows. Prior to discharging to the Delta, water from East Antioch Creek flows into Lake Alhambra, a manmade impoundment constructed to contain storm flows (CCCDD 2003).

West Delta subarea proposed sampling locations for water year 2025 are in the West Antioch Creek and East Antioch Creek watersheds. A discussion of site details for these locations begins in Section 3.

2.2 Marsh Creek Subarea

The Marsh Creek subarea is comprised entirely by the Marsh Creek watershed (Figure 3). Located in the northeastern part of Contra Costa County, the Marsh Creek watershed is the second largest in the county, encompassing over 60,000 acres and flowing 34.57 miles before exiting into the Delta at Big Break Regional Shoreline (CCCDD 2003).

The headwaters of Marsh Creek flow from the eastern side of Mount Diablo, across the Mount Diablo foothills and Morgan Territory preserve into the Marsh Creek Reservoir. Historically, downstream of the Reservoir, this area of Marsh Creek meandered through an alluvial plain north of the Reservoir before joining the Delta. However, at the turn of the twentieth century, flood control authorities and farmers began altering the channel and surrounding landscape to protect agricultural resources that have served the area since the mid-1800s. This intended alteration of flow, including the construction of levees, detention ponds and a dam, introduced a modified hydrological state from the creek's natural system in the lower watershed.

In water year 2025, a proposed sampling location for the Marsh Creek subarea may be located on the main branch of Marsh Creek, and will only be sampled if the monitoring question presented in Provision C.19.d.ii.(2)(e) cannot be answered in water year 2024. A discussion of site details for this location is provided in CCCWP's Annual Mercury Monitoring Plan for water year 2023 (CCCWP 2022).

2.3 Central Delta Subarea

The Central Delta subarea includes the Kellogg Creek and Brushy Creek watersheds (Figure 4), and the East County Delta drainages (Figure 5). The Kellogg Creek and Brushy Creek watersheds are in the southeastern portion of Contra Costa County, bordering Alameda and San Joaquin Counties. Due to the rain shadow effect of Mt. Diablo, average rainfall in the upper watersheds averages approximately 20 inches per year, and falls to 10 inches or less in the lower watershed. Developed areas remain at a minimum in the Kellogg Creek and Brushy Creek watersheds, with all land a part of unincorporated Contra Costa County. The 32.6 square mile Kellogg Creek watershed includes the Los Vaqueros Reservoir, a reservoir that can store up to 100,000 acre-feet of water, pumped to the facility from an intake near Old River Road by Discovery Bay (CCCDD 2003). The Brushy Creek watershed is approximately 37.1 square miles, predominantly characterized by agriculture and undeveloped open space, with the longest stream branch being Brushy Creek at 12.5 miles. Brushy Creek flows into Old River and the Clifton Court Forebay, eventually draining into the Delta (CCCDD 2003).

The East County Delta Drainages of Contra Costa County are a series of bays and meandering tidally influenced waterways. Many of the islands that constitute the land area of the East County Delta drainages are below sea level, as soils reclaimed from surrounding marshes have oxidized, resulting in subsiding land masses which are kept dry by peripheral levees. Major levee breaks in the area have occurred, creating new water bodies such as Franks Tract and the aptly named Big Break (CCCDD 2003). The highest elevation in the watershed is 100 feet, with the lowest elevation at 20 feet below sea level. Surface water in the area is characterized by crisscrossing irrigation canals, channelized through flood control and agricultural infrastructure bringing water from the low-lying interior eastward to the Delta.

Characterized by low gradient, predominantly tidally influenced waterways with lack of public access, sampling locations in the East County Delta drainages are not abundant, but are scheduled for sampling in water year 2025 for baseline data collection in the area.

Proposed monitoring locations within Kellogg Creek, Brushy Creek, and the East County Delta drainages scheduled for sampling in water year 2025 are discussed in Section 3.

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3 Sampling Locations and Schedule

The monitoring schedule for methylmercury sampling is presented by Delta subarea in Table 1.

In water year 2025, the West Delta and Central Delta subareas are scheduled for sampling. Sampling in the Marsh Creek subarea will be targeted if sampling conditions to address the monitoring question in Provision C.19.d.ii.(2)(e) are not present in water year 2024.

Table 1. Monitoring Schedule for Delta Subareas in Contra Costa County, WY2023-2027

Monitoring Year (WY)	Delta Subarea		
	West Delta	Marsh Creek	Central Delta
2023		X	
2024	X	X[1]	X
2025	X	X[2]	X
2026	TBD	TBD	TBD
2027	TBD	TBD	TBD

X Indicates that the location has been sampled or is scheduled for sampling
1 Location added in summer of 2023, after submittal of WY 2022 UCMR; which included WY 2024 East County Annual Mercury Monitoring Plan
2 Location tentatively scheduled, dependent upon WY 2024 sampling results
WY water year
TBD Sampling schedule in these subareas will be determined by results of sampling in water years 2023-2025.

Details of the proposed sampling locations in water year 2025, including site location ID, site coordinates, and site descriptions for targeted locations, are presented in Table 2.

Table 2. Proposed Water Year 2025 Sample Location Details

Delta Subarea	Creek Name	Site ID	Latitude	Longitude	Site Description
West Delta	West Antioch	A1	38.00994	-121.82362	Bottom of watershed, above tidal influence
	East Antioch	A2	38.01054	-121.79682	Discharge from Lake Alhambra flap gate valve
	East Antioch	A3	38.00644	-121.78748	East Antioch Creek, upstream of Lake Alhambra
Marsh Creek	Marsh Creek	M2	37.96264	-121.68786	Marsh Creek, above Brentwood WWTP discharge
Central Delta	Kellogg Creek	K1	37.88907	-121.62879	Bottom of watershed, above tidal influence
	Brushy Creek	B1	37.84003	-121.62312	Bottom of watershed, above tidal influence
	NA	D1	37.91801	-121.64119	East County Delta drainage, above tidal influence

NA not applicable, unnamed channel
WWTP wastewater treatment plant

Sampling in Contra Costa County Delta subareas will be conducted during both the dry season and wet season, with a minimum of eight samples collected over the course of water year 2025. Dry weather samples will be collected during baseflow conditions in the late spring or early summer, depending upon hydrologic conditions. One dry season event will be targeted, with one sample being collected at each of the six sampling locations no sooner than 30 days after the last significant rainfall. Wet season samples will be collected during elevated stream stages, where flow conditions have been influenced by stormwater runoff. One wet season event will be targeted, with one sample being collected at each of the six sampling locations. A total of twelve samples are scheduled for collection over the course of water year 2025.

3.1 West Antioch Creek

Monitoring site A1 is on the main stem of West Antioch Creek. The site is located downstream of the confluence with the Markley Canyon Creek tributary near the bottom of the watershed. Located above tidal influence and below all major tributaries, this section of West Antioch Creek was selected to build upon baseline monitoring results collected by CCCWP in water years 2015 and 2024. Monitoring at site A1 will also determine methylmercury concentrations in West Antioch Creek prior to discharging into the Delta.

3.2 East Antioch Creek

Monitoring site A2 is located downstream of Lake Alhambra at the Lake's discharge point just above a tidally influenced section of East Antioch Creek. Samples will be collected near or from the discharge point flap gate prior to any tidal influence on the sample. Monitoring at this section of East Antioch Creek is selected to investigate if methylating conditions are present in Lake Alhambra and to build upon baseline monitoring data collected by CCCWP in water years 2015 and 2024. Monitoring at site A2 will also determine methylmercury concentrations in East Antioch Creek prior to discharging into the Delta.

Monitoring site A3 is located upstream of Lake Alhambra on the main branch of East Antioch Creek. Monitoring at this site of East Antioch Creek is selected to provide methylmercury ratio comparisons with data collected from samples at site A2 below Lake Alhambra. Sampling at this location will also build upon baseline monitoring data collected by CCCWP in water years 2015 and 2024.

3.3 Marsh Creek

Conditions to obtain data to satisfy the monitoring question in Provision C.19.d.ii.(2)(e) are anticipated to be present in water year 2024 if annual precipitation does not again greatly exceed annual averages for the area (see CCCWP 2023b). If data collected in water year 2024 within the Marsh Creek subarea do not address monitoring requirements in Provision C.19.d.ii(2)(e), CCCWP will target monitoring site M2 again in water year 2025.

3.4 Kellogg Creek

As with the Brushy Creek watershed sampling site, the sampling location at Kellogg Creek is located at the bottom of the Kellogg Creek watershed below major tributary confluences and above tidal influence from the Delta. CCCWP began methylmercury monitoring at this location in water year 2024. This monitoring site was selected to investigate hydrologic and seasonal conditions during which methylmercury may discharge into the Delta.

3.5 Brushy Creek

The monitoring site at Brushy Creek is located at the bottom of the Brushy Creek watershed below major tributary confluences and above tidal influence from the Delta. CCCWP began methylmercury monitoring at this location in water year 2024. This monitoring site was selected to investigate hydrologic and seasonal conditions during which methylmercury may discharge into the Delta.

3.6 East County Delta Drainages

East County Delta drainages are characterized primarily by agricultural irrigation canals and low elevation drainages. To establish a dataset associated with East County Delta drainages runoff, CCCWP will target a location near Discovery Bay to investigate under what hydrologic and seasonal conditions methylmercury may reach the Delta from East County Delta drainages.

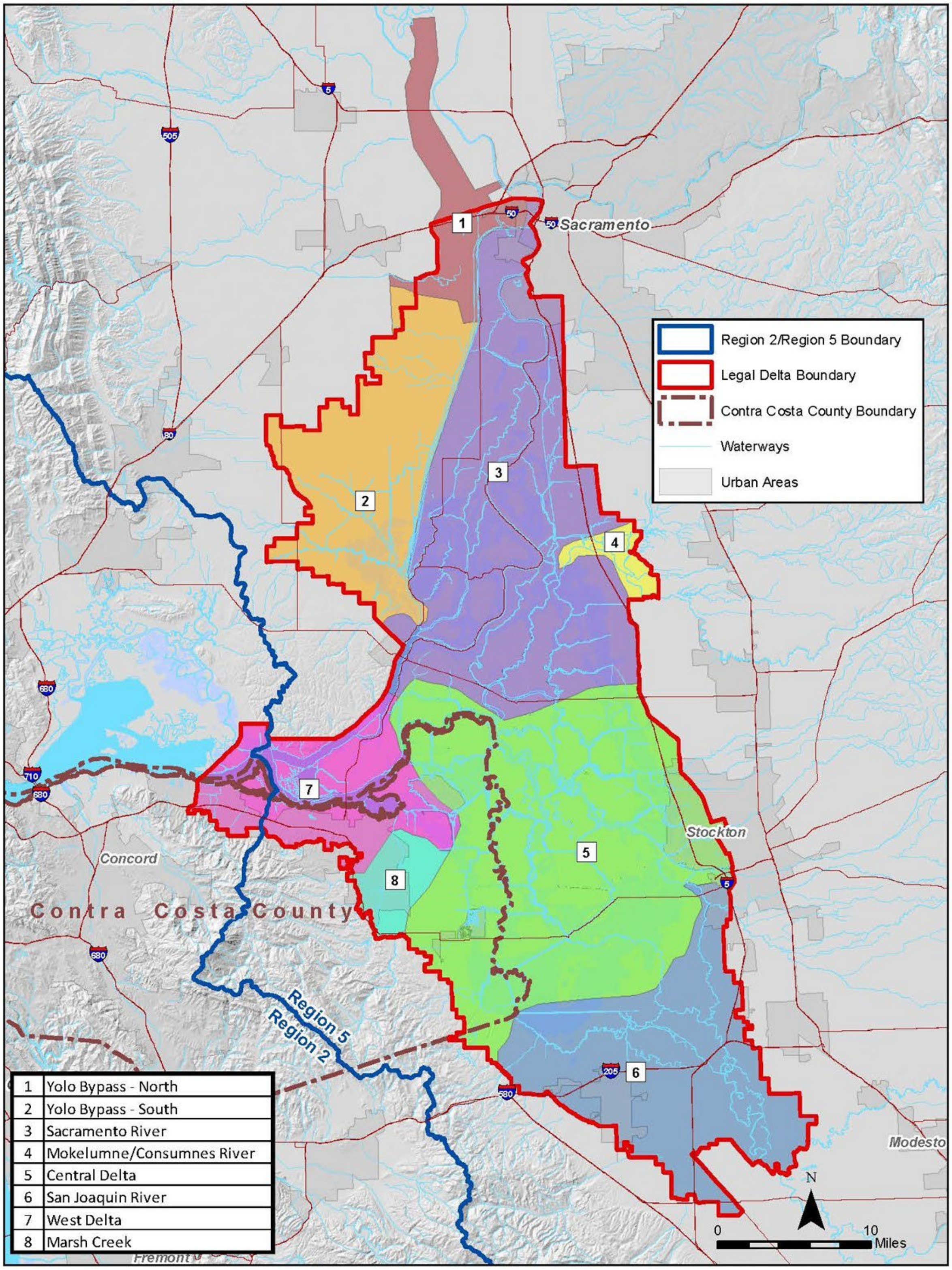

Figure 1. **Delta Subareas Defined in the Methylmercury TMDL**

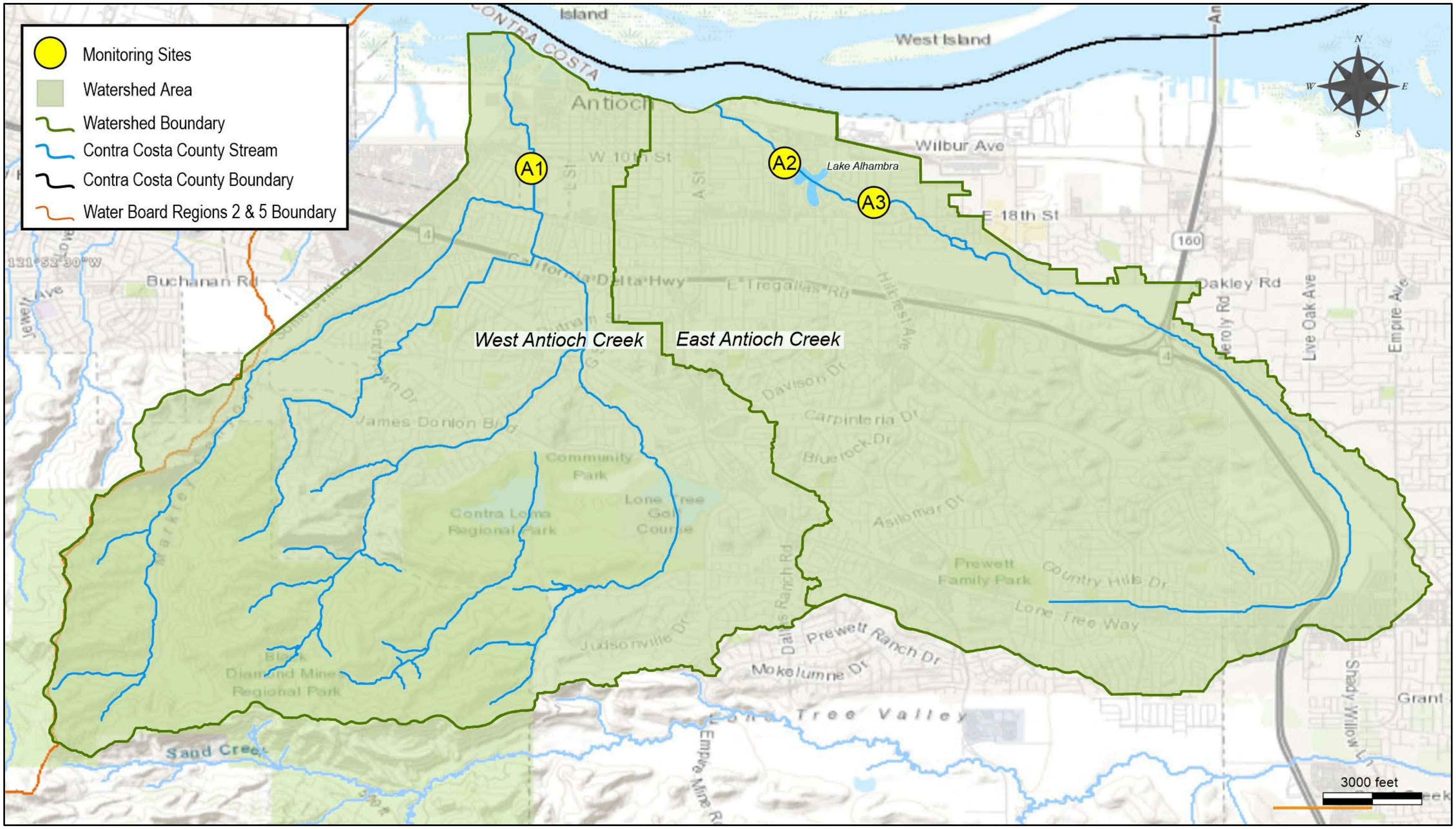

Figure 2. Overview of West Antioch Creek and East Antioch Creek Watersheds with West Delta Subarea Monitoring Sites A1-A3

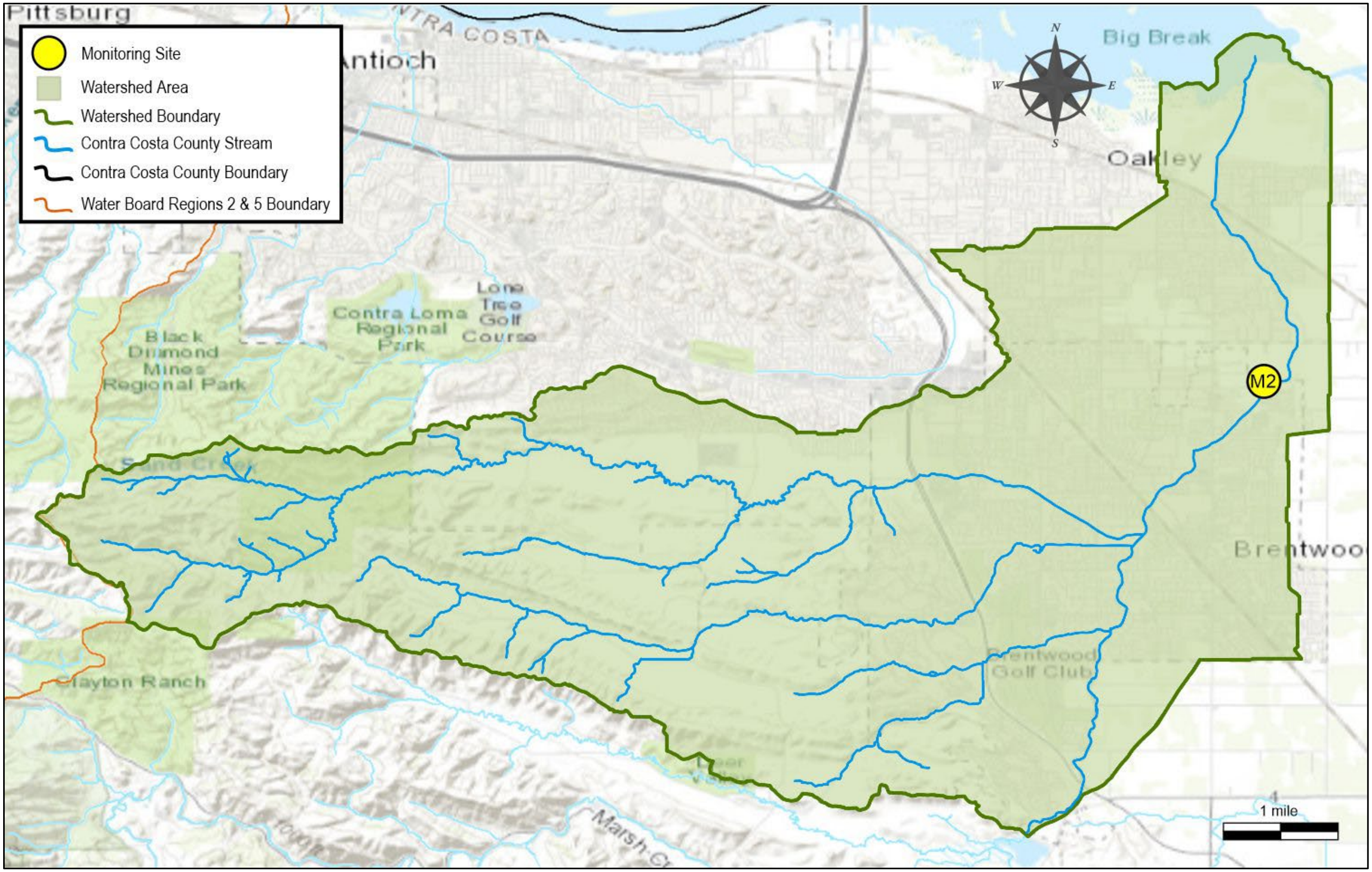

Figure 3. Overview of Marsh Creek Watershed with Marsh Creek Subarea Monitoring Site M2

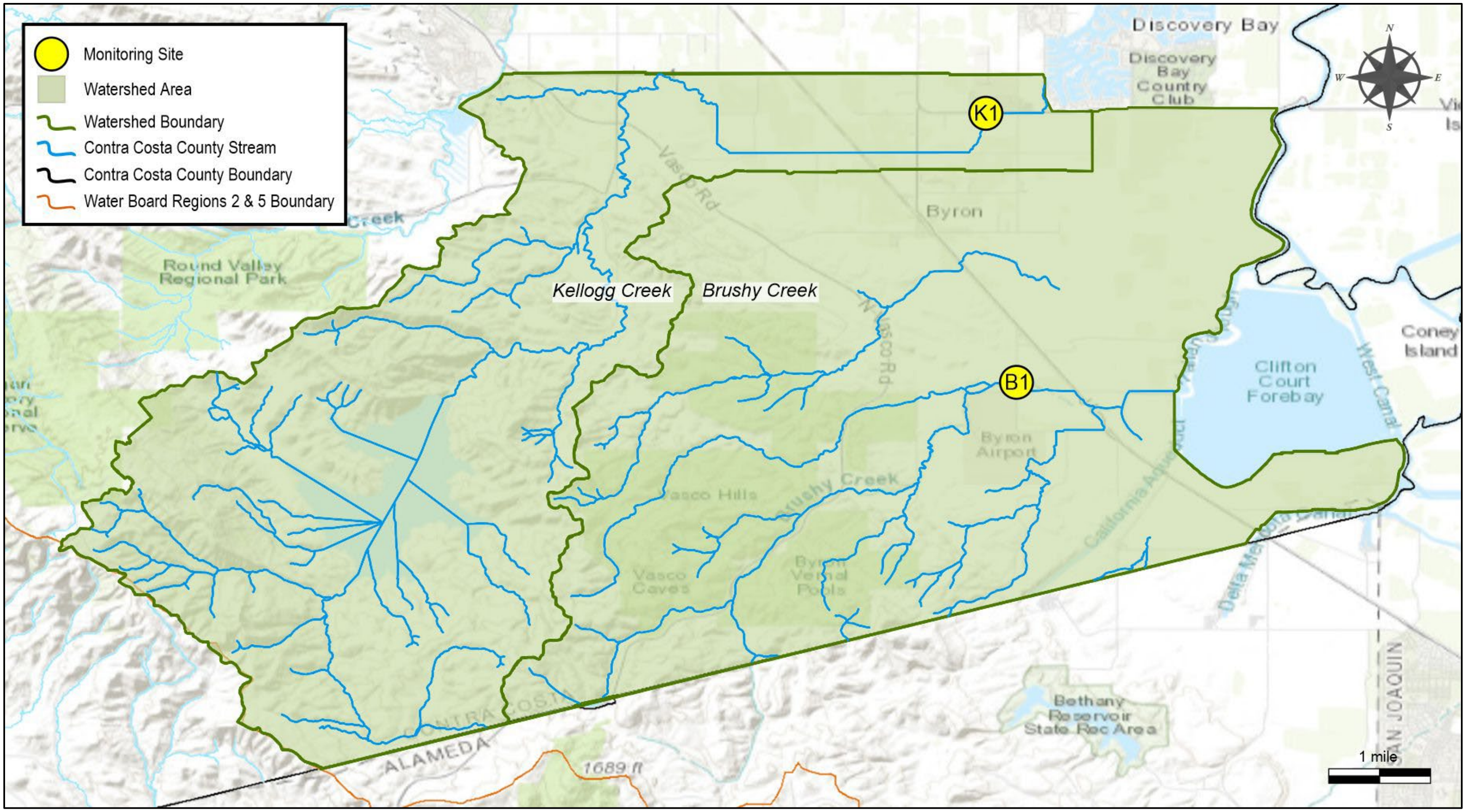

Figure 4. Overview of Brushy Creek and Kellogg Creek Watersheds with Central Delta Subarea Monitoring Sites B1 and K1

Figure 5. Overview of East County Delta Drainages with Central Delta Subarea Monitoring Site D1

4 Methods and Quality Assurance / Quality Control Overview

Sampling events and monitoring sites targeted in water year 2025 are intended to collect data to continue addressing MRP monitoring questions posed in Provision C.19.d.ii.(2)(a)-(d):

a) *What are the annual methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?*

b) *Do the methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?*

c) *Are there any MS4 design features that increase mercury methylation in the discharge?*

d) *What MS4 water quality controls have been implemented or are planned to be implemented to reduce methylmercury production and transport in the MS4 discharge?*

Field and laboratory methods to be used in the implementation of methylmercury monitoring are presented in Section 4.1.

4.1 Field Sampling and Laboratory Methods

Sample collection will be performed following clean hands/dirty hands grab sampling protocols (EPA Method 1669) for low-level mercury (EPA Method 1631E) and low-level methylmercury analysis (EPA Method 1630). At the time of grab sample collection, field measurements and observations will be made on designated field logs by the field crew, including field measurements for dissolved oxygen, pH, and water temperature. Photos and/or video will be taken to document field conditions at the time of sampling.

Analytes, methods, reporting limits, and holding times for analytes to be collected as part of this monitoring plan are presented in Table 3. Samples will be analyzed by Caltest Analytical Laboratory in Napa, California. Total mercury and total methylmercury are analyzed together (from the same sample). This is done so that methylation ratios can be calculated to indicate if samples were collected from an environment where enhanced methylation is present. Samples for suspended sediment concentration are collected and analyzed concurrent with mercury samples. This is done so that mercury results can be normalized by suspended sediment concentrations to provide an estimate of particle ratios (i.e., mercury to sediment expressed in parts per billion).

Table 3. Analytes, Methods, Reporting Limits, and Holding Times

Analyte	Method	Reporting Limit	Holding Time
Total (Unfiltered) Mercury	EPA 1631E	0.5 ng/L	90 days
Total (Unfiltered) Methylmercury	EPA 1630	0.05 ng/L	90 days
Suspended Sediment Concentration	ASTM D3977-97B	3 mg/L	7 days

4.2 Quality Assurance/Quality Control

California's Surface Water Ambient Monitoring Program (SWAMP) provides timely and high-quality data to evaluate the condition of surface waters throughout the state. This is accomplished through carefully designed, externally reviewed monitoring programs and assistance to other entities state-wide in the generation of comparable data through integrated assessments. This project will use SWAMP-specified methods related to sample handling, data review, verification and validation, and measurement quality objectives as the basis for evaluating project data with the goal of it being comparable to the standard of known and documented quality that has been set by SWAMP (SWAMP 2022).

Following SWAMP guidelines, adherence to proper sample collection, sample handling, and analytical methods will ensure water samples are collected and analyzed without the inadvertent introduction of contamination from an exterior source and that they are representative of their sampling locations. These methods and procedures include clean sample collection and handling protocols for field and quality assurance/quality control (QA/QC) samples, use of appropriate sample containers and preservation, accurate and complete field logs and chain-of-custody forms, oversight by a qualified quality assurance officer, and the internal QA/QC procedures performed by the laboratories.

For more details about sample collection and handling and other related issues, refer to the Project Sampling and Analysis Plan (ADH and AMS 2020a). For more details regarding the monitoring plan's quality assurance and quality control measures, refer to the project quality assurance project plan (ADH and AMS 2020b).

5 Summary

Data collected in water year 2025 will be used to help establish trends, adding to previous years monitoring data, and will be discussed in the Pollutants of Concern Monitoring Report, submitted annually with the Urban Creeks Monitoring Report on March 31 and East County Annual Mercury Monitoring Report, submitted annually on September 30.

As discussed in the Annual Mercury Monitoring Plan for water year 2023 (CCCWP 2022), the conceptual model for methylmercury monitoring in Delta subareas starts with the knowledge that methylmercury is formed from total mercury. Total mercury loads in watersheds are transported into waterbodies via stormwater. Potential sources of total mercury in stormwater include mobilization from legacy mercury mines, improper disposal of mercury-containing consumer products (batteries and fluorescent lights), to atmospheric deposition. The methylation process from total mercury to methylmercury occurs primarily and most efficiently, in slow-moving or stagnant waterbodies, where metabolic activity by methylating bacteria is relatively high, either in the waterbody itself or in the bottom sediments of ponds, reservoirs, and slow-moving streams.

With this conceptual model as the guiding framework, sample locations where methylating conditions may be present can be targeted, such as Lake Alhambra on East Antioch Creek. Percent methylation is an indicator of methylation efficiency, or net methylation rates (Krabbenhoft et al. 1999). Almost any uncontaminated soil-water system could be expected to have 1 to 3 percent methyl-total ratios. Moderately high methylation efficiency is indicated by methyl-total ratios of around 5 percent. Waters with methyl-total ratios exceeding 10 percent are considered to have high methylation efficiencies (i.e., are highly methylating).

By targeting monitoring events at strategic locations, samples collected will help determine whether methylating conditions are present and in which watersheds and will help determine methylmercury concentrations that may be reaching Delta receiving waters.

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6 References

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Attachment A

Electronic Data Transmittal Letter dated April 2, 2024, with attached file list

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CONTRA COSTA
CLEAN WATER
PROGRAM

April 2, 2024

Eileen White, Executive Officer
California Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Patrick Pulupa, Esq., Executive Officer
California Regional Water Quality Control Board, Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

SUBJECT: Submittal of Electronic Status Monitoring Data Report in Accordance with MRP 3 Provisions C.8.h.ii and C.8.h.iv

Dear Ms. White and Mr. Pulupa:

Provision C.8.h.ii of the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (Order No. R2-2022-0018) requires submittal of monitoring data collected during the previous water year to the California Environmental Data Exchange Network (CEDEN). Data that CEDEN cannot accept are exempt from this requirement. Enclosed please find documentation that applicable monitoring data were uploaded to CEDEN in a Surface Water Ambient Monitoring Program (SWAMP) compatible format on behalf of all Contra Costa County Permittees. Provision C.8.h.iv stipulates that pollutants of concern monitoring data, not reportable to CEDEN, be included with the Urban Creeks Monitoring Report (UCMR). Per historic practice, the Contra Costa Clean Water Program (CCCWP) has also transmitted monitoring data to SFBRWQCB staff (Mr. Zach Rokeach)and CVRWQCB staff (Ms. Elizabeth Lee) electronically by share site.

With the approval and direction from each duly authorized representative of each CCCWP Permittee, I have been authorized to submit and certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.

Regards,

Rinta Perkins
Interim Program Manager
Contra Costa Clean Water Program

cc: Tom Mumley, Keith Lichten, Joseph Martinez, Zach Rokeach, and Richard Looker, SFBRWQCB
Elizabeth Lee, CVRWQCB
Contra Costa Clean Water Program (CCCWP) Permittees

Folder	Name	Contents
Pesticides and Toxicity Monitoring	CCCWP_PT_Dry_Weather_Sediment_Chemistry_WY2023.xlsx	Sediment chemistry data from station 207R02615
Pesticides and Toxicity Monitoring	CCCWP_PT_Dry_Weather_Toxicity_WY2023.xlsx	Water and sediment toxicity data from station 207R02615
Pesticides and Toxicity Monitoring	CCCWP_PT_Wet_Weather_Toxicity_WY2023_Event1.xlsx	Water toxicity data from station 207R02615 and 206PNL010
Pesticides and Toxicity Monitoring	CCCWP_PT_Wet_Weather_Toxicity_WY2023_Event2.xlsx	Water toxicity data from station 207R02615
Pesticides and Toxicity Monitoring	CCCWP_PT_Wet_Weather_Water_Chemistry_WY2023_Event1.xlsx	Water chemistry data from stations 207R02615 and 206PNL010
Pesticides and Toxicity Monitoring	CCCWP_PT_Wet_Weather_Water_Chemistry_WY2023_Event2.xlsx	Water chemistry data from stations 207R02615
Pollutants of Concern Monitoring\	CCCWP 2023 POC Results.pdf	Pollutants of Concern Monitoring data
Marsh Creek DO Monitoring\	CCCWP_BOD_WY2023_Event1.xlsx	Biochemical Oxygen Demand data from Marsh Creek
Marsh Creek DO Monitoring\	CCCWP_BOD_WY2023_Event2.xlsx	Biochemical Oxygen Demand data from Marsh Creek
Reports\	CCCWP_UCMR_WY 2023_with Appendices_FINAL.pdf	WY 2023 UCMR Report with Appendices
	CCCWP_WY2023_UCMR Letter to RB2RB5 (4-2-2024)	Submission letter to RWQCB, San Francisco Bay and Central Valley Regions