Monitoring Plan Update

2024-25 Monitoring Season

NPDES Permit No. CAS00003

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The Caltrans National Pollutant Discharge Elimination System (NPDES) Permit requires development of a plan for monitoring receiving waters, characterizing runoff, and determining BMP effectiveness. This Monitoring Plan Update describes updates to the proposed monitoring for the 2024-25 and 2025-26 fiscal years.

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SECTION 1

Introduction

1.1 Purpose

This document is an update to the 2023-24 Monitoring Season Monitoring Plan which was conditionally approved by the State Water Board in September, 2024. This update fulfils the requirement in Section G3 of the Caltrans National Pollutant Discharge Elimination System Permit (Permit; State Water Board 2023) Only the sections that have been updated are included in this Monitoring Plan Update. Also included is the proposed monitoring for the North Coast sediment TMDL watersheds that was requested in the State Water Board Executive Officer letter dated September 9, 2024 and email and attachment dated October 15, 2024.

The purpose of the Monitoring Plan is to present the California Department of Transportation (Caltrans) approach to comply with the monitoring requirements set forth in Attachment F of its Permit. The Monitoring Plan also complies with the State Water Resources Control Board (State Water Board) requirement in the Permit, cited below:

> ***Attachment F, Section F2.*** The Monitoring Plan shall include the elements required by section F2 through F2.15 of this Attachment. The Monitoring Plan shall be submitted within 12 months of the Effective Date of this Order. Annual updates shall be submitted by November 30 of each year. The Department shall submit updates to the Monitoring Plan and annual updates for review and consideration of approval by State Water Board Executive Director.
>
> The Monitoring Plan shall address the requirements of this Attachment. The Monitoring Plan shall include all proposed monitoring and a monitoring schedule for the upcoming fiscal year and the following fiscal year, including monitoring of applicable water body reaches in total maximum daily load (TMDL) watersheds where the Department is named as a responsible party where required through region-specific monitoring requirements or, where there are no region-specific monitoring requirements, as needed to demonstrate compliance with TMDLs in accordance with the Department's TMDL Compliance Plan. The Monitoring Plan and annual updates shall be implemented upon approval by the State Water Board Executive Director.

3.2 Regional Monitoring Programs (Permit Sections F2.11.2, F2.11.4)

Caltrans works with regional monitoring groups to maximize monitoring resources. Table 3-1 lists Caltrans participation in regional receiving water monitoring programs. Caltrans will no longer participate in the Klamath Basin regional monitoring program because it intends to implement a self-monitoring program.

Table 3-1
Caltrans Participation in Regional Monitoring Programs

Program	Regional Board	Purpose/TMDLs	Major Analyte Categories	Document Links
Phase I Methylmercury Delta Regional Monitoring Program	Central Valley	Trends Monitoring, TMDL compliance, characterization • Sacramento-San Joaquin Delta Methylmercury TMDL	TSS, methylmercury, nutrients, field tests, pesticides, constituents of emerging concern, toxicity, phytoplankton	Monitoring Workplan Fiscal Year, 2023-2024 Annual Regional Monitoring Report, 2021 - 2022
Central Valley Region Salts Monitoring Program	Central Valley	Trends monitoring, characterization • Central Valley Salts Monitoring TMDL	Salinity, nitrate, TDS	Surveillance and Monitoring Program, 2023 Final Baseline Characterization Report, 2024
Lake Tahoe Regional Stormwater Monitoring Program	Lahontan	Trends monitoring, TMDL compliance, characterization, BMP effectiveness • Lake Tahoe Sediment and Nutrients TMDL	TSS, turbidity, particle size distribution, nutrients, field tests	Monitoring Plan Update, 2023 Annual Stormwater Monitoring Report, Water Year 2023
Southern California Stormwater Monitoring Coalition	All Southern California	Trends monitoring, TMDL compliance, characterization, BMP effectiveness • Multiple TMDLs in the Los Angeles, Santa Ana, and San Diego Regions[1]	TSS, bacteria, nutrients, metals, organics, pesticides, field tests, sediment, biological indicators	Workplan, 2021 - 2025 Annual Report, 2022 - 2023
San Francisco Bay Regional Monitoring Program	San Francisco	Trends Monitoring, TMDL compliance, characterization • San Francisco Bay PCBs and Mercury TMDLs	TSS, PCBs, mercury, contaminants of emerging concern, field tests, sediment, turbidity	Water Year 2024 Near-Field Sampling and Analysis Plan Regional Monitoring Program Update, 2023

1 - Table 7 of *Bioassessment Survey of the Stormwater Monitoring Coalition, Workplan for Years 2021 through 2025*. SCCWRP Technical Report #1174.

SECTION 4
Region-Specific TMDL Monitoring

4.2 Region-Specific TMDL Monitoring Options

4.2.1 North Coast Water Board Sediment TMDL (Permit Section F2.12.1)

Caltrans monitoring options for sediment in the North Coast Water Board region are:

1. *Cooperative Monitoring*. (a) Allocate a one-time funding contribution equivalent to ten percent of each TMDL sediment reduction project cost to maintain existing watershed-based status and trends monitoring programs or (b) contribute funding proportionate to its share of waste load allocation among stakeholders for each TMDL sediment reduction project, or
2. *Self-Monitoring*. Implement a watershed monitoring program associated with state highways within the North Coast region TMDL watersheds. State highways are broadly distributed and therefore the monitoring will be watershed-based to allow North Coast Water Board staff to assess water quality impacts from state highways and progress toward achieving TMDL targets from Caltrans implementation of TMDL sediment reduction projects. The watershed-based monitoring program will include a number of monitoring locations and frequency of monitoring proportional to Caltrans sediment load in excess of its load allocation for each TMDL watershed.

Table 4-1 describes the Caltrans monitoring strategy for the North Coast Sediment TMDLs.

Table 4-1
North Coast TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Options	Caltrans Strategy
North Coast Sediment TMDLs	Attachment F, Section F2.12.1 Attachment D, Section D5.7	Cooperative monitoring: (a) Provide 10% additional funding contribution for each Cooperative Implementation Agreement project in lieu of Caltrans monitoring (b) Contribute funding proportionate to its share of waste load allocation among stakeholders Self-monitoring: Monitor at a number of monitoring locations in each TMDL watershed	Caltrans has selected self-monitoring. Caltrans will develop and implement a monitoring program in the South Fork Eel River, Trinity River, and Redwood Creek watersheds.

Caltrans has selected self-monitoring because there are no existing watershed-based status and trends monitoring programs in the North Coast region. However, Caltrans has analyzed its share of waste load allocation among stakeholders to quantify its proportional responsibility for any monitoring effort. Table 4-2 provides Caltrans responsibility for overall watershed health monitoring in each TMDL watershed based on its share of management waste load allocation. As can be seen in Table 4-2, the relative impact of Caltrans discharges and Caltrans proportional responsibility for monitoring are minor in all watersheds.

To satisfy the self-monitoring program, Regional Board staff have proposed monitoring of receiving water locations upstream and downstream of outfalls that discharge Caltrans runoff. Caltrans is planning to identify and monitor six new locations in the South Fork Eel River, Trinity River, and Redwood Creek watersheds for its self-monitoring program. Data will be collected at a total of 18 new stations at these locations, with each location comprising of an upstream station, a downstream station, and a discharge station. Monitoring at these 18 stations is expected to begin in the 2025-26 season.

In addition to self-monitoring in the South Fork Eel River, Trinity River, and Redwood Creek watersheds, Caltrans will monitor BMP effectiveness at one low impact development BMP in the Redwood Creek watershed. Monitoring at site is expected to continue during the 2024-25 fiscal year. Details on this additional monitoring are provided in Section 6 and Appendix B.

Table 4-2
Caltrans Responsibility for North Coast Sediment TMDLs Watershed Monitoring

Watershed	Watershed Area (mi²)	Caltrans Load Allocation[1] (t/y)	Total Management Load in Watershed[2] (t/mi²/y)	Management Load Reduction Required[2] (%)	Management Load Allocation[2] (t/mi²/y)	Management Load Allocation[3] (t/y)	Proportional Responsibility for Watershed Health Monitoring Programs[4] (%)
Albion River	43	1.9	435	69%	135	5799	0.03%
Big River	181	43.4	314	75%	79	14209	0.31%
Eel River, Upper Main	708	70.9	152	49%	78	54884	0.13%
Eel River, Middle Fork	753	105.7	82	65%	29	21611	0.49%
Eel River, Lower Main	300	73.7	775	77%	178	53475	0.14%
Eel River, South Fork	689	4848.2	845	71%	247	170376	2.85%
Garcia River	114	100.0	1380	60%	552	62928	0.16%
Gualala River	299	20.6	840	89%	96	28632	0.07%
Mad River	374	515.0	1580	89%	174	65001	0.79%
Navarro River	316	1362.6	775	62%	293	92572	1.47%
Noyo River	113	32.8	274	70%	82	9317	0.35%
Redwood Creek	282	855.6	4360	65%	1510	425820	0.20%
Scott River	814	66.7	299	63%	111	90053	0.07%
Ten Mile River	120	1.1	318	75%	80	9540	0.01%
Trinity River	1694	88.9	548	68%	178	301018	0.03%
Trinity River, South Fork	931	352.3	371	68%	119	110528	0.32%
Van Duzen River	428	67.8	586	72%	162	69368	0.10%

1 – Table A-3, State Water Board (2023)

2 – Derived from TMDL staff reports. Management Load Allocation (t/m²/y) is the Total Management Load in Watershed (t/mi2/y) multiplied by [100 – Management Load Reduction Required (%)]

3 – Management Load Allocation (t/y) is the Management Load Allocation (t/mi²/y) multiplied by the Watershed Area (mi²)

4 – Proportional monitoring responsibility assumed to be same as share of management waste load allocation. The percent share of management waste load allocation is [Caltrans Load Allocation (t/y) divided by the Management Load Allocation (t/y)] multiplied by 100

4.2.2 San Francisco Bay Mercury & PCBs TMDLs (Permit Section F2.12.2)

San Francisco Bay Mercury TMDL (Permit Section F2.12.2.1)

Caltrans mercury monitoring options are as follows:

1. *Regional Monitoring*. Participate in mercury monitoring via the Regional Monitoring Program for Water Quality in San Francisco Bay; or
2. *Self-Monitoring*. Develop and implement a mercury monitoring plan to quantify the mercury loads or load reductions achieved through treatment, source control, and other management efforts. Sample bedded fine sediment for a minimum of four wet weather events per year over the term of the Order. Select sample locations at or near a point of discharge from the right-of-way and into the system that discharges stormwater into San Francisco Bay.

3. *Combination*. Implement a combination of monitoring requirements in options 1 or 2, above, provided that the combination provides equivalent monitoring.

Table 4-3 describes the Caltrans monitoring strategy for the San Francisco Bay Mercury TMDL.

Table 4-3
San Francisco Bay Mercury TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Options	Caltrans Strategy
San Francisco Bay Mercury TMDL	Attachment F, Section F2.12.2.1 Attachment D, Section D5.8	<u>Regional monitoring</u>: Participate in Regional Monitoring Program <u>Self-monitoring</u>: Monitor to quantify mercury loads or load reductions achieved through treatment, source control, and other management efforts. Include bedded fine sediment sampling <u>Combination</u>: Participate in Regional Monitoring Program and perform self-monitoring	Caltrans has selected combination monitoring. Caltrans will continue to contribute funding for the Regional Monitoring Program for Water Quality in San Francisco Bay and perform as needed self-monitoring to quantify mercury loads and load reductions achieved through treatment, source control, and other management efforts. Caltrans may also enter into cooperative implementation agreements for treatment projects outside its right-of-way. Monitoring for these projects may be performed by other stakeholders.

In addition to participating in the Regional Monitoring Program, Caltrans will characterize mercury in its runoff and monitor BMP effectiveness at 6 open graded friction course (OGFC) sites, 3 hydrodynamic separator (HDS) sites, one multi gross solids removal device (MGSRD) site, and one HDS cooperative monitoring site in the TMDL watershed. Monitoring at the 6 OGFC sites and the HDS cooperative monitoring site will commence during the 2024-25 fiscal year. Monitoring at the 3 HDS and one MGSRD sites, which are currently in the planning phase, is expected to commence during the 2025-26 fiscal year. Additional details on this self-monitoring are provided in Sections 5 and 6, and Appendix B.

San Francisco Bay PCBs TMDL (Permit Section F2.12.2.2)

Caltrans PCBs monitoring options are as follows:

1. *Regional Monitoring*. Participate in PCBs monitoring via the Regional Monitoring Program for Water Quality in San Francisco Bay; or
2. *Self-Monitoring*. Develop, submit, and implement a Caltrans-specific monitoring plan to quantify PCBs stormwater runoff loads and the load reductions achieved through treatment, source control and other actions. Sample bedded fine sediment a minimum of four wet

weather events per year over the term of the Order. Sample locations will be at/near a point of discharge from the right-of-way and into the conveyance system that discharges stormwater into San Francisco Bay. Monitoring will be representative of pollutant concentrations or loadings in discharges from Caltrans right-of-way or will be representative of the effects of discharges from Caltrans right-of-way on water qualities in the TMDL waterbodies.

3. *Combination*. Implement a combination of monitoring requirements in options 1 or 2, above, provided that the combination provides equivalent monitoring.

Table 4-4 describes the Caltrans monitoring strategy for the San Francisco Bay PCBs TMDL.

Table 4-4
San Francisco Bay PCBs TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Options	Caltrans Strategy
San Francisco Bay PCBs TMDL	Attachment F, Section F2.12.2.2 Attachment D, Section D5.8	Regional monitoring: Participate in Regional Monitoring Program Self-monitoring: Monitoring to quantify PCBs stormwater runoff loads and the load reductions achieved through treatment, source control and other actions. Include bedded fine sediment sampling Combination: Participate in Regional Monitoring Program and perform self-monitoring	Caltrans has selected combination monitoring. Caltrans will continue to contribute funding for the Regional Monitoring Program for Water Quality in San Francisco Bay and perform as needed self-monitoring to quantify PCBs loads and load reductions achieved through treatment, source control, and other management efforts. Caltrans may also enter into cooperative implementation agreements for treatment projects outside its right-of-way. Monitoring for these projects may be performed by other stakeholders.

In addition to participating in the Regional Monitoring Program, Caltrans will characterize PCBs in its runoff and monitor BMP effectiveness at 6 open-graded friction course (OGFC) sites, 3 hydrodynamic separator (HDS) sites, one multi gross solids removal device (MGSRD) site, and one HDS cooperative monitoring site in the TMDL watershed. Monitoring of the 6 OGFC sites, which are located in areas which are expected to be hotpots for PCBs, and the HDS cooperative monitoring site will commence during the 2024-25 fiscal year. Monitoring at the 3 HDS and one MGSRD sites, which are currently in the planning phase, is expected to commence during the 2025-26 fiscal year. Additional details on this self-monitoring are provided in Sections 5 and 6, and Appendix B.

4.2.3 Los Angeles Water Board TMDLs (Permit Section F2.12.3)

Caltrans monitoring options for TMDLs in the Los Angeles Water Board region (Los Angeles Region) are:

1. *Coordinated Integrated Monitoring*. Caltrans may continue to participate in Coordinated Integrated Monitoring Programs for individual TMDL watersheds or participate in other watershed cooperative monitoring programs in lieu of self- monitoring; or
2. *Self-Monitoring*. Caltrans will implement self-monitoring through development of a monitoring plan and schedule to monitor its rights-of-way. The monitoring plan will be equivalent in methods, precision, accuracy, and quality to the (1) relevant Coordinated Integrated Monitoring Programs or other watershed cooperative monitoring programs and (2) the monitoring requirements in this Attachment. The monitoring plan shall include a work plan and schedule to implement the monitoring. The watershed and TMDL shall be identified in the monitoring plan; or
3. *Combination*. Caltrans may implement a combination of requirements in options 1 or 2, above, provided that the combination is equivalent to the monitoring via watershed cooperative monitoring and right-of-way monitoring.

Table 4-5 describes the Caltrans monitoring strategy for the Los Angeles Region TMDLs.

Table 4-5
Los Angeles Region TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Options	Caltrans Strategy
Los Angeles Region TMDLs	Attachment F, Section F2.12.3 Attachment D, Section D5.10	Coordinated Integrated monitoring: Participate in Coordinated Integrated Monitoring Programs Self-monitoring: Monitoring shall be equivalent in methods, precision, accuracy, and quality to the relevant Coordinated Integrated Monitoring Programs or other watershed cooperative monitoring programs Combination: Participate in Coordinated Integrated Monitoring Programs and perform self-monitoring providing that it is equivalent to the monitoring via watershed cooperative monitoring and right-of-way monitoring	Caltrans has selected combination monitoring. Caltrans will continue to contribute funding or enter into new Coordinated Integrated Monitoring Programs for individual TMDL watersheds, and perform additional self-monitoring to quantify its loads and load reductions achieved through treatment, source control, and other management efforts. Caltrans may continue to enter into cooperative implementation agreements for treatment projects outside its right-of-way. Monitoring for these projects may be performed by other stakeholders.

Caltrans is currently participating in a number of Coordinated Integrated Monitoring Programs in the Los Angeles Region and is planning to participate in new programs in the future. Current Coordinated Integrated Monitoring Programs are listed in Table 3-2. Caltrans anticipates participating in the new programs after management approval of terms and conditions of participation and upon acceptance from existing stakeholders.

As efforts continue to pursue participation in Coordinated Integrated Monitoring Programs, Caltrans will characterize its runoff at 9 sites and monitor BMP effectiveness at 2 sites in various Los Angeles Region TMDL watersheds. Monitoring at these sites, which are either ongoing monitoring sites or are currently in the planning phase, is expected to continue or commence during the 2024-25 fiscal year. To characterize dry weather flows, monitoring will include field observations on the frequency of dry weather flows and dry weather flow sampling at select locations during the dry season. Additional details on this self-monitoring are provided in Sections 5 and 6, and Appendix B.

4.2.4 Central Valley Water Board TMDLs (Permit Section F2.12.4)

In the Central Valley Water Board region (Central Valley Region), Caltrans will continue to participate in the Central Valley Water Board approved Delta Regional Monitoring Program. In the event the Delta Regional Monitoring Program is no longer approved by the Central Valley Water Board Executive Officer, Caltrans will submit a Methylmercury Monitoring Plan that assesses attainment with the TMDL allocations in its stormwater discharges, and implement it within six months of the Central Valley Water Board Executive Officer approval. The Methylmercury Monitoring Plan and Quality Assurance Project Plan that is to be included will meet the requirement of Section F2.12.4 of the Permit.

Table 4-6 describes the Caltrans monitoring strategy for the Central Valley Region.

Table 4-6
Central Valley Region TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Requirement	Caltrans Strategy
Sacramento-San Joaquin Delta Methylmercury TMDL	Attachment F, Section F2.12.4 Attachment D, Section D5.11	Regional monitoring: Participate in Delta Regional Monitoring Program	Caltrans will continue to participate in Delta Regional Monitoring Program. Caltrans may perform as needed self-monitoring to quantify its loads and load reductions achieved through treatment, source control, and other management efforts.

As required in Section F2.12.4 of the Permit, Caltrans will continue to implement turbidity monitoring for construction projects in the Clear Lake Nutrients TMDL watershed and the Cache

Creek, Bear Creek, Sulphur Creek, and Harley Gulch Mercury TMDL watershed. In addition to monitoring construction projects, Caltrans is monitoring 3 open-graded friction course (OGFC) sites together with one control (no OGFC) site in Merced County.

4.2.7 Santa Ana Water Board TMDLs (Permit Section D5.13)

The monitoring options for the Lake Elsinore and Canyon Lake Nutrient TMDL are:

1. *Cooperative Monitoring*. Caltrans will continue participation with the Lake Elsinore and Canyon Lake Nutrients TMDL Task Force for cooperative implementation actions, monitoring, and special studies; or
2. *Self-Monitoring*. Caltrans will develop and implement a program consistent with the Lake Elsinore and Canyon Lake TMDL Task force, which will include Canyon Lake in-lake monitoring consistent with the TMDL Task Force monitoring program and a monitoring program to evaluate the success of in-lake sediment reduction strategies that will be implemented.

Table 4-9 describes the Caltrans monitoring strategy for the Santa Ana Region.

Table 4-7
Santa Ana Region TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Options	Caltrans Strategy
Lake Elsinore and Canyon Lake Nutrient TMDL	Attachment D, Section D5.13	Cooperative monitoring: Participate in Lake Elsinore and Canyon Lake Nutrients TMDL Task Force Self-monitoring: Prepare and implement a monitoring program that is consistent with that conducted by the Lake Elsinore and Canyon Lake TMDL Task force	Caltrans has selected cooperative monitoring. Caltrans will continue to participate in the Lake Elsinore and Canyon Lake Nutrients TMDL Task Force

In addition to participating in the Lake Elsinore and Canyon Lake Nutrients TMDL Task Force, Caltrans will characterize its runoff at 3 sites in the Big Bear Lake watershed. Monitoring at these new sites is expected to continue during the 2024-25 fiscal year. Additional details on this self-monitoring are provided in Section 5 and Appendix B.

4.2.8 San Diego Water Board TMDLs (Permit Section F2.12.7)

Twenty Beaches & Creeks Bacteria TMDL (Permit Section F2.12.7.1)

Caltrans monitoring options in the Project I – Twenty Beaches and Creeks Bacteria TMDL watersheds are:

1. *Cooperative Monitoring*. Caltrans will participate in cooperative watershed monitoring with the other responsible municipalities, as approved by the State Water Board Executive

Director in consultation with the San Diego Water Board Executive Officer. Caltrans participation shall be a proportional responsibility that is calculated in accordance with Caltrans land use coverage in the watershed; or

2. *Self-Monitoring*. Caltrans will conduct compliance monitoring to demonstrate the effectiveness of best management practices (BMPs) in controlling bacteria loads. Receiving water monitoring will be conducted in three representative watersheds annually for the Permit term. For each of the twenty beaches and creeks watersheds, outfalls shall be monitored weekly during the dry season and a minimum of three rain events during one wet season. This monitoring will be conducted in two different sampling years and at a minimum of twice per Permit term.

Table 4-10 describes the Caltrans monitoring strategy for the Twenty Beaches & Creeks Bacteria TMDL.

In addition, Caltrans will continue to self-monitor indicator bacteria in its runoff and discharge at 4 monitoring stations in the Chollas Creek watershed. Monitoring at these stations, which are existing monitoring stations, is expected to continue during the 2024-25 fiscal year. Additional details on this self-monitoring are provided in Sections 5 and 6, and Appendix B.

Table 4-8
Twenty Beaches & Creeks Bacteria TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Options	Caltrans Strategy
Twenty Beaches & Creeks Bacteria TMDL	Attachment F, Section F2.12.7.1 Attachment D, Section D5.14.1	Cooperative monitoring: Participate in an approved cooperative watershed monitoring program Self-monitoring: Conduct annual receiving water in three representative watersheds, and outfall monitoring in each of the twenty beaches and creeks watersheds. May conduct compliance monitoring to demonstrate BMP effectiveness for bacteria	Caltrans has selected cooperative monitoring. Caltrans will continue to participate in Project I-Twenty Beaches and Creeks/ Chollas Creek Bacteria TMDL Monitoring in cooperation with the County and City of San Diego and other responsible municipalities

Chollas Creek Dissolved Metals TMDL (Permit Section F2.12.7.2)

Caltrans monitoring options in the Chollas Creek Dissolved Copper, Lead, and Zinc TMDL (Chollas Creek Metals TMDL) watershed are:

1. *Cooperative Monitoring*. Caltrans may participate in or contribute to a cooperative watershed monitoring program with the other responsible municipalities, as approved by the

State Water Board Executive Director in consultation with the San Diego Water Board Executive Officer. Receiving water will be sampled monthly during the wet season; or

2. *Self-Monitoring*. Caltrans may develop and conduct compliance monitoring to demonstrate the effectiveness of best management practices (BMPs) at outfalls. Representative outfalls will be monitored for applicable metals for one rain event per year over three separate years during the wet season per the Permit term or per every five years, whichever is less.

Table 4-11 describes the Caltrans monitoring strategy for the Chollas Creek Metals TMDL.

Table 4-9
Chollas Creek Dissolved Copper, Lead, and Zinc TMDL Monitoring

TMDL(s)	Section in Permit	Monitoring Options	Caltrans Strategy
Chollas Creek Metals TMDL	Attachment F, Section F2.12.7.2 Attachment D, Section D5.14.2	<u>Cooperative monitoring</u>: Participate in an approved cooperative receiving water monitoring program <u>Self-monitoring</u>: Perform representative outfall monitoring for applicable metals for one rain event per year over three separate years during the wet season per the Permit term or per every five years, whichever is less. Caltrans may develop and conduct compliance monitoring to demonstrate the effectiveness of BMPs	Caltrans has selected self-monitoring. Caltrans will continue monitoring at representative BMP sites that have been approved by the Water Board. The approved sites are an Austin sand filter and a bioswale. Monitoring at these approved sites will target a minimum of one rain event per year over three separate years during the wet season, and will include north and south fork receiving water sampling for hardness and pH. Although not required by the Permit since self-monitoring is selected, Caltrans will continue to participate in the Regional Monitoring Program with the City of San Diego to assess compliance in the receiving water

Since 2010, Caltrans has installed more than 20 structural BMPs within its right-of-way to treat stormwater runoff in the Chollas Creek watershed. Four monitoring stations, located at representative Caltrans BMP locations on the north and south forks of Chollas Creek, have been selected for Caltrans runoff characterization and BMP effectiveness monitoring. These locations include an Austin sand filter and one receiving water station on the north fork and a bioswale and one receiving water station on the south fork. To improve assessments of the dissolved metals TMDL acute and chronic thresholds, two receiving water monitoring stations located on the north and south fork of Chollas Creek are also being monitored. Monitoring at these BMP and receiving water sites, which are existing monitoring sites approved as representative sites by the San Diego Water Board, is expected to continue during the 2024-25 fiscal year. Additional details on this self-monitoring are provided in Sections 5 and 6, and Appendix B.

Runoff Characterization Monitoring

5.2 Characterization Monitoring Sites (Permit Section F2.13)

Table 4 in the QAPP (Appendix B) lists the current and proposed runoff characterization monitoring sites, together with information on the station codes, where the sites are located, and the type of monitoring (edge-of-pavement, right-of-way, or BMP influent). Caltrans intends to monitor 27 runoff characterization sites during the 2024-25 fiscal year.

Site selection for runoff characterization focused on TMDL watersheds. For each TMDL watershed, an analysis was performed during the 2023-24 season to determine the number of existing runoff monitoring sites and representative runoff sites that had at least five analytical results for the TMDL constituent. Representative sites are sites that are located outside the TMDL watershed but are considered representative of sites within the TMDL watershed based on important factors such as traffic. Traffic was the main factor found to govern Caltrans runoff quality in previous characterization studies (Section 4 in Caltrans 2003). Following this approach, new runoff monitoring sites were identified in the following TMDL watersheds: Big Bear Lake, Los Angeles River, Redwood Creek, Sacramento- San Joaquin River Delta Estuary, South Fork Eel River, San Francisco Bay, San Gabriel River, and some smaller watersheds.

In the North Coast sediment TMDL watersheds, Caltrans plans to monitor 6 new discharge sites in the South Fork Eel River, Trinity River, and Redwood Creek watersheds during the 2023-24 season. Each discharge site will be paired with upstream and downstream receiving water stations.

5.4 Characterization Monitoring Schedule (Permit Section F2.13)

Table 4 of the QAPP (Appendix B) provides the monitoring schedule for runoff characterization sites in each TMDL watershed. Table 4 specifies monitoring that will be conducted during the 2024-25 fiscal year and monitoring that is proposed for the 2025-26 fiscal year. The decision to monitor these sites during the 2025-26 fiscal year will be made after the current season, when the total number of usable data points for the sites are known.

SECTION 6

BMP Effectiveness Monitoring

6.2 BMP Monitoring Sites (Permit Section F2.14)

Table 4 of the QAPP (Appendix B) lists the current and proposed BMP effectiveness monitoring sites, together with information on the influent and effluent station codes, where the sites are located, and key TMDL pollutants. Caltrans intends to monitor a total of 13 BMP sites during the 2024-25 fiscal year.

Site selection for BMP effectiveness assessment focused on ecoregions. For each ecoregion, an analysis was performed to determine the number of existing BMP monitoring sites of a given type that had at least five analytical results for the TMDL constituent. Representative sites outside the ecoregion were also identified. Representative sites outside an ecoregion are sites that are located outside the ecoregion but are considered representative of sites within the ecoregion based on traffic, the main factor found to govern Caltrans runoff quality in previous characterization studies (Section 4 in Caltrans 2003). Following this approach, new BMP effectiveness monitoring sites were identified in the following water board regions: North Coast, San Francisco Bay, Central Valley, Los Angeles, and San Diego.

6.2.1 North Coast Region (Permit Section F2.14)

Caltrans intends to monitor the effectiveness of one bioswale near Lord Ellis Summit that drains to Redwood Creek. Monitoring at this existing BMP site, which include influent and effluent stations, is expected to continue during the 2024-25 fiscal year. Details on these BMP sites are given in Table 4 of the QAPP.

6.2.2 San Francisco Bay Region (Permit Section F2.14)

Caltrans has completed monitoring the effectiveness of an Austin sand filter vault that drains to Carquinez Strait in the San Francisco Bay region. This site, which includes influent station 4-434 and effluent station 4-435, will not be monitored during the 2024-25 fiscal year as sufficient data have been collected to evaluate BMP effectiveness.

6.2.3 Central Valley Region (Permit Section F2.14)

Caltrans is currently monitoring the effectiveness of three types of Open Graded Friction Course (OGFC) near Santa Nella in the Central Valley: Non-Rubberized, Rubberized, and Modified Rubberized. The Santa Nella OGFC study consists of four monitoring stations: three stations with OGFC overlays (10-307, 10-308, 10-309), while the remaining station (10-306) is a control station that collects runoff from standard dense-graded hot mix asphalt. Monitoring of these stations will continue during the 2024-25 fiscal year. Details on these BMP sites are given in Table 4 of the QAPP.

6.2.4 Los Angeles Region (Permit Section F2.14)

Caltrans is currently monitoring the effectiveness of two Austin sand filters in the Los Angeles Region, one in the Ballona Creek watershed and one in the Peck Road Park Lake (Los Angeles River) watershed. The Ballona Creek filter, located off I-10, includes influent station 7-413 and effluent station 7-414. The Peck Road Park Lake filter, located off SR-210, includes influent station 7-422 and effluent station 7-423. These BMP sites will be monitored during the 2024-25 fiscal year. Details on these BMP sites are given in Table 4 of the QAPP.

Caltrans has collected sufficient monitoring data for pilot trash devices with biochar media at six locations in the Los Angeles Region, all in the Los Angeles River watershed. No further monitoring is anticipated at these sites.

6.2.5 San Diego Region (Permit Section F2.14)

Caltrans has constructed bioswales, modular infiltration trenches, and an Austin sand filter to address the Chollas Creek Diazinon TMDL, Dissolved Metals TMDL, and Twenty Beaches and Creeks Bacteria TMDL. Caltrans has selected and is performing effectiveness monitoring of one bioswale and one Austin sand filter. The bioswale, located off SR-94, includes influent station 11-357 and effluent station 11-358. The Austin sand filter, also located off SR-94, includes influent station 11-359 and effluent station 11-360. In addition to BMP effectiveness monitoring, Caltrans is also conducting monitoring at two receiving water stations (11-355 and 11-356) to improve assessments of dissolved metals TMDL acute and chronic thresholds. These BMP and receiving water sites will be monitored during the 2024-25 fiscal year. Details on these sites are given in Table 4 of the QAPP.

Caltrans is also conducting a pilot pervious pavement BMP monitoring study at three sites near Encinitas in the Cottonwood Creek watershed. The Encinitas Pervious Pavement Pilot Monitoring Project (Encinitas Pilot Project) consists of three stations that evaluate the performance of pervious highway shoulders for runoff treatment. One station (11-362) monitors untreated runoff while the other two monitor treated effluent (11-363 and 11-364). Continuation of monitoring at these sites will depend on a review of operational monitoring data collected to date. Details on these BMP sites are given in Table 4 of the QAPP.

6.4 BMP Monitoring Schedule (Permit Section F2.14)

Table 4 of the QAPP (Appendix B) provides the monitoring schedule for BMP effectiveness sites in each TMDL watershed. Table 4 specifies monitoring that will be conducted during the 2024-25 fiscal year and monitoring that is proposed for the 2025-26 fiscal year. The decision to monitor these sites during the 2025-26 fiscal year will be made after the current season, when the total number of usable data points for the sites are known.

SECTION 7

Conditionally Exempt Non-Stormwater Discharge Monitoring

Section F2.15 of the Caltrans Permit allows certain types of non-stormwater discharges that are not considered to be sources of pollutants. However, if the State Water Board Executive Director determines that any category of allowed non-stormwater discharge is a source of pollutants, the State Water Board Executive Director may require the Department to conduct additional monitoring and submit a report on such discharges. The State Water Board Executive Director may also order the Department to cease a non-stormwater discharge.

During the 2024-25 season, the State Water Board Executive Director has not identified any of the conditionally exempt non-stormwater discharges to be a source of pollutants.

Updates to Appendix A (Sampling and Analysis Plan)

Table SAP- 4.1 - Methods and Reporting Limits

Constituent	Analytical Method(s)[1]	Units	Reporting Limit
Conventionals			
Hardness as $CaCO_3$	SM 2340 B or C	mg/L	1
pH	Calibrated Field Instrument	pH Units	Field
Temperature	Calibrated Field Instrument	° Celsius	Field
Flow Rate	Calibrated Field Instrument	ft^3/s	Field
Salinity	SM 2520 A	ppt	1
Total Dissolved Solids	EPA 160.1	mg/L	1
Total Suspended Solids	EPA 160.2	mg/L	1
Settleable Solids	SM 2540 F	mL/L	0.1
Turbidity	EPA 180.1	NTU	0.5
Total Organic Carbon	EPA 5310B or C	mg/L	0.6
Dissolved Organic Carbon	EPA 5310B or C	mg/L	0.6
Alkalinity as $CaCO_3$	EPA 310.1	mg/L	1
Conductivity	EPA 120.1	uS/cm	1
Nutrients			
Total Kjeldahl Nitrogen	EPA 351.3	mg/L	0.1
Nitrate as N	EPA 300.0/EPA 300.1	mg/L	0.1
Nitrite as N	EPA 300.0/EPA 300.1	mg/L	0.1
Phosphorous as P	EPA 365.2	mg/L	0.03
Orthophosphate (Total)	SM 4500-P, E	mg/L	0.03
Ammonia as N	SM 4500-NH3 D	mg/L	0.1
Metals (Total and Dissolved)			
Aluminum	EPA 200.8/EPA 1640	µg/L	25
Arsenic	EPA 200.8/EPA 1640	µg/L	0.01
Cadmium	EPA 200.8/EPA 1640	µg/L	0.005
Chromium	EPA 200.8/EPA 1640	µg/L	0.025
Copper	EPA 200.8/EPA 1640	µg/L	0.01
Iron	/EPA 200.8/EPA 1640	µg/L	1
Lead	EPA 200.8/EPA 1640	µg/L	0.05
Manganese	EPA 200.8/EPA 1640	µg/L	0.01
Mercury	EPA 1631E/EPA 1640	µg/L	0.0002
Nickel	EPA 200.8/EPA 1640	µg/L	0.02
Selenium	EPA 200.8/EPA 1640	µg/L	0.3
Silver	EPA 200.8/EPA 1640	µg/L	0.02
Zinc	EPA 200.8/EPA 1640	µg/L	5
Hydrocarbons			
Oil & Grease	EPA 1664B	mg/L	1.4
Organics			
Polynuclear Aromatic Hydrocarbons (PAHs)	EPA 8310	ng/L	See Note[2]
Chlorinated Phenolics	EPA 625/EPA 8270	µg/L	1
Phenolic Compounds (non-chlorinated)	EPA 625/EPA 8270	µg/L	30
Organochlorine Pesticides	EPA 8081/EPA 625	µg/L	See Note[2]
Organochlorine Pesticides (low level)	EPA 1699	pg/L	See Note[2]
Organophosphorus Pesticides	EPA 8141/EPA 625	ng/L	See Note[2]

Constituent	Analytical Method(s)[1]	Units	Reporting Limit
Pyrethroid Pesticides	EPA 625/EPA 8270	ng/L	See Note[2]
PCBs	EPA 8081/EPA 8082	µg/L	See Note[2]
PCB (low level)	EPA 1668C	pg/L	See Note[3]
Microbiologicals			
Total Coliform	SM 9221 C	MPN/100 mL	2
Fecal Coliform	SM 9221 C	MPN/100 mL	2
Enterococcus	EPA 1600/Enterolert	CFU/100 mL	1
E. Coli	SM 9221 C	MPN/100 mL	2
Other			
Cyanide	EPA 335.2	mg/L	0.05
Total Chlorine Residual	EPA 330.1/EPA 330.5	mg/L	0.2
Toxicity			
Acute Toxicity	EPA-821-R-02-012	Pass/Fail	Not Applicable
Chronic Toxicity	EPA 821-R-02-013/ EPA-821-R-02-014	Pass Fail	Not Applicable

[1] Alternate analytical methods may be used, but the use of any method not listed on this table must be approved in advance and in writing by the Caltrans Task Order Manager.

[2] See Tables SAP-4.2 through SAP-4.6 for the individual compounds and their associated reporting limits.

[3] PCBs are analyzed on a per-congener basis. MDLs are determined by the laboratory for each congener during each analysis.

Table SAP- 4.2 - Compound List/RLs for Organochlorine Pesticides

Constituent Name	Units	Reporting Limit
DDTs	ug/L	0.005
Toxaphene	ug/L	0.005
Dieldrin	ug/L	0.005
Chlordane	ug/L	0.005
DDTs	pg/L	5
Toxaphene	pg/L	50
Dieldrin	pg/L	5
Chlordane	pg/L	5
HCHs	µg/L	0.002
Endosulfan	µg/L	0.002
Endrin	µg/L	0.002

Updates to Appendix B (Quality Assurance Project Plan)

A6.3 Geographical Locations

This section describes the physical locations (sites) at which monitoring will be conducted. All monitoring samples and measurements shall be representative of the monitored volume and characteristics of the monitored discharge at each monitoring site. At select monitoring locations, effluent from BMPs will be used as representative of the water quality of stormwater discharges from BMPs of the same type at other locations. Selection of representative BMP effectiveness monitoring sites are based on existing and proposed BMPs.

Table 4 lists all project monitoring sites, their geographical locations, and the type of monitoring, such as discharge characterization, BMP effectiveness, receiving water, or cooperative agreement, that will be conducted at each site. Table 4 summarizes the geographical information for all project monitoring sites.

Table 3 - Project Station Information

Station Code	Station Name	Latitude	Longitude	RWQCB	County	Route	Postmile	Catchment (ha)	Position	Monitoring Type	Watershed Name	TMDL Pollutant List	Monitored 2024-25*	Monitored 2025-26*
1-351	Lord Ellis Influent	40.9303	-123.855	1	Humboldt	299	18.42	0.54	Influent	Bioswale	Redwood Creek	Sediment	Yes	Planned
1-352	Lord Ellis Effluent	40.9305	-126.855	1	Humboldt	299	18.42	0.54	Effluent	Bioswale	Redwood Creek	Sediment	Yes	Planned
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	Redwood Creek	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	Redwood Creek	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	EOP	Receiving Water Impact	Redwood Creek	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	Redwood Creek	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	Redwood Creek	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	EOP	Receiving Water Impact	Redwood Creek	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	South Eel Fork River	Temperature and Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	South Eel Fork River	Temperature and Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	EOP	Receiving Water Impact	South Eel Fork River	Temperature and Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	South Eel Fork River	Temperature and Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	RW	Receiving Water Impact	South Eel Fork River	Temperature and Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Humboldt/ Del Norte	TBD	TBD	TBD	EOP	Receiving Water Impact	South Eel Fork River	Temperature and Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Trinity	TBD	TBD	TBD	RW	Receiving Water Impact	Trinity River	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Trinity	TBD	TBD	TBD	RW	Receiving Water Impact	Trinity River	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Trinity	TBD	TBD	TBD	EOP	Receiving Water Impact	Trinity River	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Trinity	TBD	TBD	TBD	RW	Receiving Water Impact	Trinity River	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Trinity	TBD	TBD	TBD	RW	Receiving Water Impact	Trinity River	Sediment	Planned	Yes
1-###	North Coast	TBD	TBD	1	Trinity	TBD	TBD	TBD	EOP	Receiving Water Impact	Trinity River	Sediment	Planned	Yes
4-442	Pescadero- Butano Creek	37.26482	-122.41199	2	San Mateo	1	13.92	0.2	Overside Drain	Characterization	Pescadero- Butano Creek	Sedimentation/ Siltation	Yes	Planned
4-351	I-580/80 IC	37.8914	-122.308	4		I 80	12/13 WB	0.101	Influent	Non OGFC Control for 4-454	San Francisco Bay	PCB, Hg	Yes	Planned
4-449	Hayward HDS West unit	37.63131	-122.08237	2	Alameda	880	15.582	174.42	Influent	HDS	San Francisco Bay	PCB, Hg	Yes	Planned

Station Code	Station Name	Latitude	Longitude	RWQCB	County	Route	Postmile	Catchment (ha)	Position	Monitoring Type	Watershed Name	TMDL Pollutant List	Monitored 2024-25*	Monitored 2025-26*
4-450	Hayward HDS West unit	37.63128	-122.08237	2	Alameda	880	15.582	174.42	Effluent	HDS	San Francisco Bay	PCB, Hg	Yes	Planned
4-454	D4 OGFC Virginia Street at I-80- Test Site	37.87114	-122.30477	4	Alameda	I 80	6.142	2.89	Effluent	OGFC Test	San Francisco Bay	PCB, Hg	Yes	Planned
4-455	D4 OGFC I-580 E from I-80 W column drain	37.82824	-122.29352	4	Alameda	580	R35.232L	0.59	Influent	OGFC Control for 4-456	San Francisco Bay	PCB, Hg	Yes	Planned
4-456	D4 OGFC Basin 1 and 4 Inlet	37.82829	--122.29315	4	Alameda	80/580/880	46.552R	2.15	Effluent	OGFC Test	San Francisco Bay	PCB, Hg	Yes	Planned
4-352	D4 OGFC I-880/80 IC	37.82750	-122.29400	4	Contra Costa	I 880	44 SB	0.093	EOP	Characterization	San Francisco Bay	PCB, Hg	Yes	Planned
4-460	Basin 4 Column Drain	37.8278889	-122.2933	4	Alameda	I 880	R35.232L	0.14	Influent	Control for 4-456 (high truck traffic)	San Francisco Bay	PCB, Hg	Yes	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	HDS influent	San Francisco Bay	PCBs, Mercury	No	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	HDS effluent	San Francisco Bay	PCBs, Mercury	No	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	HDS influent	San Francisco Bay	PCBs, Mercury	No	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	HDS effluent	San Francisco Bay	PCBs, Mercury	No	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	HDS influent	San Francisco Bay	PCBs, Mercury	No	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	HDS effluent	San Francisco Bay	PCBs, Mercury	No	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	MGSRD influent	San Francisco Bay	PCBs, Mercury	No	Planned
4-###	SFBAY HDS	TBD	TBD	TBD	TBD	TBD	TBD	TBD	BMP	MGSRD effluent	San Francisco Bay	PCBs, Mercury	No	Planned
7-127	Site 2, Interstate 210 mile post 40.8	34.12	-117.89	4	Los Angeles	210	40.8	0.4	EOP	Characterization	San Gabriel River	Nitrogen, Phosphorus, Copper, Lead, Zinc, Chlordane, DDT, PCBs, Mercury, Dieldrin, PAHs	Yes	No
7-128	Site 3, Interstate 91 post 8.92	33.8736	-118.236	4	Los Angeles	91	8.9	0.4	EOP	Characterization	San Gabriel River	Nitrogen, Phosphorus, Copper, Lead, Zinc, Chlordane, DDT, PCBs, Mercury, Dieldrin, PAHs	Yes	No
7-380	SAD1060	34.0156	-118.823	4	Los Angeles	1		3.181	EOP	Characterization	Los Angeles River	Mercury	Yes	No

Station Code	Station Name	Latitude	Longitude	RWQCB	County	Route	Postmile	Catchment (ha)	Position	Monitoring Type	Watershed Name	TMDL Pollutant List	Monitored 2024-25*	Monitored 2025-26*
7-413	I-10 Media Filter Influent	34.03619	-118.37821	4	Los Angeles	10	8.81	3.34	Influent	Media Filter	Ballona Creek Estuary & Wetlands	Sediment and Invasive Exotic Vegetation / Toxic Pollutants Ag, Cd, Cu, Pb, Zn, and Selenium, Chlordane, DDTs, Total PCBs, and Total PAHs	Yes	Planned
7-414	I-10 Media Filter Effluent	34.03619	-118.37821	4	Los Angeles	10	8.81	3.34	Effluent	Media Filter	Ballona Creek Estuary & Wetlands	Sediment and Invasive Exotic Vegetation / Toxic Pollutants Ag, Cd, Cu, Pb, Zn, and Selenium, Chlordane, DDTs, Total PCBs, and Total PAHs	Yes	Planned
7-420	Echo Park Lake Characterization	34.08379	-118.25996	4	Los Angeles	2	13.64	0.52	EOP	Characterization	Part B-Los Angeles Area Echo Park Lake	Nitrogen, Phosphorus, Chlordane, Dieldrin, PCBs, and Trash	Yes	Planned
7-421	Legg Lake Characterization	34.03978	-118.06391	4	Los Angeles	164	3.24	0.6	Pipe outlet	Characterization	Part B-Los Angeles Area North, Center & Legg Lake	Nitrogen, Phosphorus	Yes	Planned
7-422	Peck Road Park Lake SF Influent	34.13572	-117.98787	4	Los Angeles	210	34.66	2.35	Influent	Austin Sand Filter	Los Angeles Area Peck Road Park Lake	Nitrogen, Phosphorus, Chlordane, DDT, Dieldrin, and PCBs	Yes	Planned
7-423	Peck Road Park Lake SF Effluent	34.13572	-117.98787	4	Los Angeles	210	34.66	2.35	Effluent	Austin Sand Filter	Los Angeles Area Peck Road Park Lake	Nitrogen, Phosphorus, Chlordane, DDT, Dieldrin, and PCBs	Yes	Planned
7-425	Machado Lake Characterization	33.79089	-118.29129	4	Los Angeles	1	12.15	0.55	EOP	Characterization	Machado Lake	Eutrophic, Algae, Ammonia, and Odors (Nutrients) /Pesticides and PCBs	Yes	Planned
7-427	Maxella Ave Characterization	33.98649	-118.44431	4	Los Angeles	90	31.45	0.84	EOP	Characterization	Marina Del Rey Harbor	Toxic Pollutants (Cu, Pb, Zn, Chlordane and Total PCBs)	Yes	Planned
TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Los Angeles Area Lake Sherwood	Mercury	No	Planned
TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Ventura River and its Tributaries	Algae, Eutrophic Conditions, and Nutrients	No	Planned

Station Code	Station Name	Latitude	Longitude	RWQCB	County	Route	Postmile	Catchment (ha)	Position	Monitoring Type	Watershed Name	TMDL Pollutant List	Monitored 2024-25*	Monitored 2025-26*
8-313	I-10 West of Jackson St, FES	33.73723	-116.21556	7	Riverside	Inter	55.812	3.5	Flared End Section Outlet	Characterization	Coachella Valley Storm Water Channel	Bacterial Indicators	Yes	Planned
8-314	I-10 East of Jackson St, Inlet	33.73828	-116.2185	7	Riverside	Inter	55.629	1	Drop Inlet in Median	Characterization	Coachella Valley Storm Water Channel	Bacterial Indicators	Yes	Planned
8-315	I-10 West of Monroe St, Inlet	33.73882	-116.22513	7	Riverside	Inter	55.25	1.1	Drop Inlet in Median	Characterization	Coachella Valley Storm Water Channel	Bacterial Indicators	Yes	Planned
8-316	SR-86 near interchange, Inlet	33.71645	-116.1924	7	Riverside	State	R23.051	1	Drop Inlet	Characterization	Coachella Valley Storm Water Channel	Bacterial Indicators	Yes	Planned
8-321	Big Bear Lake HDU 1 Characterization	34.24331	-116.89136	8	San Bernardino	SR 18	50.258	1.59	Catch Basin Inlet	BMP	Big Bear Lake	Nutrients for Dry Hydrological Conditions	Yes	Planned
8-322	Big Bear Lake HDU 2 Characterization	34.24895	-116.88298	8	San Bernardino	SR 18	51.018	0.06	EOP	Characterization	Big Bear Lake	Nutrients for Dry Hydrological Conditions	Yes	Planned
8-323	Big Bear Lake HDU 4 Characterization	34.24362	-116.91219	8	San Bernardino	SR 18	Not Provided	0.2	Drop Inlet	Characterization	Big Bear Lake	Nutrients for Dry Hydrological Conditions	Yes	Planned
10-306	SR 33-13.45-NB	37.0598	-121.01632	5	Merced	SR 33	13.45	0.1255	Edge of Pavement	Characterization	No TMDL	None	Yes	Planned
10-307	SR 33-14.33-NB	37.07254	-121.01615	5	Merced	SR 33	14.33	0.0567	Edge of Pavement	Porous Pavement (HMA-O)	No TMDL	None	Yes	Planned
10-308	SR 33-14.75-SB	37.07877	-121.01619	5	Merced	SR 33	14.75	0.142	Edge of Pavement	Porous Pavement (RHMA-O)	No TMDL	None	Yes	Planned
10-309	SR 33-14.75-NB	37.07877	-121.01610	5	Merced	SR 33	14-48 NB	0.028	Edge of Pavement	Porous Pavement (RHMA-O-MG)	No TMDL	None	Yes	Planned
11-355	RW-NF	32.71747	-117.11505	9	San Diego	94	3.3	2286	RW	Receiving Water	Chollas Creek	Hardness, TSS, Field Parameters	Yes	Unknown
11-356	RW-SF	32.72306	-117.07598	9	San Diego	94	5.78	567	RW	Receiving Water	Chollas Creek	Hardness, TSS, Field Parameters	Yes	Unknown
11-357	94E/College-INF	32.7404	-117.05211	9	San Diego	94	7.5	1.2626	Influent	Biofiltration Swale	Chollas Creek	Dissolved Copper, Dissolved Lead, Dissolved Zinc, Total Diazinon	Yes	Unknown
11-358	94E/College-EFF	32.73943	-117.05318	9	San Diego	94	7.5	1.2626	Effluent	Biofiltration Swale	Chollas Creek	Dissolved Copper, Dissolved Lead, Dissolved Zinc, Total Diazinon	Yes	Unknown
11-359	94E/Median ASF-INF	32.71663	-117.11878	9	San Diego	94	3	0.855	Influent	Austin Sand Filter	Chollas Creek	Dissolved Copper, Dissolved Lead, Dissolved Zinc, Total Diazinon	Yes	Unknown
11-360	94E/Median ASF-EFF	32.71677	-117.11844	9	San Diego	94	3	0.855	Effluent	Austin Sand Filter	Chollas Creek	Dissolved Copper, Dissolved Lead, Dissolved Zinc, Total Diazinon	Yes	Unknown
11-362	I-5S - Encinitas Porous Influent	33.05486	-117.28947	9	San Diego	5	41.883	0.3359	EOP	Characterization	Cottonwood Creek	Fecal Coliform	Yes	Unknown

Station Code	Station Name	Latitude	Longitude	RWQCB	County	Route	Postmile	Catchment (ha)	Position	Monitoring Type	Watershed Name	TMDL Pollutant List	Monitored 2024-25*	Monitored 2025-26*
11-363	I-5S - Encinitas Porous Effluent 1	33.05303	-117.28888	9	San Diego	5	41.883	0.4516	EOP	Porous Pavement (HMA-O over PCP)	Cottonwood Creek	Fecal Coliform	Yes	Unknown
11-364	I-5S - Encinitas Porous Effluent 2	33.05189	-117.28858	9	San Diego	5	41.883	0.1538	EOP	Porous Pavement (PCP over PAB)	Cottonwood Creek	Fecal Coliform	Yes	Unknown

Planned - Monitoring at these sites will depend on a review of monitoring data collected to date.
Unknown - The decision to monitor these sites during the 2025-26 storm season will be made after the current season, when the total number of usable data points for the site are known.

B1.3 Sample Count and Types

Table 5 lists the sample counts, sample types, and required analyses for each project site.

In addition to the analyses listed in Table 5, field tests will be conducted at every monitoring site during every event. Field testing shall include temperature, pH, conductivity, turbidity, and dissolved oxygen.

Table 4 - Sample Counts, Types, and Analyses

Station Code/Name	Analytical Constituent	Sample Type	Sample Frequency (per Year)
1-351	SSC	Grab	3
1-352	SSC	Grab	3
North Coast (18 stations) see Table 4	TSS, SSC, Turbidity, PSD, Temp, pH	Field/Grab	3
SF BAY HDS (6 stations) see Table 4	PCB[3], Hg, SSC, TSS, PAH, Nutrients, Metals, organochlorine pesticides	Composite/Grab	3
SF BAY MGSRD (2 Stations)	Sediment test only: PCB[3], Hg, TOC, % fines	Grab	4
D4 OGFC (6 Stations) see Table 4	SSC, O&G, Hg, PCB[3]	Grab	3
4-442	TSS	Composite	2
	SSC	Grab	2
4-443	Total Coliform	Grab	2
	Fecal Coliform	Grab	2
	E. Coli	Grab	2
4-449	Conventionals, O&G, PAH, Nutrients, Metals, Fecal Coliform, PCB[3], Organochlorine Pesticides, Toxicity	Composite	6
4-450	Conventionals, O&G, PAH, Nutrients, Metals, Fecal Coliform, PCB[3], Organochlorine Pesticides, Toxicity	Composite	6
7-127	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
	Copper	Composite	2
	Lead	Composite	2
	Mercury	Grab	2
	Zinc	Composite	2
	Chlordane	Composite	2
	DDTs, DDDs, DDEs (all forms)	Composite	2
	PCBs[1]	Composite	2
	PAHs	Composite	2
	Dieldrin	Composite	2

Station Code/Name	Analytical Constituent	Sample Type	Sample Frequency (per Year)
	TSS	Composite	2
	SSC	Grab	2
	Total Organic Carbon	Composite	2
	Dissolved Organic Carbon	Composite	2
7-128	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
	Copper	Composite	2
	Lead	Composite	2
	Mercury	Grab	2
	Zinc	Composite	2
	Chlordane	Composite	2
	DDTs, DDDs, DDEs (all forms)	Composite	2
	PCBs[1]	Composite	2
	PAHs	Composite	2
	Dieldrin	Composite	2
	TSS	Composite	2
	SSC	Grab	2
	Total Organic Carbon	Composite	2
	Dissolved Organic Carbon	Composite	2
7-380	Mercury	Grab	2
7-413	Cadmium	Composite	2
	Copper	Composite	2
	Lead	Composite	2
	Silver	Composite	2
	Zinc	Composite	2
	Selenium	Composite	2
	DDTs, DDDs, DDEs (all forms)	Composite	2
	Chlordane	Composite	2
	PCBs[1]	Composite	2
	PAHs	Composite	2
	TSS	Composite	2
	SSC	Grab	2
	Total Organic Carbon	Composite	2
	Dissolved Organic Carbon	Composite	2
7-414	Cadmium	Composite	3
	Copper	Composite	3
	Lead	Composite	3

Station Code/Name	Analytical Constituent	Sample Type	Sample Frequency (per Year)
	Silver	Composite	3
	Zinc	Composite	3
	Selenium	Composite	3
	DDTs, DDDs, DDEs (all forms)	Composite	3
	Chlordane	Composite	3
	PCBs[1]	Composite	3
	PAHs	Composite	3
	TSS	Composite	3
	SSC	Grab	3
	Total Organic Carbon	Composite	3
	Dissolved Organic Carbon	Composite	3
7-420	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
	Chlordane	Composite	2
	Dieldrin	Composite	2
	PCBs[2]	Composite	2
	TSS	Composite	2
	SSC	Grab	2
	Total Organic Carbon	Composite	2
	Dissolved Organic Carbon	Composite	2
	Trash	Not Applicable	2
7-421	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
7-422	Nitrate as N	Composite	3
	Nitrite as N	Composite	3
	TKN	Composite	3
	Phosphorus as P	Composite	3
	Chlordane	Composite	3
	Dieldrin	Composite	3
	PCBs[2]	Composite	3
	TSS	Composite	3
	SSC	Grab	3
	Total Organic Carbon	Composite	3
	Dissolved Organic Carbon	Composite	3
7-423	Nitrate as N	Composite	3

Station Code/Name	Analytical Constituent	Sample Type	Sample Frequency (per Year)
	Nitrite as N	Composite	3
	TKN	Composite	3
	Phosphorus as P	Composite	3
	Chlordane	Composite	3
	Dieldrin	Composite	3
	PCBs[2]	Composite	3
	TSS	Composite	3
	SSC	Grab	3
	Total Organic Carbon	Composite	3
	Dissolved Organic Carbon	Composite	3
7-425	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
	Chlordane (low level)	Composite	2
	Dieldrin (low level)	Composite	2
	DDTs, DDDs, DDEs (all forms low level)	Composite	2
	PCBs[1]	Composite	2
	TSS	Composite	2
	SSC	Grab	2
	Total Organic Carbon	Composite	2
	Dissolved Organic Carbon	Composite	2
7-427	Copper	Composite	2
	Lead	Composite	2
	Zinc	Composite	2
	Chlordane	Composite	2
	PCBs[1]	Composite	2
	TSS	Composite	2
	SSC	Grab	2
	Total Organic Carbon	Composite	2
	Dissolved Organic Carbon	Composite	2
TBD Sites District 7 Lake Sherwood	Mercury	Grab	2
TBD Sites District 7 Ventura River	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
	Phosphorus as P	Composite	2
8-313	Total Coliform	Grab	2

Station Code/Name	Analytical Constituent	Sample Type	Sample Frequency (per Year)
	Fecal Coliform	Grab	2
	E. Coli	Grab	2
	Enterococcus	Grab	2
8-314	Total Coliform	Grab	2
	Fecal Coliform	Grab	2
	E. Coli	Grab	2
	Enterococcus	Grab	2
8-315	Total Coliform	Grab	2
	Fecal Coliform	Grab	2
	E. Coli	Grab	2
	Enterococcus	Grab	2
8-316	Total Coliform	Grab	2
	Fecal Coliform	Grab	2
	E. Coli	Grab	2
	Enterococcus	Grab	2
8-321	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
8-322	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
8-323	Nitrate as N	Composite	2
	Nitrite as N	Composite	2
	TKN	Composite	2
	Phosphorus as P	Composite	2
10-306	Cadmium	Composite	3
	Chromium	Composite	3
	Copper	Composite	3
	Lead	Composite	3
	Mercury	Composite	3
	Zinc	Composite	3
	Hardness as CaCO3	Composite	3
	Nitrate as N	Composite	3
	Nitrite as N	Composite	3
	TKN	Composite	3
	Phosphorus as P	Composite	3
	PCBs[1]	Composite	3

Station Code/Name	Analytical Constituent	Sample Type	Sample Frequency (per Year)
	TSS	Composite	3
	SSC	Grab	3
	Total Organic Carbon	Composite	3
	Dissolved Organic Carbon	Composite	3
10-307	Cadmium	Composite	3
	Chromium	Composite	3
	Copper	Composite	3
	Lead	Composite	3
	Mercury	Composite	3
	Zinc	Composite	3
	Hardness as CaCO3	Composite	3
	Nitrate as N	Composite	3
	Nitrite as N	Composite	3
	TKN	Composite	3
	Phosphorus as P	Composite	3
	PCBs[1]	Composite	3
	TSS	Composite	3
	SSC	Grab	3
	Total Organic Carbon	Composite	3
	Dissolved Organic Carbon	Composite	3
10-308	Cadmium	Composite	3
	Chromium	Composite	3
	Copper	Composite	3
	Lead	Composite	3
	Mercury	Composite	3
	Zinc	Composite	3
	Hardness as CaCO3	Composite	3
	Nitrate as N	Composite	3
	Nitrite as N	Composite	3
	TKN	Composite	3
	Phosphorus as P	Composite	3
	PCBs[1]	Composite	3
	TSS	Composite	3
	SSC	Grab	3
	Total Organic Carbon	Composite	3
	Dissolved Organic Carbon	Composite	3
10-309	Cadmium	Composite	3
	Chromium	Composite	3
	Copper	Composite	3

Station Code/Name	Analytical Constituent	Sample Type	Sample Frequency (per Year)
	Lead	Composite	3
	Mercury	Composite	3
	Zinc	Composite	3
	Hardness as CaCO3	Composite	3
	Nitrate as N	Composite	3
	Nitrite as N	Composite	3
	TKN	Composite	3
	Phosphorus as P	Composite	3
	PCBs[1]	Composite	3
	TSS	Composite	3
	SSC	Grab	3
	Total Organic Carbon	Composite	3
	Dissolved Organic Carbon	Composite	3
11-355	TSS	Composite	1
	Hardness	Composite	1
11-356	TSS	Composite	1
	Hardness	Composite	1
11-357	Dissolved Copper	Composite	1
	Dissolved Lead	Composite	1
	Dissolved Zinc	Composite	1
	Diazinon	Composite	1
11-358	Dissolved Copper	Composite	1
	Dissolved Lead	Composite	1
	Dissolved Zinc	Composite	1
	Diazinon	Composite	1
11-359	Dissolved Copper	Composite	1
	Dissolved Lead	Composite	1
	Dissolved Zinc	Composite	1
	Diazinon	Composite	1
11-360	Dissolved Copper	Composite	1
	Dissolved Lead	Composite	1
	Dissolved Zinc	Composite	1
	Diazinon	Composite	1
11-362	Fecal Coliform, Conventionals, PAH, O&G, Nutirients, Metals, Toxicity	Composite/Grab	3
11-363	Fecal Coliform, Conventionals, PAH, O&G, Nutirients, Metals, Toxicity	Composite/Grab	3
11-364	Fecal Coliform, Conventionals, PAH, O&G, Nutirients, Metals, Toxicity	Composite/Grab	3

[1]Standard PCBs: Aroclors 1016 ,1221 ,1232 ,1242 ,1248, 1254, 1260

[2]54 PCB congeners: 8, 18, 28, 31, 33, 37, 44, 49, 52, 56, 60, 66, 70, 74, 77, 81, 87, 95, 97, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132, 138, 141, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 174, 177, 180, 183, 187, 189, 194, 195, 201, 203, 206, and 209.

[3]PCBs 40 Congeners SF Bay List: PCB 004, 087, 153, 008, 095, 156, 018, 097, 158, 028, 099, 170, 031, 101, 174, 033, 105, 177, 044, 110, 180, 049, 118, 183, 052, 128, 187, 056, 132, 194, 060, 138, 195, 066, 141, 201, 070, 149, 203, 074, 151

PAHs: Acenaphthene, Chrysene, Acenaphthylene, Dibenzo(a,h)anthracene, Anthracene, Fluoranthene, Benzo(a)anthracene, Fluorene,Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Benzo(b)fluoranthene, Naphthalene, Benzo(ghi)perylene, Phenanthrene, Benzo(k)fluoranthene, Pyrene

B2.1 Collection Methods

Sample collection will be performed using the methods provided in the project SAP (Appendix A). Methods in the SAP were developed in accordance with the guidelines in Chapters 4, 8, and 11 of the Stormwater Monitoring Guidance Manual (Caltrans 2020).

In general, composite samples will be collected using the methods provided in Section SAP-1.2 of Appendix A. Grab samples will be collected using the methods provided in Section SAP-1.3 of Appendix A.

Time-Weighted Sample Collection and Compositing at TMDL Sites

Time-weighted composite samples for TMDL sites may be collected using the following procedures.

Grab samples are collected manually and combined into a single composite sample in accordance with the procedure outlined in Section SAP-1.3 of Appendix A. Grab samples will be collected according to the following strategy:

1. Storms with a duration greater than three hours: Samples shall be collected manually by taking at least three discrete grab samples during each of the first three hours of discharge.
2. Storms with a duration of three hours or less: at least three discrete grab samples shall be collected during each hour of discharge for the entire duration of the storm event.

Samples shall be collected between 15 and 20 minutes apart. The actual time that it takes to collect an individual grab sample will not exceed 15 minutes. The first flow measurement will be taken approximately 10 minutes after the discharge has stabilized and the first sample will be collected approximately 15 minutes after the discharge has stabilized. The discharge will be considered to have stabilized when flow rate and turbidity appear to be reasonably constant and/or sheet flow is well established.

Field crews will take instantaneous flow measurements at the sample collection point prior to the collection of each grab sample. Flow measurements will be made using the measurement methods described in Section SAP-1.3.3 of Appendix A. One flow measurement will be made approximately 5 to 10 minutes prior to the collection of each grab sample, so that each grab sample is associated with a corresponding flow measurement.

At the end of the monitoring event, field technicians will use the flow measurements to prepare a compositing scheme, as shown in Figure 2. Field technicians or office staff will prepare this compositing scheme using the tool that has been provided by Caltrans for this purpose. Each grab sample must be associated with a corresponding flow measurement in order to us this tool correctly.

The field crew will then send all discrete grab samples to the laboratory along with the compositing scheme. The laboratory will use this flow compositing scheme to combine all discrete grab samples into a single composite sample for analysis.

Samples such as coliform bacteria and oil & grease must be collected as single discrete samples. These samples will be collected sometime during 45 to 90 minutes after start of sampling, or if the event lasts more than 3 hours, approximately in the middle of the sampling event. These tests will be performed on individual grab samples, not on the composite sample.

Table 5 - Example of a Sample Compositing Scheme for a Standard 3-Hour Event

				TOTAL SAMPLE VOLUME REQUIRED (Vc)	**20000**	**mL**		
				DISCREET GRAB SIZE (Vgrab)	**4000**	**mL**		
Aliquot #	Time of Flow Measurement	Time of Grab Sample	Measured Flow Rate (L/min)	Time Interval Between Flow Measurements (min)	Averaged Flow Rate (L/min)	Flow Volume (L)	Unadjusted Aliquot Volume	**Final Aliquot Volume**
--	00:00	--	92	--	--	--	--	--
1	00:18	00:20	100	18	96	1728	840	**818**
2	00:36	00:41	115	18	108	1935	941	**916**
3	00:57	00:59	201	21	158	3318	1613	**1571**
4	01:16	01:20	330	19	266	5045	2453	**2388**
5	01:30	01:33	401	14	366	5117	2488	**2423**
6	01:52	01:57	367	22	384	8448	4108	**4000**
7	02:08	02:10	209	16	288	4608	2241	**2182**
8	02:25	02:30	301	17	255	4335	2108	**2053**
9	02:47	02:54	299	22	300	6600	3209	**3125**
							Final Composite Volume:	**19476**

Note: The start time of 00:00 reflects the time approximately 10 minutes after the flow appears to have stabilized, based on visual observation. During a storm event, actual times of day will be placed in these cells.

The volume of each grab sample that should be used to make the final composite (shown in Column 8 of Figure 2) is calculated as follows. These equations assume that the volume of the final composite will be 20 liters (20,000 ml) and that the target volume for each individual grab sample is 4 liters (4,000 ml).

First, for each discrete grab sample collected, determine the volume of discharge that it represents.

Equation B2.1

$$\text{Flow Volume (L)} = \Delta\text{Time} * ((dQ_{i\,t2} - dQ_{i\,t1}) / 2)$$

Where: Flow Volume = Volume of flow represented by the discrete grab sample

ΔTime = Interval in minutes between the current and the previous instantaneous flow measurements

$dQ_{i\,t2}$ = Instantaneous flow measurement (L/min) associated with this grab sample

$dQ_{i\,t1}$ = Previous instantaneous flow measurement (L/min)

Next, determine the volume of each discrete grab sample to be used as an aliquot in the final composite sample. This is an unadjusted volume based on the assumption that all discrete grabs will have sufficient volume.

Equation B2.2

$$\text{Unadjusted Aliquot Volume (mL)} = \text{Flow Volume} * \text{Final Composite Volume} / \sum dQi$$

Where: Initial Aliquot Volume = Volume of the discrete grab used in the composite (mL)
Flow Volume = Flow volume for this sample, from Equation B2.1
Final Composite Volume = Target volume of the final composite (ml)
∑dQi = Sum of all flow volumes (L)

If all individual grab samples have sufficient volume, then these volumes will be used to make the final composite However, if some grab samples do not have sufficient volume, then adjusted volumes must be calculated so that a flow-proportioned composite can be made accurately. The tool provided by Caltrans does this job automatically using the following formula:

Equation B2.3

$$\text{Final Aliquot Volume (ml)} = \text{Initial Aliquot Volume} * \text{Grab Volume}_{target} / \text{Grab Volume}_{max}$$

Where: Final Aliquot Volume = Volume of the discrete grab that will be used in the composite
Initial Aliquot Volume = Volume of the aliquot calculated in Equation B2.2
Grab Volume_{target} = Target volume for discrete grab samples
Grab Volume_{max} = Volume of largest discrete grab sample or Grab Volume_{target}, whichever is greater.

In the example shown in Figure 2, the final required volumes are shown in Column 9. These are the final volumes of each discrete grab sample that will be used to make the composite sample.

Receiving Water Sample Collection

Receiving water samples will be collected using the grab sample methods provided in Section SAP-1.3 of Appendix A. Time-weighted grab samples will be collected at three monitoring points at each location:

- From the receiving waterbody, upstream
- From the receiving waterbody, downstream
- From an edge-of-pavement (EOP) discharge location prior to the point at which it enters the receiving waterbody

In addition to sample collection, an onsite rain gauge will be installed at each location where receiving water monitoring will be conducted. Rainfall data will be recorded by the field technicians in their field logs.

Samples will be collected at the upstream and downstream sampling points directly into sample bottles provided by the laboratory. Each discrete sample will consist of two one-liter wide mouth HDPE sample bottles filled completely.

Samples will be collected as close as possible to the bottom of the water column to represent the bedload as accurately as possible. In wadable streams, field crews may opt to wade into the waterbody and immerse the bottles by hand. Where the waterbody is too deep or difficult to wade, or where the field team believes that this procedure may not be safe, sample bottles will be affixed to a pole and lowered into the stream.

The downstream receiving water samples must be collected at a point at or beyond the full mixing point. When monitoring turbulent waterbodies, these samples must be collected at about five stream widths downstream from where the discharge enters the stream. If the field technicians note any pooling of water in this area, samples must be collected from a point downstream of where the pooling occurs.

EOP samples will be collected manually by holding the uncapped sample container in the runoff stream and direct-filling.

The intent of receiving water monitoring is to characterize the impact on the waterbody of the rising and peak discharge portions of the hydrograph. Because storms vary widely in their duration, it may be necessary to modify the timing of sample collection based on the anticipated time span of the storm.

For storms anticipated to last three hours or more:

- Field crews will attempt to represent the "first flush" of discharge at both the receiving water and the EOP sites.
- Samples will be collected over the first three hours of the storm.
- One set of samples will be collected approximately every 15 minutes. The target is a total of 12 sets of samples collected.
- At each 15-minute interval, all three monitoring points (receiving water and EOP) will be collected as close together as possible, so that each set of samples represents a single point in time.

For storms with an anticipated duration of less than three hours:

- Field crews will attempt to represent the "first flush" of discharge at both the receiving water and the EOP sites.
- Samples will be collected over the entire duration of the storm.
- As with longer storms, the target is a total of 12 sets of samples collected. When planning the storm event, field technicians will use best professional judgement to anticipate what sample collection frequency will be required to reach this target.
- As with longer storms, all three monitoring points (receiving water and EOP) will be collected as close together as possible, so that each set of samples represents a single point in time.