URBAN CREEKS MONITORING REPORT

PART B: TRASH MONITORING PROGRESS REPORT

Water Year 2023 (October 2022 – September 2023)

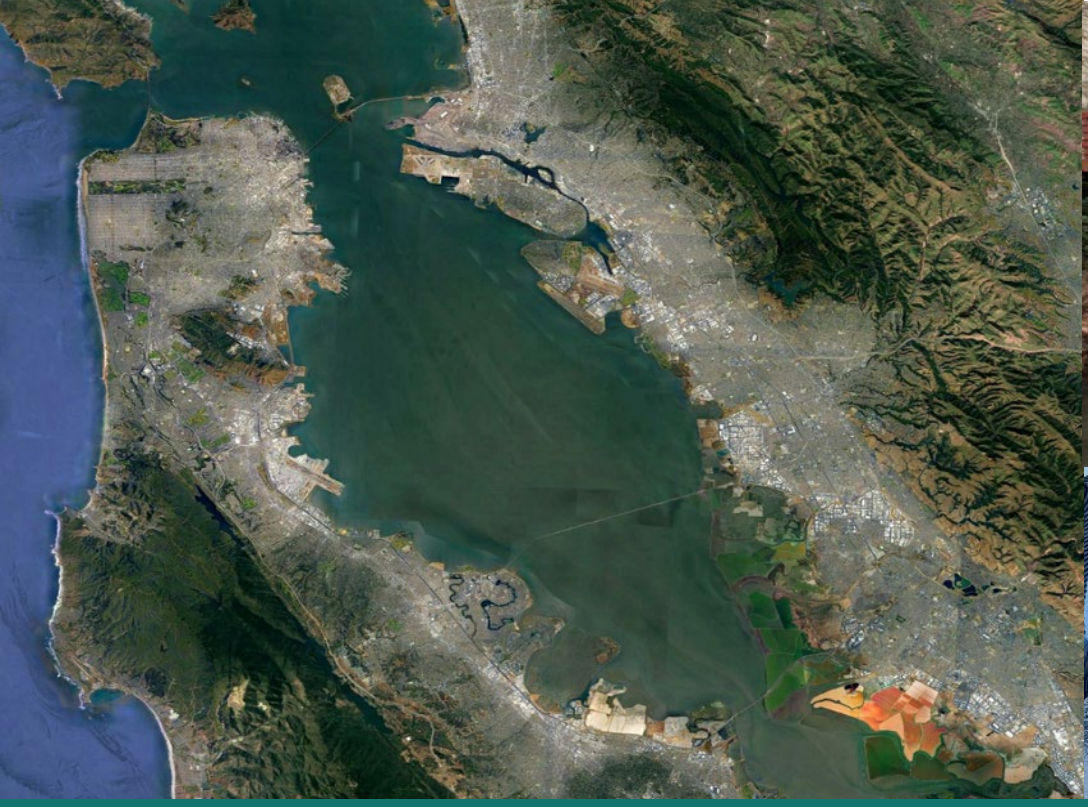


Submitted in Compliance with
NPDES Permit No. CAS612008 (Order No. R2-2022-0018)
Provision C.8.h.iii.(2)

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program

A Program of the City/County Association of Governments of San Mateo County

March 31, 2024



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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LIST OF ACRONYMS

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.

Outfall Monitoring. 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.

Trash TAG Meeting #1 (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”

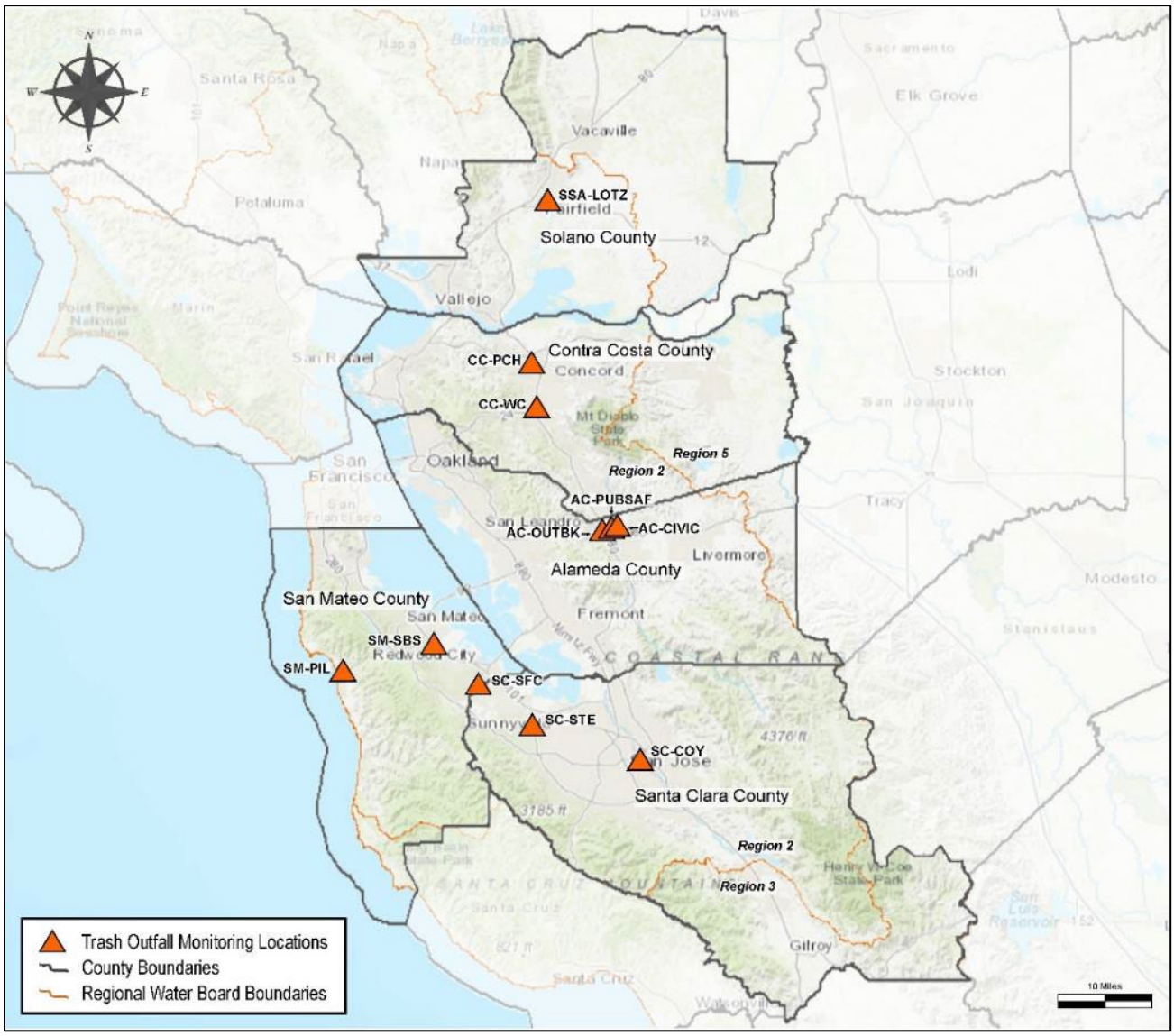

Figure 1. Trash Stormwater Outfall Monitoring Sites

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.

Flow Measurement: 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.

[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)

Accomplishments During WY 2023

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.

Pre-Monitoring Tasks Planned for Early WY 2024

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.

Planned Refinements to Monitoring Plan

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.

Monitoring Site Descriptions

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.

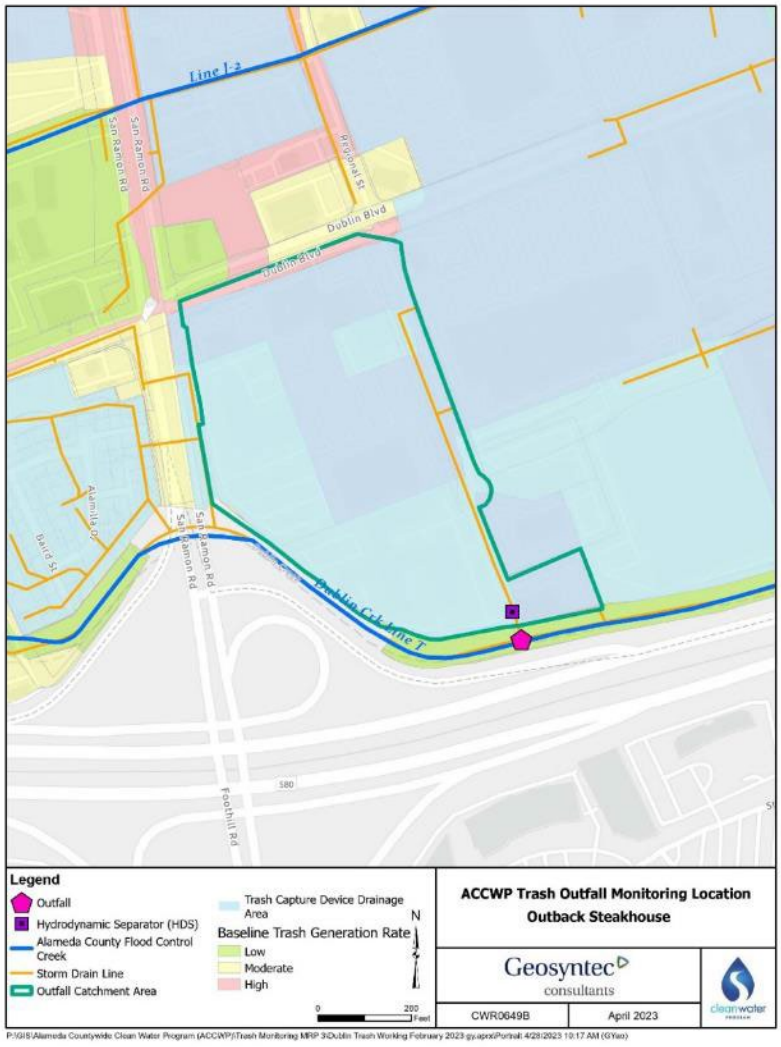

Figure AC-1. Trash monitoring catchment area at Outback Steakhouse in the City of Dublin.

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.

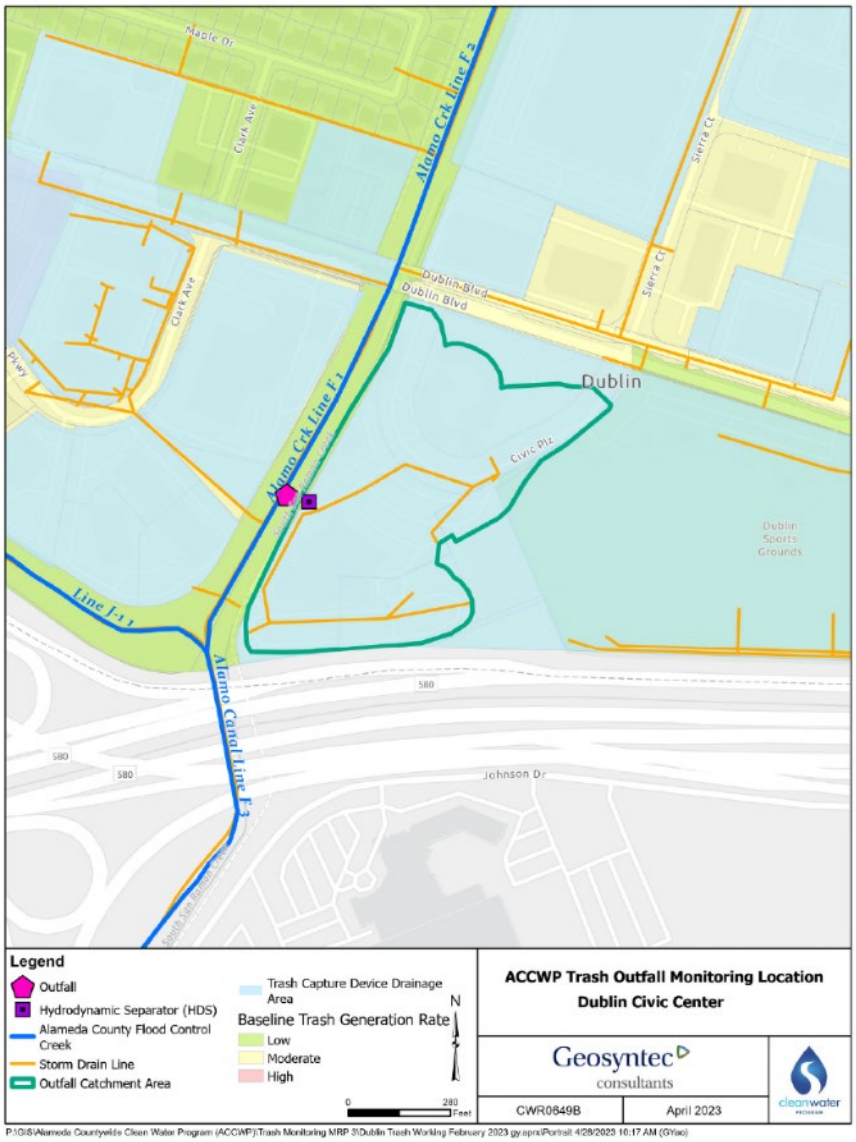

Figure AC-2. Trash monitoring catchment area at Civic Center in the City of Dublin.

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.

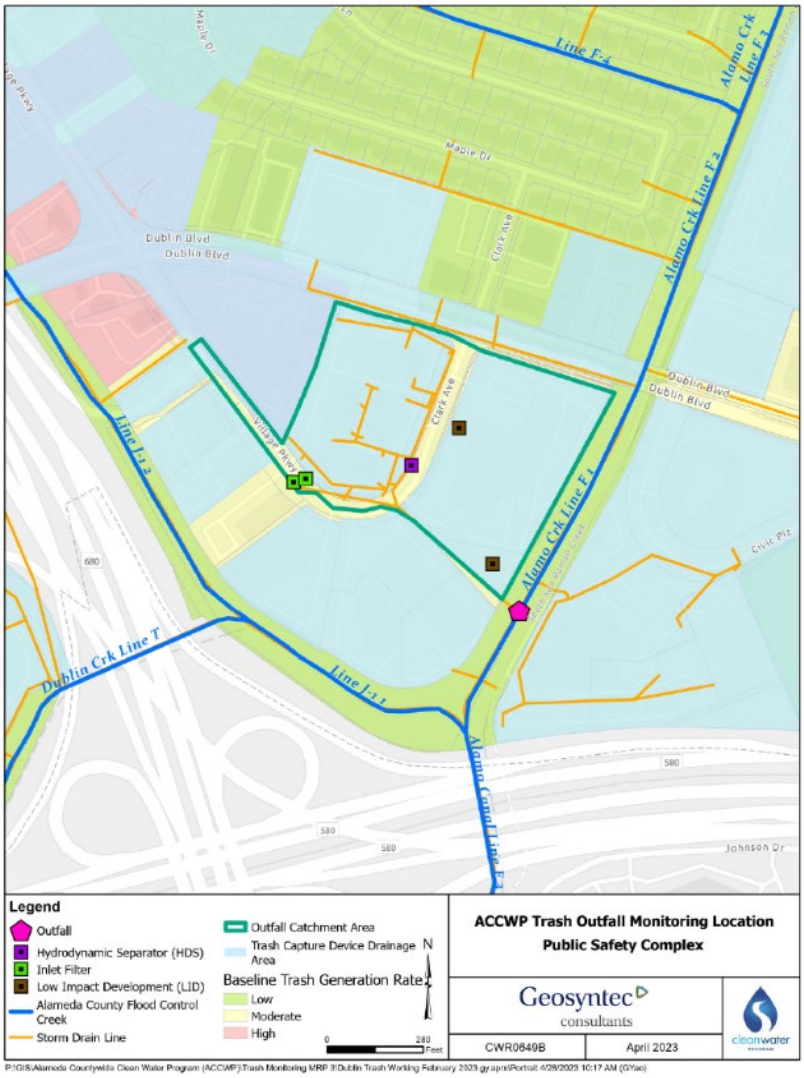

Figure AC-3. Trash monitoring catchment area at the Public Safety Complex in the City of Dublin.

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.

Monitoring Site Descriptions

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.

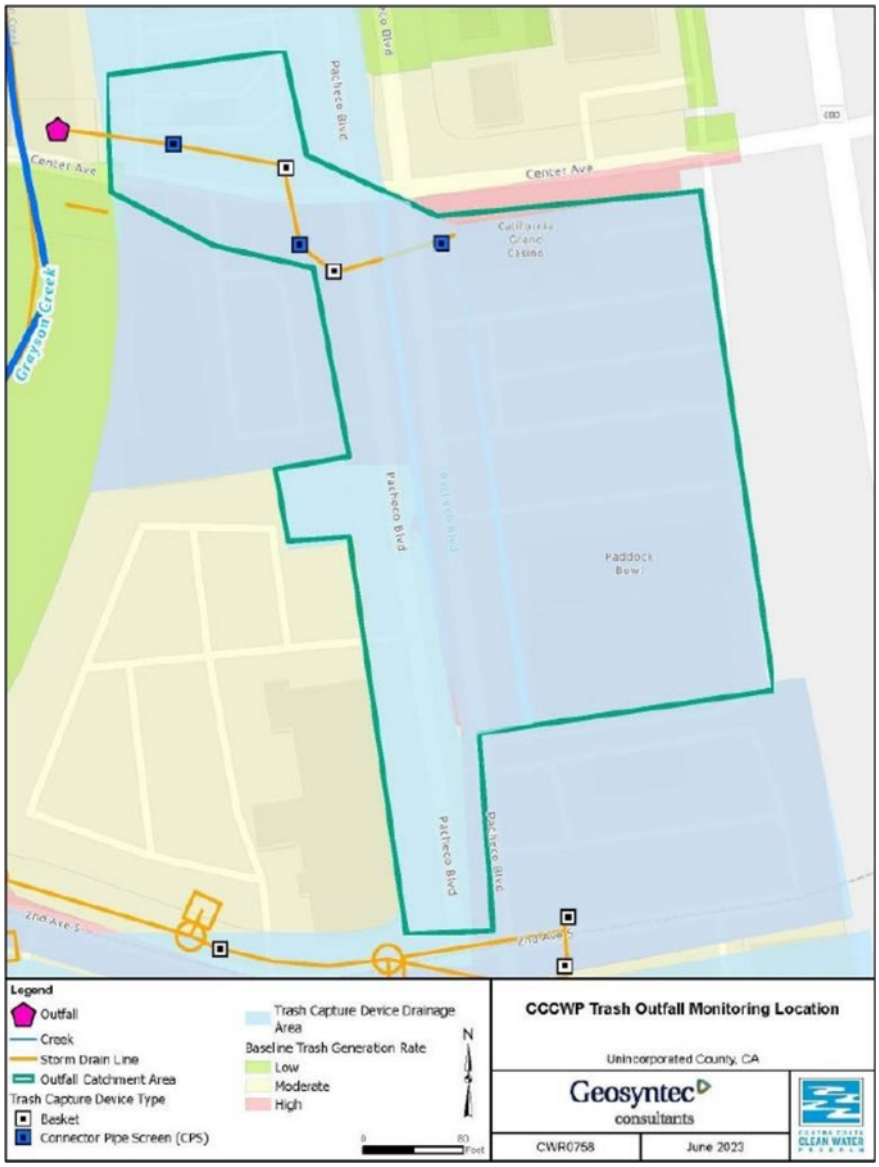

Figure CC-1. Trash monitoring catchment area at Grayson Creek in Pacheco.

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).

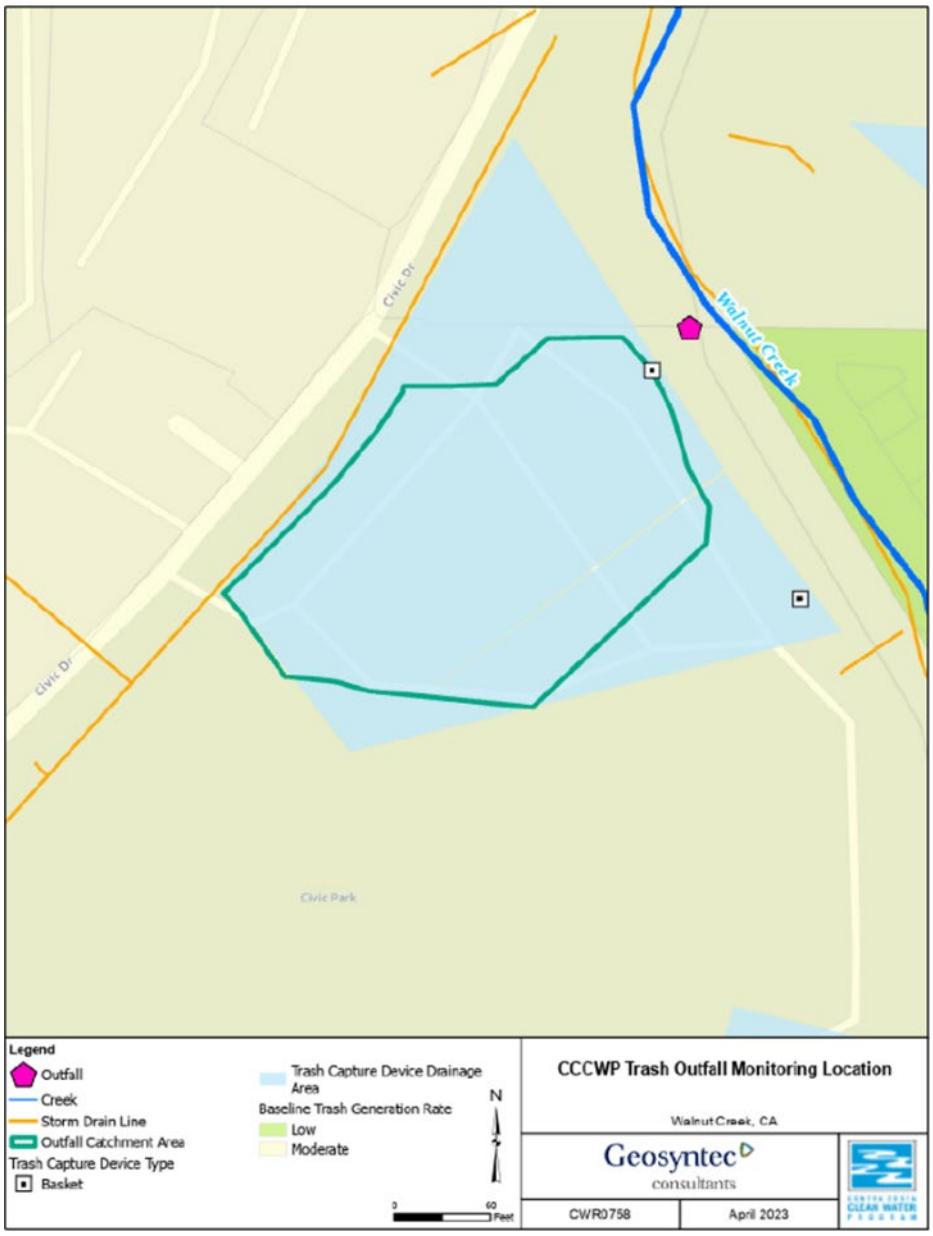

Figure CC-2. Trash monitoring catchment area at Civic Park in Walnut Creek

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.

Monitoring Tasks Planned for WY 2024

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.

Planned Refinements to Monitoring Plan

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.

Monitoring Site Descriptions

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.

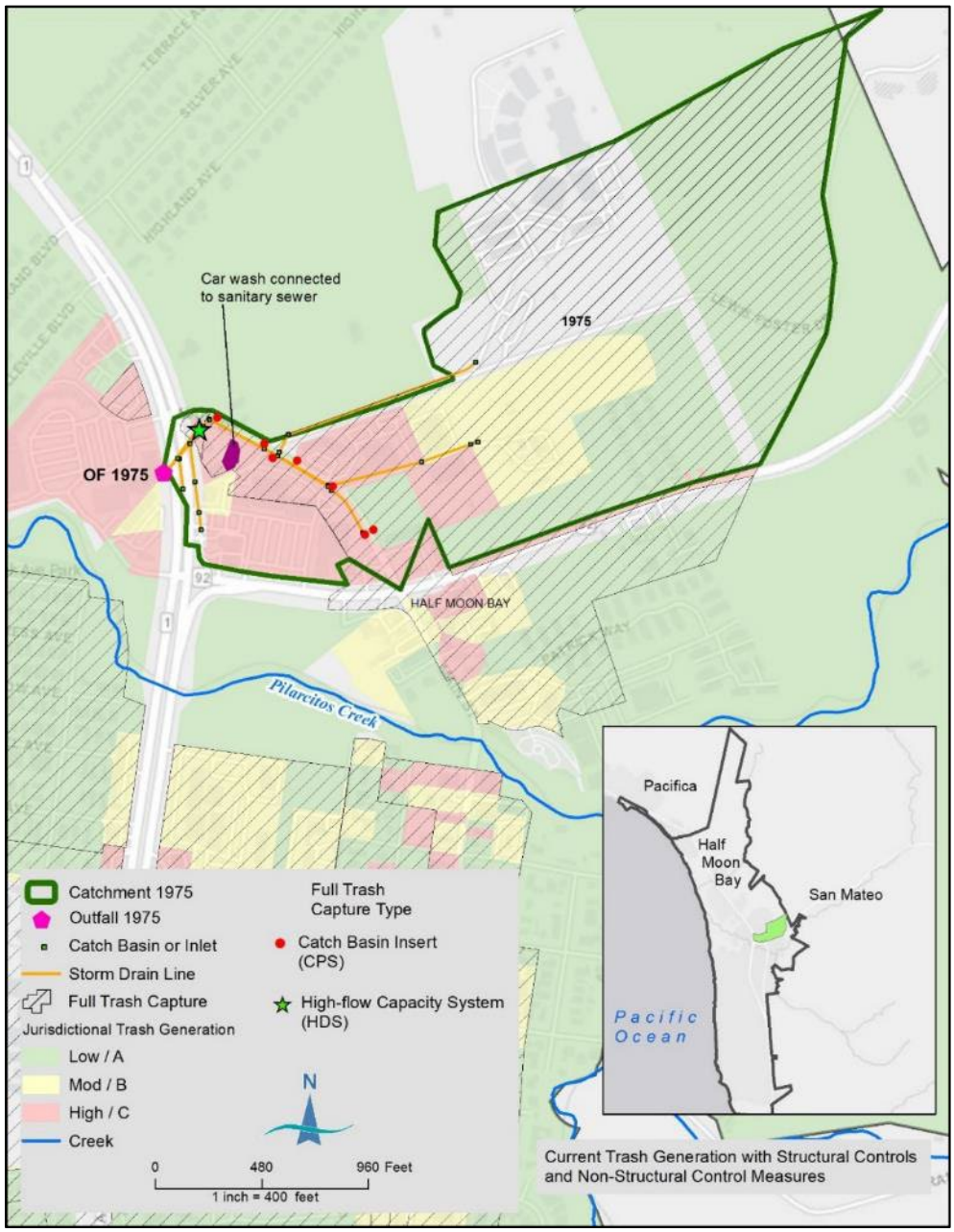

Figure SM-1. Trash monitoring catchment at Pilarcitos Creek (Site SM-PIL)

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.

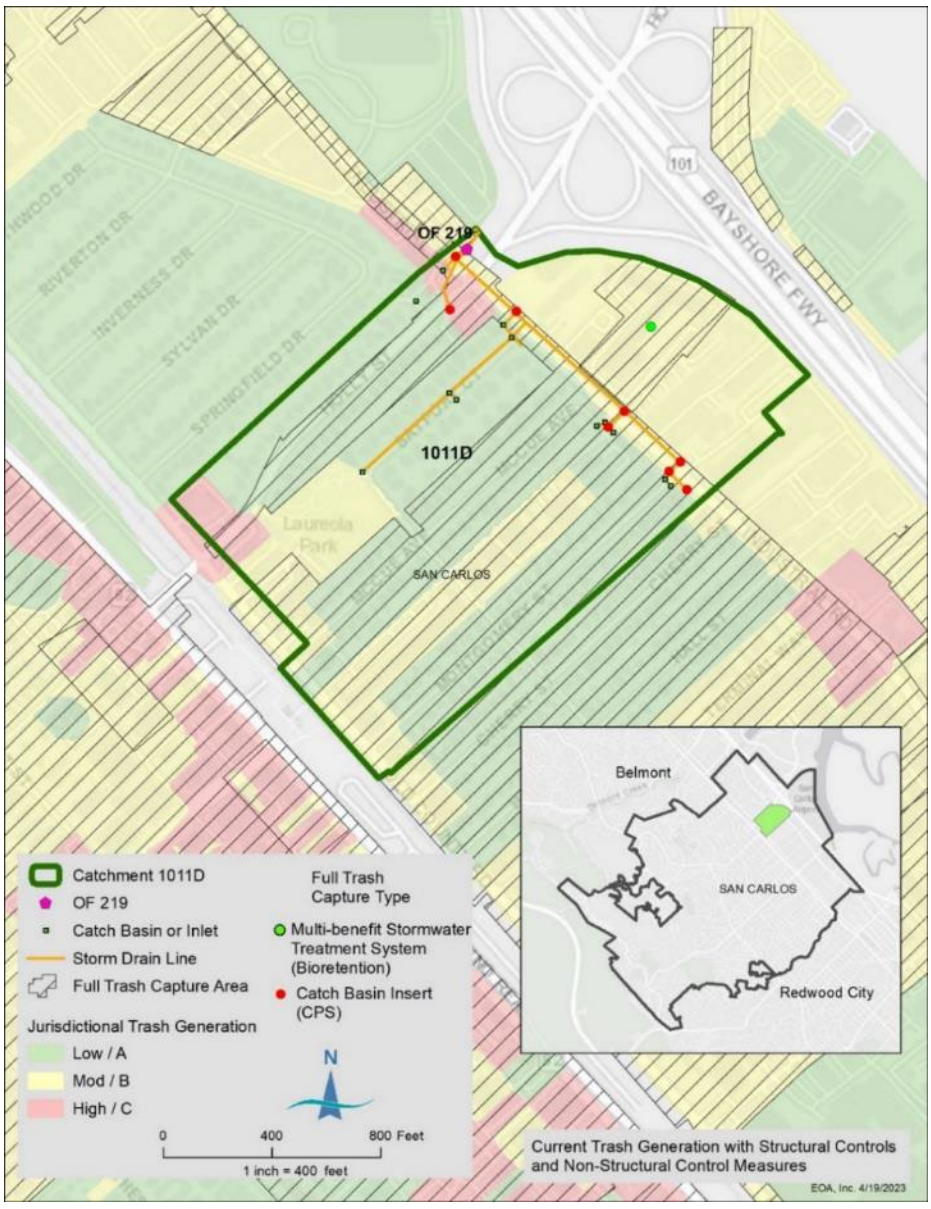

Figure SM-2. Trash monitoring catchment at Steinberger Slough (Site SM-SBS)

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.

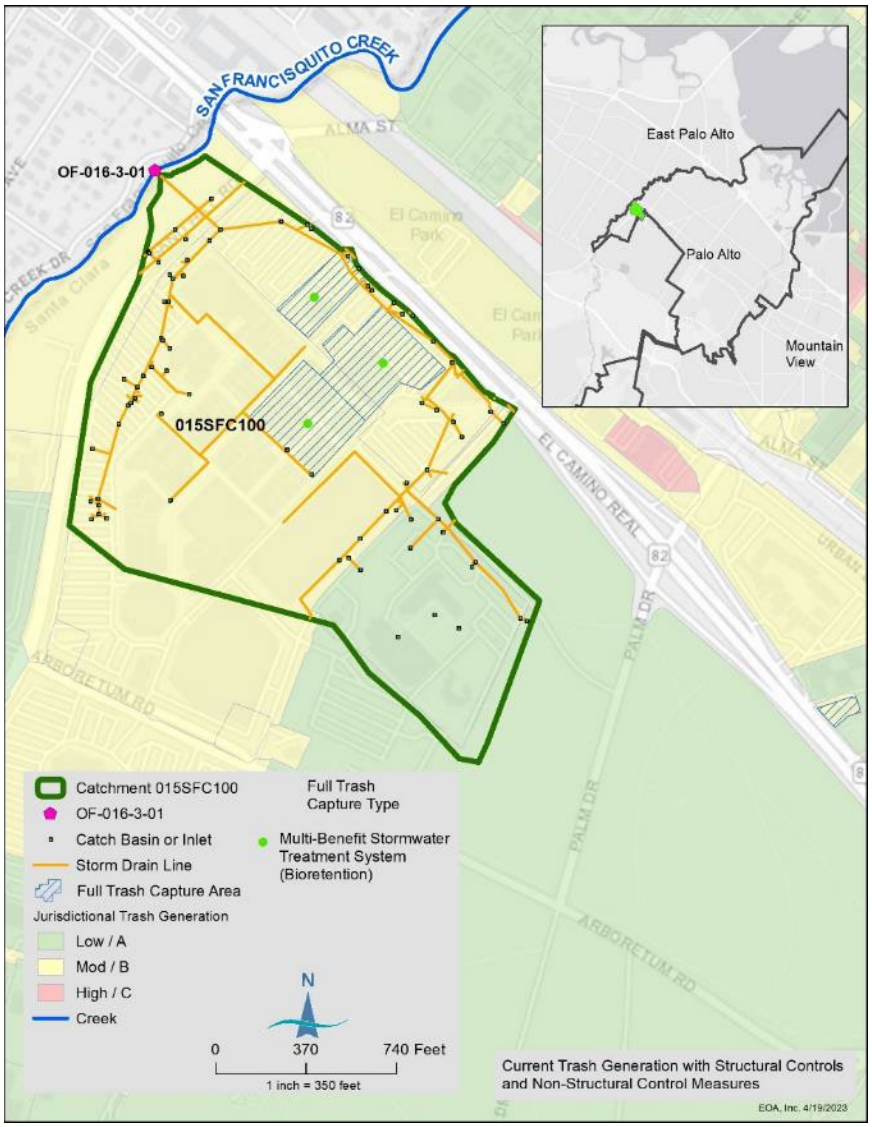

Figure SC-1. Trash monitoring catchment at San Francisquito Creek (Site SC-SFC)

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.

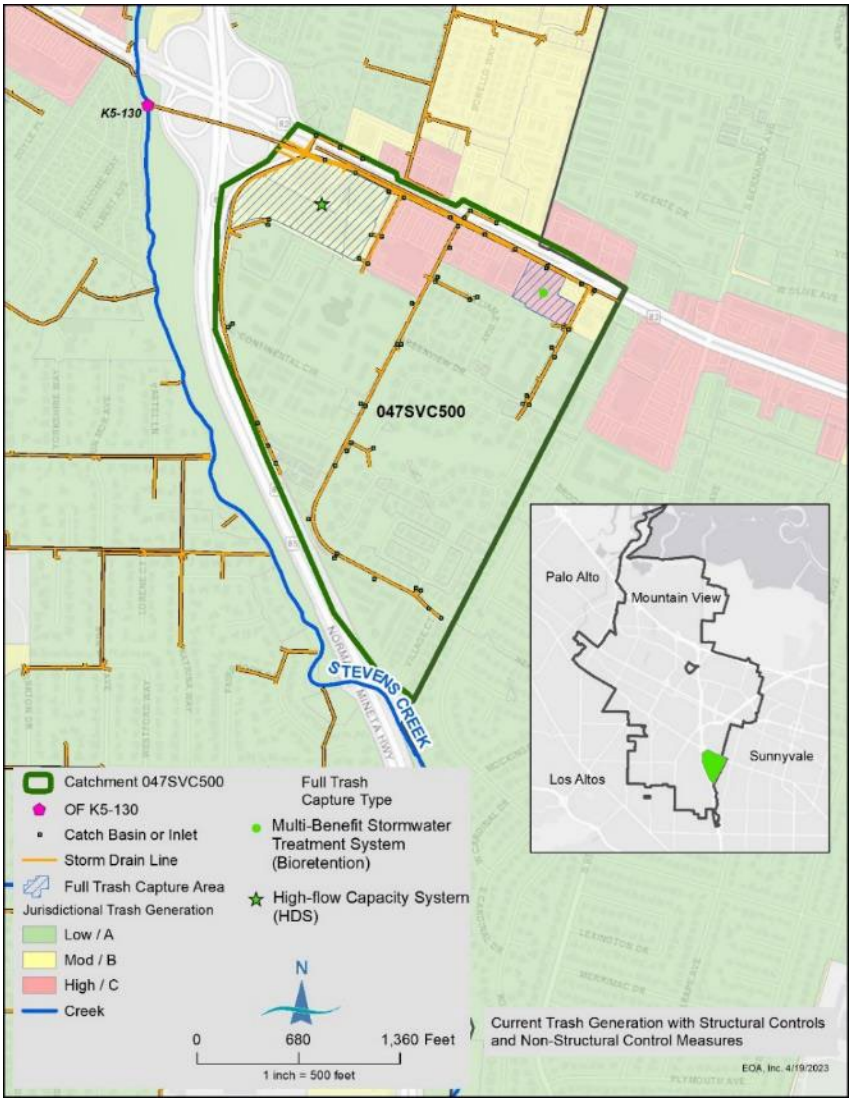

Figure SC-2. Trash monitoring catchment at Stevens Creek (Site SC-STE)

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.

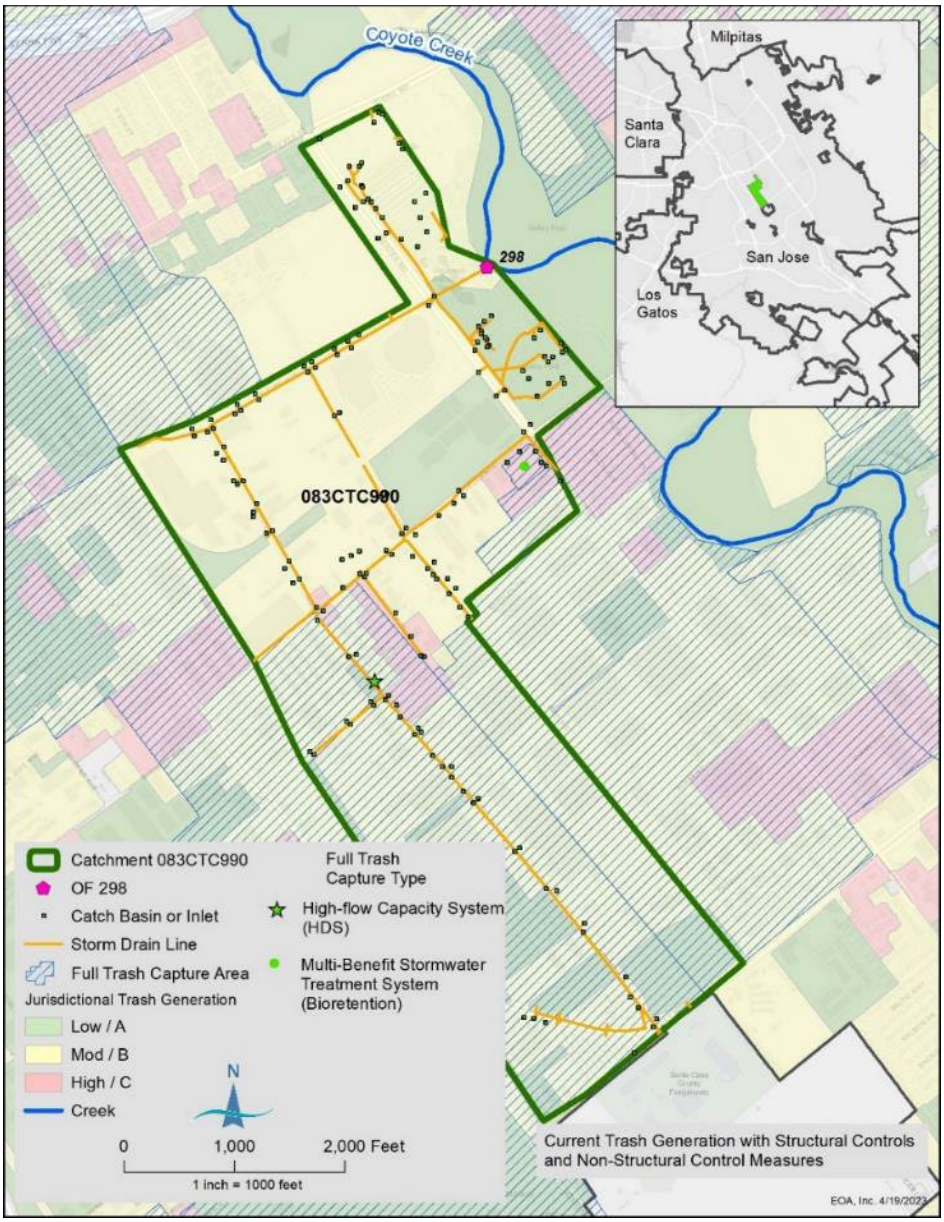

Figure SC-3. Trash monitoring catchment at Coyote Creek (Station SC-COY)

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.

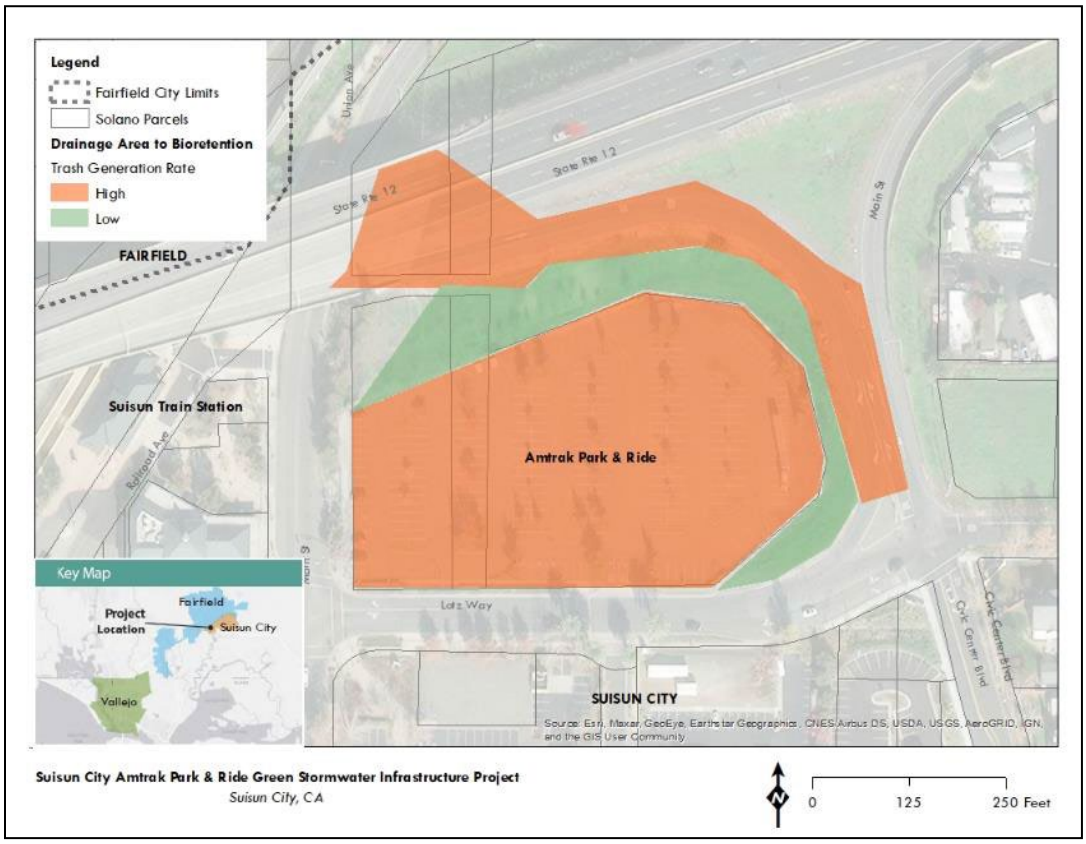

Figure S-1. Trash monitoring catchment at Suisun City (Station SSA-LOTZ)

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.