Construction Site Monitoring Program Guidance Manual

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Acronyms and Abbreviations

ATS	active treatment system
BMP	best management practice
Caltrans	California Department of Transportation
CEDEN	California Environmental Data Exchange Network
COI	Change of Information
CEM	Construction Engineering Management
CFR	Code of Federal Regulations
CGP	Construction General Permit
CSMP	Construction Site Monitoring Program
CWA	Clean Water Act
DCSWC	District Construction Stormwater Coordinator
DOT	Department Of Transportation
DWQ	Division of Water Quality
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
ID	identification
LUP	Linear Underground and Overhead Projects
MQO	measurement quality objectives
MS/MSD	matrix spike/matrix spike duplicate
MS4	Municipal Separate Storm Sewer System
NAL	numeric action level
NEL	numeric effluent limitation
NELAP	National Environmental Laboratory Accreditation Program
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
NWS	National Weather Service
NONA	Notice Of Non-Applicability
NOT	Notice Of Termination
PAH	polycyclic aromatic hydrocarbons
PECE	Permanent Erosion Control Establishment
PDF	Portable Document Format
PPDG	Project Planning and Design Guide
QA	quality assurance
QC	quality control
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
RE	Resident Engineer
RL	reporting limit
RPD	relative percent difference
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SMARTS	Stormwater Multi-Application and Report Tracking System
SSP	Standard Special Provisions
SWAMP	Surface Water Ambient Monitoring Program
SWMP	Stormwater Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
VOC	volatile organic compound
WDID	waste discharge identification
WDR	waste discharge requirement
WLA	Waste Load Allocation
WPCD	Water Pollution Control Drawings
WPC	Water Pollution Control
WPCP	Water Pollution Control Program
WQO	water quality objective

Section 1
Introduction

1.1 Purpose of Document

This Construction Site Monitoring Program Guidance Manual presents guidance for California Department of Transportation (Caltrans) staff and contractors to use in the planning and implementation of stormwater monitoring programs at construction sites in compliance with the following permits:

- State of California's Construction General Permit (CGP) issued by the State Water Resources Control Board (SWRCB): State Water Resources Control Board Order No. 2022-0057-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, herein called the "Construction General Permit (CGP)." The CGP applies statewide except for discharges of stormwater within the Lake Tahoe Hydrologic Unit or on federal Tribal Lands.
- The Lahontan Regional Water Quality Control Board (RWQCB) has adopted its own permit to regulate stormwater discharges from construction activity in the Lake Tahoe Hydrologic Unit (RWQCB 6SLT; Caltrans District 3). Owners of construction projects in this watershed must apply for the Lahontan RWQCB permit (Tahoe CGP), Order No. R6T-2016-0010, NPDES No. CAG616002, rather than the abovementioned statewide CGP.
- State Water Resources Control Board Order No. 2022-0033-DWQ, NPDES Permit No. CAS000003, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California Department of Transportation (Caltrans) was adopted on June 22, 2022, and became effective January 1, 2023. It is known as the "Caltrans' Municipal Separate Storm Sewer System (MS4) Permit" or "Caltrans MS4 Permit."

Reference to all three permits collectively will be referred to as the "Stormwater Permits." If individual permit requirements are referenced, it will be noted as CGP, Tahoe CGP or Caltrans MS4 Permit.

This manual contains additional Construction Site Monitoring Program (CSMP) requirements based on the Caltrans *Standard Specifications*[1]. This manual is organized to provide descriptions of the processes used to plan and implement a successful stormwater monitoring program specific to runoff from construction sites. The manual directly addresses CGP requirements for the monitoring of stormwater runoff.

The guidance provided in this manual complements the Caltrans *Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual*

[1] https://dot.ca.gov/programs/design/ccs-standard-plans-and-standard-specifications

(Caltrans, 2016a)[2], particularly the Caltrans *SWPPP Template* (Caltrans, 2024a). This manual should be used to complete the SWPPP template and the CSMP's sections based on project-specific information.

An important objective of this manual is to provide consistency in monitoring methods among the various Caltrans construction sites, as well as consistency in monitoring protocols over time. Such consistency is essential to ensure compliance with the stormwater permits and provide data comparability. It is also essential that monitoring data are collected in a manner to ensure the data are accurate. Therefore, this manual includes detailed information on quality assurance (QA) and quality control (QC) procedures from *Surface Water Ambient Monitoring Program Quality Assurance Program Plan* (SWAMP, 2022), as required by the CGP.

The stormwater sampling and testing procedures in this manual are based on the Caltrans general guidance manual for stormwater monitoring—*Stormwater Monitoring Guidance Manual* (Caltrans, 2020)—which provides more comprehensive guidance for planning and implementation of stormwater monitoring projects.

Because construction projects come in many sizes and configurations, each site must be addressed individually. The CGP makes essential distinctions by Risk Level, as described in Section 2 of this manual, and has separate requirements for particularized monitoring based on site conditions and triggers. The contractor's Qualified Stormwater Pollution Prevention Plan Developer (QSD) must evaluate each construction project and use this manual to develop a site-specific monitoring strategy in compliance with the CGP and coordinated with the Caltrans SWPPP requirements. For further guidance and/or direction about compliance with the CGP, the Caltrans District Construction Stormwater Coordinator (DCSWC) can be contacted.

The Resident Engineer (RE), as stated in the Caltrans *Statewide Stormwater Management Plan* (SWMP; Caltrans, 2024c), is the Department's representative charged with administering construction contracts, and is responsible for ensuring stormwater controls are implemented on construction sites. The RE makes decisions regarding the acceptability of material furnished and work performed, and exercises contractual authority to direct the contractor. The RE may impose sanctions if the contractor fails to take appropriate actions specified in the contract to correct deficiencies as described in the Construction Enforcement Response Program (SWMP Section 2.8.3). The RE must also ensure that inspectors and the contractor attend construction site stormwater training and cooperate with the self-audit program (SWMP Sections 6 and 16).

As stated in Section 13 of the Caltrans *Standard Specifications*, the contractor must assign one water pollution control (WPC) manager to implement the WPCP or SWPPP, whichever is applicable for the project. At a minimum, the WPC manager must be a Qualified SWPPP Practitioner (QSP).

1.2 CGP Overview

The California SWRCB administers the federal NPDES Permit Program for stormwater runoff from construction sites through its statewide CGP. On September 8, 2022, the SWRCB reissued the CGP under Order No. 2022-0057-DWQ. Under the CGP, owners or managers of construction sites are called "dischargers," referring to the potential to "discharge" stormwater

[2] This manual is planned for update in 2024, which can be downloaded at: https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control

runoff from the construction site. The permit requires dischargers whose projects disturb 1 acre of soil or more, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 acre or more, to obtain coverage under the CGP.

This manual addresses the monitoring requirements of the CGP and other monitoring requirements required by the Caltrans *Standard Specifications* (Section 13). The CGP covers construction site stormwater management more broadly, including requirements for preparation of a SWPPP. The SWPPP includes measures for minimizing pollutants in stormwater runoff during construction. For further guidance on developing SWPPPs, refer to the Caltrans SWPPP and WPCP preparation manuals[3]. The CGP regulatory requirements vary depending on the risk level of the project. Risk level is determined by the risk determination, according to the anticipated discharge of sediment and the risk to receiving waters. The CGP establishes three levels of possible risk for a construction site: Risk Level 1, 2, or 3. A project's risk level is specified in the contract's special provisions. The monitoring requirements for each risk level are summarized in Section 2.

1.3 Organization of Manual

This manual is organized to assist Caltrans construction contractors through the process necessary to develop and implement the CSMP in compliance with the CGP using the Caltrans *SWPPP Template* (2024), or compliance with the Caltrans MS4 permit using the Caltrans *WPCP Template* (2023a).

- Section 1 provides a general introduction, purpose, and overview of this manual
- Section 2 provides general information on developing the CSMP
- Section 3 covers protocols for visual monitoring
- Section 4 covers information on CSMP implementation protocols
- Section 5 covers protocols for monitoring of non-visible pollutants including TMDL non-visible requirements
- Section 6 covers protocols for monitoring of non-stormwater discharges and dewatering requirements
- Section 7 covers protocols for monitoring of stormwater discharges (pH and turbidity) and when receiving water trigger is met
- Section 8 covers protocols for RWQCB-required monitoring
- Section 9 covers protocols for monitoring active treatment systems
- Section 10 covers protocols for monitoring receiving waters
- Section 11 provides timeline information, as well as documentation and reporting requirements
- Section 12 contains the citation references

This guidance manual also includes:

- Appendix A: Forms Instructions
- Appendix B: Active Treatment System CGP Monitoring Protocols

[3] https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control

1.4 Limitations

This manual is applicable for projects that are subject to the California statewide CGP and does not include linear underground and overhead projects (LUPs) or projects subject to other CGPs, such as those in the Lake Tahoe Hydrologic Unit or on Tribal Lands.

This manual does not include monitoring guidance for LUPs. LUPs are subject to monitoring, and a user may find this manual helpful towards developing a monitoring and reporting program for a LUP, as defined in Section B of Order No. 2003-007-DWQ. This permit can be found at https://www.waterboards.ca.gov/water_issues/programs/stormwater/linear_const.shtml.

Projects within the Lake Tahoe Hydrological Unit are covered under the Tahoe CGP (Order No. R6T-2016-0010). There are monitoring requirements in the Tahoe CGP, which are not covered in this manual. Users shall consult the Tahoe CGP at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html.

Projects on tribal lands are covered under the EPA's NPDES Construction Stormwater Permitting Program (EPA CGP) and are not required to conduct monitoring. Projects are required to follow inspection frequencies defined in the permit. Users may find Section 3 helpful towards developing a visual monitoring program for projects subject to the EPA CGP. Users should consult the permit itself at: https://lew.epa.gov/

Section 2

Construction Site Monitoring Program Overview

2.1 Permit Requirements

The CGP requires preparation of a project-specific Construction Site Monitoring Program (CSMP) for each construction site prior to the commencement of construction activities. The CSMP must be updated as necessary to reflect project changes.

As required by the CGP, the CSMP is developed to address the following objectives:

- Determine whether immediate corrective actions, implementation of additional best management practices (BMPs)[4], or SWPPP updates or amendments are necessary to reduce pollutants in stormwater discharges and/or authorized non-stormwater discharges.
- Determine whether BMPs are effective in preventing or reducing pollutants in stormwater discharges and/or authorized non-stormwater discharges.
- Demonstrate that the site complies with the Discharge Prohibitions and applicable numeric action levels (NALs), numeric effluent limitations (NELs), and if the project is within a TMDL, then TMDL-related NALs and/or NELs.
- Determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives (WQOs) and/or if site is within a TMDL and the pollutant source assessment identifies the particular pollutant, then ensure the TMDL requirements are followed.

The CSMP must be developed by a QSD, and the CGP allows the CSMP to be included as either an appendix or as a separate section in a project-specific SWPPP. The CGP requires all projects appoint a QSD, a QSP, and (if they so choose) a trained QSP delegate[5] for the construction project. A QSD and QSP (can be the same person) must have CGP-required registrations or certifications, appropriate experience, attended a State Water Board-sponsored or approved QSD or QSP training course, passed the QSD or QSP exam, and obtained the QSD or QSP certificate. Only a QSD can write, amend, or certify a SWPPP. Refer to the CGP and requirements in Section 13 of the Caltrans *Standard Specifications* for all certification and training requirements.

This section provides a summary of the elements that must be included within a project-specific CSMP. For Caltrans projects, the template for the CSMP is found in Sections 800-1400 of the

[4] BMPs are referred to as Water Pollution Control (WPC) Practices in Caltrans *Standard Specifications*, as such reader should consider the terminology as similar.

[5] The Caltrans *Standard Specifications* utilize the title *assistant WPC manager* rather than QSP Delegate, as such the reader should consider the terminology as similar for SWPPP projects.

Caltrans *SWPPP Template*. The WPC manager will oversee the field implementation of the CSMP; however, there are QSD-specific inspection requirements that cannot be delegated to a QSP or QSP delegate, and must be performed by a QSD, whether it is the QSD who prepared the SWPPP or another QSD (see Table 3-2).

Each project-specific CSMP must address the CGP monitoring and sampling requirements specified for the risk level designated for the project. Table 2-1 summarizes the monitoring requirements for each risk level.

The CSMP must include all monitoring procedures and instructions, location maps, forms, and checklists as required by the CGP. Templates and locations for the maps, forms, and checklists are provided in the Caltrans *SWPPP Template* attachments and appendices. Records of visual observations and water quality monitoring (completed forms) must be filed with the SWPPP and the appropriate findings included in the Construction Stormwater Annual Report required by the CGP or the Tahoe CGP.

The CSMP must cover all types of monitoring to be performed at the construction site, including:

- Visual Monitoring Inspections
  - Daily work activity and area inspections (per Section 13 of the Caltrans *Standard Specifications*)
  - Weekly BMP inspections
  - Non-stormwater discharges
  - Qualifying precipitation event (QPE) based inspections

Other inspections might be required based on project activities or their completion, such as:

- Permanent Erosion Control Establishment (PECE) Report
- Change of Information (COI)
- Notice of Termination (NOT)
- NAL Exceedances
- Storm Water Quality Monitoring (Sample Collection and Testing)
  - Non-visible pollutants, including TMDL-related
  - Non-stormwater discharges (authorized or non-authorized)
  - Stormwater discharges (pH, turbidity, and others, as required)
- Effluent
- Stored or contained stormwater (dewatering)
- Conditional monitoring (e.g., run-on)
- Receiving waters
  - RWQCB-required monitoring
  - Active treatment systems monitoring

Table 2-1. Risk Level Monitoring Requirements

	Visual Monitoring (Inspections)			Water Quality Monitoring (Sample Collection/Testing)					
Risk Level	Daily Inspection[1]	Weekly BMP Inspection	Pre-Storm[2]	Daily Storm[3]	Post Storm[4]	Stormwater Discharge (pH and turbidity)[5,6]	Non-Visible Pollutants[7]	Non-Stormwater Discharge[7]	Receiving Water[8]
1	✓	✓	✓	✓	✓		✓		
2	✓	✓	✓	✓	✓	✓	✓	✓	
3	✓	✓	✓	✓	✓	✓[8]	✓	✓	✓

Table Footnotes

1 These daily inspections are required by Caltrans in addition to the weekly BMP inspections required by the CGP. Daily inspections of certain activities are based on scheduled project operations.

2 The CGP requires a pre-storm inspection within two business days (48 hours) prior to a qualifying precipitation event. Any weather pattern forecast to have a 50% chance or greater probably of precipitation and a quantitative precipitation forecast of 0.5 inches or more within a 24-hour period. The event begins with the 24-hour period when 0.5 inches has been forecast and continues for subsequent 24-hour periods when 0.25 inches of precipitation or more is forecast.

3 At least once each 24-hour period during any extended storm event.

4 Within two business days (48 hours) after each qualifying precipitation event.

5 Minimum of one sample from each discharge point per day during a qualifying precipitation event. For dewatering discharges under the CGP, collect samples within the first hour of discharge and daily thereafter while the operation is taking place. For dewatering subject to RWQCB permit, comply with the specific sampling and reporting requirements.

6 Submit results to RE within 48 hours after storm event if either of the NALs is exceeded. RE submits results to SWRCB within 10 days after storm event if either of the NALs is exceeded. For Risk Level 3 projects, submit results to RE within 48 hours after storm event. RE submits results to SWRCB within five days after storm event. For projects with an active treatment system, if either of the NELs are exceeded, submit results to RE within 6 hours of NEL exceedance being identified. RE submits results to SWRCB within 24 hours after NEL exceedance has been identified.

7 If applicable; within first 8 hours of discharge from any storm event occurring during project working hours.

8 For Risk Level 3 projects that exceed the monitoring trigger and have a direct discharge to the receiving waters, collect upstream and downstream samples from the discharge location.

2.2 Monitoring Plan Outline/Content

Specific content of the CSMP for each construction project includes both visual monitoring requirements and stormwater and non-stormwater monitoring requirements based on applicable sampling and analysis plans (SAPs). The CSMP content must include the following sections as applicable to the specific construction project:

- Site Visual Monitoring Inspections
  - Visual Monitoring Locations
  - Visual Monitoring Schedule
  - Visual Monitoring Procedures
  - Visual Monitoring Follow-up and Tracking Procedures
- Sampling and Analysis Plans (SAPs)
  - General
  - Non-visible Pollutants (including TMDL required)

- Non-stormwater Discharges
- Stormwater Discharges (pH and Turbidity)
- Monitoring Required by RWQCB
- Active Treatment Systems

The CSMP must include a general SAP and specific SAPs based on the specific construction project's risk level, RWQCB requirements, and project-specific activities (i.e., dewatering activities, active treatment system discharges, etc.). For example, for a Risk Level 1 project that does not have additional RWQCB requirements or an active treatment system, the CSMP must have a General SAP, a SAP for non-visible pollutants, and a SAP for non-stormwater discharges (accumulated stormwater or groundwater discharge only). Alternatively, some Risk Level 2 or 3 projects may require a general SAP and all specific SAPs. The project's risk level is specified in the contract's special provisions. Table 2-1 identifies the monitoring requirements that apply for each risk level. Other project-specific monitoring requirements placed upon the project by RWQCB would be identified in an order or permit which should be included with the contract documents.

Each SAP, as detailed in the Caltrans *SWPPP Template* (Section 900), must include the following sections:

- Scope of Monitoring Activities
- Monitoring Preparation
- Monitoring Strategy
- Sample Collection and Handling
- Sample Analysis
- Quality Control and Assurance
- Data Management and Reporting
- Data Evaluation
- Change of Conditions

Section 3

Visual Monitoring Inspection Requirements and Protocols

3.1 Permit Requirements

Dischargers must conduct several types of visual monitoring inspections of construction sites to comply with the CGP. All Risk Level 1, 2 and 3 projects must perform weekly, and pre-, during- and post-inspections for qualifying precipitation events. Following are the inspections required for all Caltrans projects regardless of the amount of disturbed soil area. Dischargers shall provide an explanation for all missed visual inspections or sampling, with supporting information in the Project Stormwater Annual Report form (DOT CEM-2075SW); see Section 11 for reporting requirements.

3.1.1 Daily Inspections

The Caltrans *Standard Specifications* (Section 13) require the contractor to inspect several work activities and areas, including hazardous material delivery and storage areas, waste disposal, and transporting activities. They must inspect vehicles and equipment for leaks and spills and it identifies eight specific activities that must be inspected if work is taking place, including pile driving, dewatering, and work over water.

3.1.2 Weekly Inspections

The CGP requires all BMPs be inspected at least weekly to ensure they are properly installed and maintained, and to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. A pre-, during, or post-qualifying precipitation event inspection also satisfies the weekly visual inspection requirement.

3.1.3 Pre-Storm QPE

Inspections shall include an inspection of the following: (a) identify leaks, spills, or uncontrolled pollutant sources and, when necessary, implement appropriate corrective actions to control pollutant sources; (b) all BMPs to identify whether they have been properly implemented in accordance with the SWPPP and, when necessary, implement appropriate corrective actions to control pollutant sources; (c) evaluate stormwater storage and containment areas to detect leaks, ensure adequate freeboard to prevent overflow, and document any pollutant characteristics; and (d) confirm proper rain gauge installation. A qualifying precipitation event is any weather pattern forecasted to have a 50% or greater chance of 0.5 inches or more in a 24-hour period. Caltrans requires a pre-storm inspection 48 hours before a predicted storm event. “Storm event” is defined as a qualifying precipitation event per the CGP. The term “Storm event” used in the Caltrans *Standard Specifications* and “Qualifying Precipitation Event” used in the CGP have the same definition, either term may be used throughout the remainder of this document.

3.1.4 During-Storm QPE

Inspections are performed to identify BMPs requiring maintenance to operate effectively, that have failed, or that could fail to operate as intended. In addition, inspections are required of stormwater discharges at all discharge locations. These inspections are required for each day of a storm event. Qualifying precipitation events are extended for each subsequent 24-hour period forecast to have at least 0.25 inches of precipitation.

3.1.5 Post-QPE

Inspections are similarly performed to identify BMPs that require maintenance to operate effectively, that have failed, or that could fail to operate as intended. In addition, discharges of stored or contained stormwater that is derived from and discharged after a qualifying precipitation event must also be inspected.

For inactive SWPPP CGP projects, dischargers may reduce the visual inspection frequency and suspend sampling after an approved Change of Information in SMARTS. Table 3-1 summarizes the visual monitoring requirements.

Table 3-1. Summary of Visual Monitoring Requirements

Risk Level	Daily [1]	Weekly	Pre-QPE [2]	During QPE [3]	Post-QPE
1	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓

Table Footnotes

1 Inspection required if specific activities are taking place.

2 Within two business days before the predicted storm event, the CGP requires a pre-storm inspection prior to a qualifying precipitation event, defined as any weather pattern forecasted to have a 50% or greater chance of 0.5 inches or more in a 24-hour period, based on the National Weather Service Forecast Office (National Oceanic and Atmospheric Administration).

3 At least once every 24-hour period of a storm event.

As part of the visual inspections, CGP projects require specific individuals who are QSD or QSP certified to conduct the inspections listed in Table 3-2. The person responsible for these inspections must have valid certification and have familiarity with the project and its activities as included in the SWPPP.

Table 3-2. CGP QSD or QSP Inspection Requirements

QSD Only	QSD or QSP only
One within 30 days of construction activities starting	Once every calendar month
One within 30 days of a new site QSD	Once within 72 hours of each forecasted qualifying precipitation event
Once between August 1 and October 31 of each year	Within 14 days after NAL exceedance
Once between January 1 and March 31 of each year	Before the final Notice of Termination or Change of Information (for acreage changes) of all or part of the site
Within 14 calendar days after NAL exceedance	
Within 14 calendar days of inactive project status	

3.2 How and What to Inspect

The CGP and the Caltrans *Standard Specifications* include inspection requirements based on project activities, risk level, or the project's locations. The WPC manager is charged with overall stormwater field compliance, including ensuring the above listed inspections are performed by the certified QSD or QSP listed in the site-specific SWPPP, as required.

Caltrans inspectors should accompany the WPC manager or the contractor's trained stormwater staff when conducting stormwater inspections, as some issues can be resolved immediately and conducting a joint inspection allows Caltrans and the contractor to have the same point of reference for stormwater issues and their compliance. Caltrans should conduct quality assurance reviews to facilitate the accuracy and adequate review of contractor's submitted CEM forms. Most projects have assigned a Caltrans stormwater inspector who works with the RE to ensure the standard specifications are followed and the project complies with the Stormwater Permits.

Caltrans has construction engineering management (CEM) forms to assist the construction project in documenting project operations, areas and overall stormwater compliance[6]. Table 3-3 lists the CEM forms and includes whether they are required by the SWPPP or WPCP, and which certified staff can conduct the inspection.

[6] https://dot.ca.gov/programs/construction/forms

Table 3-3. Caltrans Stormwater CEM Forms

CEM Form Number and Name	Inspection to be Conducted By Contractor Staff [1]	Required By SWPPP	Required By WPCP
DOT CEM-2030SW Stormwater Site Inspection Report Form	QSD, QSP or trained QSP Delegate	Yes	Yes
DOT CEM-2032SW Permanent Erosion Control Establishment (PECE) Report Form	QSD	Yes	Yes
DOT CEM-2033SW Dewatering Operations Sampling Report Form [2]	QSD or QSP	Yes	Yes
DOT CEM-2035SW Stormwater Corrective Actions Summary Form	QSD, QSP or trained QSP Delegate	Yes	Yes
DOT CEM-2075SW Project Stormwater Annual Report Form	Varies if made in conjunction with another inspection	Yes	No
DOT CEM-2080SW Stormwater Change of Information Form	QSD or QSP	Yes	No
DOT CEM-2090SW Notice of Termination and Final Inspection Report Form	QSD or QSP	Yes	No

Table Footnotes

1 There are specific instances that require the QSD or QSP to conduct the specific inspection (see Table 3-2).

2 If dewatering is being conducted under a separate RWQCB permit, there might be additional requirements. This form is to be used for compliance with Attachment J of the CGP when conducting dewatering operations.

Prior to performing a visual monitoring site inspection, review the following:

- SWPPP Attachment H Water Pollution Control Drawings (WPCDs)
- Latest Stormwater Site Inspection Report form (DOT CEM-2030SW)
- Latest Stormwater Corrective Actions Summary form (DOT CEM-2035SW)

Bring the following items with you on the inspection:

- A copy of the SWPPP Attachment H WPCDs
- A daily logbook
- A digital camera or mobile phone to photo-document conditions onsite
- Physical or electronic forms to complete during the inspection; reports may also be completed after the inspection based on field notes and photos

The Stormwater Site Inspection Report form (DOT CEM-2030SW) and the Stormwater Corrective Actions Summary form (DOT CEM-2035SW) (as applicable) must be completed, signed, and dated by the person performing the inspections.

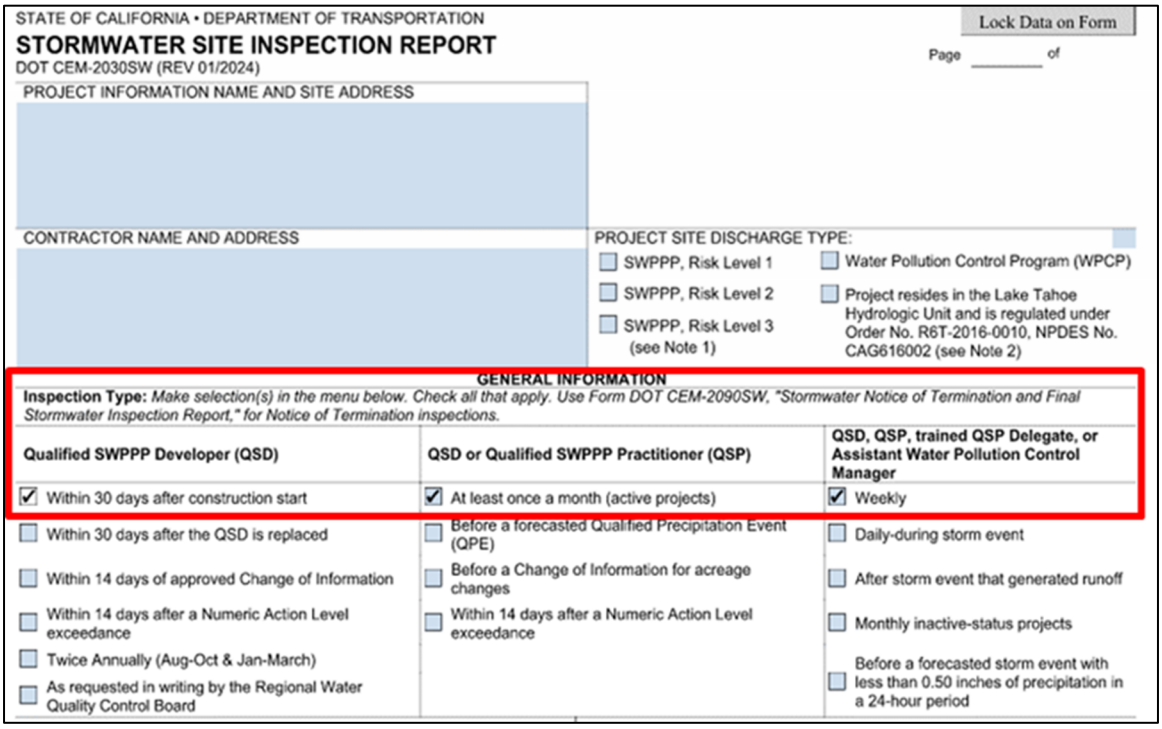
The requirements for routine and storm event-based inspections listed in Table 3-1 are described in detail below.

3.2.1 BMP Monitoring Inspection Process

For all types of inspections, review the SWPPP or WPCP to determine the locations of the BMPs. Determine if any corrective actions and/or revisions were scheduled to be performed. Determine whether the corrective actions and/or revisions were performed on schedule and record notes accordingly on the appropriate reporting form. If the actions were not performed on schedule, determine the reason and either revise the schedule or perform the actions immediately, if possible.

Observations must be made and recorded on the Stormwater Site Inspection Report form (DOT CEM-2030SW) and the Stormwater Corrective Actions Summary form (DOT CEM-2035SW), if applicable, as follows:

- Complete the header information on each page of the form.
- Complete the General Information and Storm Information on page 1 of the form. If the inspection type requires a specific certification, make sure the person with the certification is conducting the inspection. For example, for the "within 30 days after construction start inspection", a QSD must conduct that inspection, but the inspection can also be combined with the once-a-month inspection that can be completed by a QSD or QSP; and if the weekly inspection has not been completed that week, the inspection by the QSD can also be counted for completing the weekly inspection. This is shown in Figure 3-1 below:



STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

STORMWATER SITE INSPECTION REPORT

DOT CEM-2030SW (REV 01/2024)

Lock Data on Form

Page _____ of

PROJECT INFORMATION NAME AND SITE ADDRESS

CONTRACTOR NAME AND ADDRESS

PROJECT SITE DISCHARGE TYPE:

- ☐ SWPPP, Risk Level 1
- ☐ SWPPP, Risk Level 2
- ☐ SWPPP, Risk Level 3 (see Note 1)
- ☐ Water Pollution Control Program (WPCP)
- ☐ Project resides in the Lake Tahoe Hydrologic Unit and is regulated under Order No. R6T-2016-0010, NPDES No. CAG616002 (see Note 2)

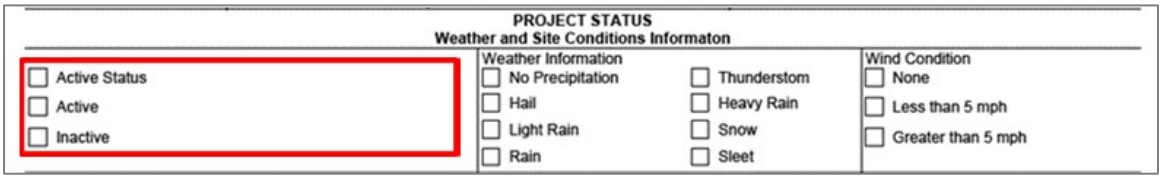
GENERAL INFORMATION

Inspection Type: *Make selection(s) in the menu below. Check all that apply. Use Form DOT CEM-2090SW, "Stormwater Notice of Termination and Final Stormwater Inspection Report," for Notice of Termination inspections.*

Qualified SWPPP Developer (QSD)	QSD or Qualified SWPPP Practitioner (QSP)	QSD, QSP, trained QSP Delegate, or Assistant Water Pollution Control Manager
☑ Within 30 days after construction start	☑ At least once a month (active projects)	☑ Weekly
☐ Within 30 days after the QSD is replaced	☐ Before a forecasted Qualified Precipitation Event (QPE)	☐ Daily-during storm event
☐ Within 14 days of approved Change of Information	☐ Before a Change of Information for acreage changes	☐ After storm event that generated runoff
☐ Within 14 days after a Numeric Action Level exceedance	☐ Within 14 days after a Numeric Action Level exceedance	☐ Monthly inactive-status projects
☐ Twice Annually (Aug-Oct & Jan-March)		☐ Before a forecasted storm event with less than 0.50 inches of precipitation in a 24-hour period
☐ As requested in writing by the Regional Water Quality Control Board		

Figure 3-1. DOT CEM-2030SW Stormwater Site Inspection Report – General Information

For the project status, identify if the site is deemed active or inactive (Figure 3-2). "Inactive" can only be marked after having a RWQCB approve a Change of Information (COI). An approved COI is required to create inactive status and to have the project area resume to active status.



PROJECT STATUS

Weather and Site Conditions Informaton

- ☐ Active Status
- ☐ Active
- ☐ Inactive

Weather Information

- ☐ No Precipitation
- ☐ Hail
- ☐ Light Rain
- ☐ Rain
- ☐ Thunderstom
- ☐ Heavy Rain
- ☐ Snow
- ☐ Sleet

Wind Condition

- ☐ None
- ☐ Less than 5 mph
- ☐ Greater than 5 mph

Figure 3-2. DOT CEM-2030SW Stormwater Site Inspection Report – Project Status

Inspect each BMP and respond to each item on the form with a check in the appropriate column for either “Yes” or “No” (Figure 3-3). Include an explanation in the “Comments” column where applicable; these specific comments will allow more direct comparison over time to track results of stormwater pollution prevention efforts. Include a description of the corrective actions taken or necessary to be performed. The form includes three rows for each location, but additional locations can be added by a button included in the form. Photograph the BMPs as needed to document any identified problem areas. The CGP requires that if the QSP delegate is the one conducting the inspection, any issues identified must be routed to the QSP within 24 hours of when corrective action is needed.

Site Inspection of Best Management Practices

If this form will be completed by hand in the field, click on "Show Entire Form" button at the top of page one to expand the sections, then print the form to take to the field. If the inspection form does not contain enough lines for all locations, use the "Add Item" button so that all BMP locations are inspected and reported.

Preservation of Existing Vegetation ☒ Yes ☐ No List all areas by location Add Location	Is ESA fencing installed in all required areas, as staked? See Note 1		Are the ESA fences in good repair?		Are ESA signs installed according to plan?		Are the ESA fences effective in eliminating encroachments?		Is vegetation removal limited to approved clearing limits?	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Location 1										X
Location 2										X
Location 3										X

Location Number	Comments, Deficiencies Identified, and Corrective Actions	Action Number
1		
2		
3		

Notes:
1. Environmentally Sensitive Area (ESA)

Image Location		Image Location	
Click Here to Insert Image		Click Here to Insert Image	

Figure 3-3. DOT CEM-2030SW Stormwater Site Inspection Report – BMPs

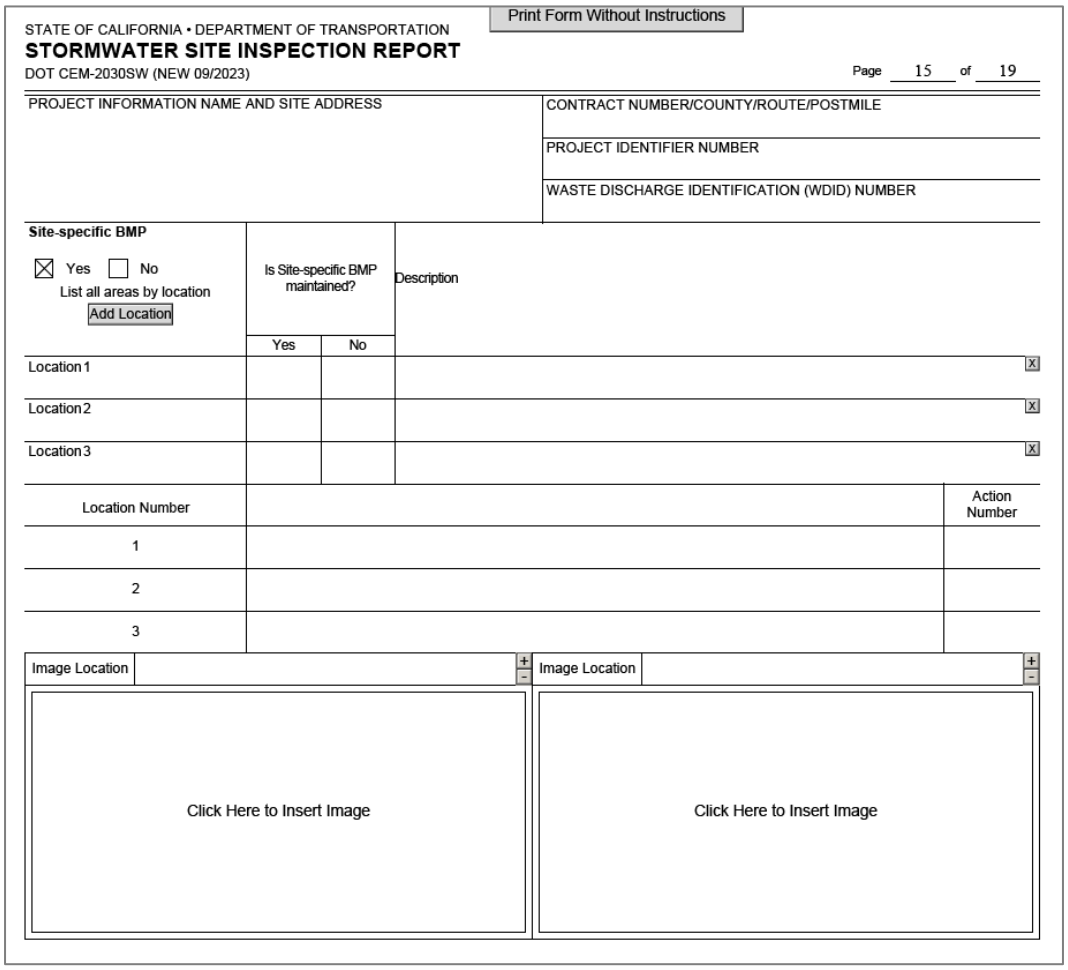
The Stormwater Site Inspection Report form (DOT CEM-2030SW) asks BMP-specific questions, such as:

- Is the BMP installed in the required location?
- Is the BMP installed per plan?
- Does the BMP require maintenance or repair? Inspections should determine if any maintenance activities are needed, such as:
  - Removing sediment from barriers and sedimentation devices.
  - Replacement or repair of worn, missing, or damaged BMP devices.
  - Replacement or repair of damaged structural controls (e.g., check for seepage, erosion and undercutting, structural soundness, damaged or obstructed inlet/outlet or spillway).
  - Other maintenance as defined in the SWPPP or BMP manufacturer’s specifications.

The form includes BMPs for all six categories:

- Soil stabilization
- Sediment control
- Wind erosion
- Tracking controls
- Non-stormwater management
- Waste management and materials pollution control

While not every single BMP is included, if the specific project has a BMP not listed, the form has a section to fill out specific BMPs as part of the inspection (Figure 3-4). The project SWPPP or WPCP includes all the BMPs that will be implemented in the project. Additional guidance for selecting, installing, and maintaining BMPs is available in the Caltrans *Construction Site Best Management Practices (BMP) Manual* (Caltrans, 2024b).



Print Form Without Instructions

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
STORMWATER SITE INSPECTION REPORT
DOT CEM-2030SW (NEW 09/2023)

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PROJECT INFORMATION NAME AND SITE ADDRESS	CONTRACT NUMBER/COUNTY/ROUTE/POSTMILE
	PROJECT IDENTIFIER NUMBER
	WASTE DISCHARGE IDENTIFICATION (WDID) NUMBER

Site-specific BMP

☒ Yes ☐ No

List all areas by location

Add Location

	Is Site-specific BMP maintained?		Description
	Yes	No	
Location 1			
Location 2			
Location 3			

Location Number		Action Number
1		
2		
3		

Image Location

Click Here to Insert Image

Image Location

Click Here to Insert Image

Figure 3-4. DOT CEM-2030SW Stormwater Site Inspection Report – Site Specific BMP

3.2.2 Discharge Inspection Process

During any inspection identified in Table 3-1, Table 3-2, or Table 3-3, any discharges or evidence of a prior discharge that could cause adverse conditions in the conveyance system or

the receiving water must be identified, recorded, and reported. Discharges requiring reporting include:

- Stormwater from a disturbed soil area discharged to a waterway without treatment by an effective combination of temporary erosion and sediment control BMPs.
- Non-stormwater discharged to a waterway or a storm drain system, without BMPs. There are conditionally exempted discharges, and they need not be reported unless their discharge includes contaminants (picked up by the non-stormwater runoff) present in the discharge from the construction project or activity.
- Stormwater discharged to a waterway, or a storm drain system where the control measures (i.e., BMPs) have been overwhelmed or not properly maintained or installed.
- Discharge of hazardous substances above the reportable quantities in 40 Code of Federal Regulations (CFR) 110.3, 117.3 or 302.4.
- Stormwater runoff containing hazardous substances from spills discharged to a waterway or storm drain system.

If dry weather flow is observed (i.e., non-stormwater discharge) on the project site, the source of the discharge must be identified. For each non-stormwater discharge described, the discharge must be identified as an authorized or unauthorized non-stormwater discharge (see Section 3.2.2). Non-stormwater flows could originate from sources such as vehicle washing, chemical leaks and/or spills, or potentially illicit connections. If the source cannot be determined by visual observation, detailed testing that may include non-visible pollutant analyses should be performed. The source, quantity, frequency, and characteristics of the non-stormwater discharges and associated drainage area should be documented.

The Stormwater Corrective Actions Summary form (DOT CEM-2035SW) must be completed if any of the following conditions requiring corrective actions are identified:

- To prevent any unauthorized discharge, including a discharge that can cause adverse conditions in the storm sewer system or the receiving water.
- To reduce or prevent pollutants (from a breach, malfunction, leakage, spill, or uncontrolled pollutant source) from contacting non-stormwater or stormwater discharges.
- To implement additional BMPs and/or restore operation of BMPs that are not properly installed, that need maintenance to operate effectively, that have failed, or that could fail to operate as intended.

The RE must be immediately notified by the QSD or the WPC manager of any discharge or evidence of a prior discharge that could cause adverse conditions in the storm sewer system or the receiving water. The Notice of Discharge form (DOT CEM-2061SW) must be submitted to the RE within 24 hours of the discharge event or discovery of evidence of a prior discharge that could cause adverse conditions in the storm sewer system or receiving water. The RE will decide if the discharge warrants an additional report to the applicable RWQCB. Refer to other guidance, such as the District spill communication plan, for reporting to other agencies. The Caltrans District Construction Stormwater Coordinator, working with the RE, shall notify the RWQCB of existing or anticipated non-stormwater discharges not authorized by the CGP within

24 hours of the discharge to determine if regulatory coverage is necessary through a separate NPDES permit.

Adverse conditions include, but are not limited to, violations or threatened violations of WDRs, significant spills of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance. Caltrans will perform follow-up monitoring of major spills and/or perform confirmation sampling to ensure that threats to waters of the United States have been eliminated, as determined by the local RWQCB. Caltrans will notify the owner/operator of the Municipal Separate Storm Sewer System or the principal permittee as soon as practicable, but no later than 24 hours after onset of or threat of discharge that can cause adverse conditions in the storm sewer system or the receiving water. This requirement applies to any such discharge not covered by the California Emergency Management Agency procedures for discharges from a highway to a storm sewer system subject to a MS4 permit.

3.2.3 Daily Inspections

Caltrans requires daily inspections by the WPC Manager or delegate of the following:

- Storage areas for hazardous materials and waste
- Hazardous waste disposal and transporting activities
- Hazardous material delivery and storage activities

The following operations require daily inspection if activities are occurring:

- Vehicle and equipment cleaning facilities
- Vehicle and equipment maintenance and fueling areas
- Verification that operators are inspecting vehicles and equipment for leaks and spills at the job site
- Demolition sites within 50 feet of storm drain systems and receiving waters
- Pile driving areas for leaks and spills during pile driving operations
- Temporary concrete washouts during concrete work activity
- Paved roads at job site access points for street sweeping if earthwork and other sediment or debris-generating activities occur daily.
- Dewatering work
- Active treatment systems
- Work over water

Findings from the daily inspections must be documented on Stormwater Site Inspection Report (DOT CEM-2030SW); any areas needing corrective actions should be documented on the Stormwater Corrective Actions Summary form (DOT CEM-2035SW). Any corrective actions needed from inspections conducted by the QSP delegate must be communicated to the WPC manager for follow-up, as required by the CGP.

Inspections are not required when climatic conditions (electrical storms, high winds [40 mph or higher], flooding, etc.) present a health or safety hazard, outside of scheduled site operating hours, or when the site is not accessible to personnel. If the required visual observations (inspections) are not performed due to dangerous weather conditions or site accessibility, provide an explanation for why the site inspection could not be conducted on Stormwater Site Inspection Report form (DOT CEM-2030SW).

3.2.4 Non-Stormwater Inspections

Each drainage area must be inspected for the presence of authorized or unauthorized non-stormwater discharges and their sources. The inspection must be documented on the Stormwater Site Inspection Report form (DOT CEM-2030SW). Each drainage area also must be inspected for indications of flow during dry weather conditions.

3.2.4.1 Authorized Non-Stormwater Discharges

The CGP authorizes certain non-stormwater discharges that may be necessary for the completion of construction projects. Authorized non-stormwater discharges may include those from dechlorinated potable water and non-potable sources, such as firefighting activities, fire hydrant system flushing; irrigation of vegetative erosion control measures; water line/pipe flushing and testing; water to control dust; uncontaminated groundwater or spring water from dewatering activities; and other discharges not subject to a separate NPDES permit adopted by a RWQCB. The CGP requires that the above non-stormwater discharges are authorized under the following conditions:

- The discharge is not routed through site areas with exposed soil, except for water used for dust control or to vegetation irrigation to stabilize areas,
- The discharge does not cause or contribute to an exceedance of water quality standards in the receiving water,
- The discharge complies with NALs for pH and turbidity, and other applicable effluent limitations, and monitoring and reporting requirements,
- The discharge is not prohibited by an applicable regional or statewide water quality control plan,
- The discharge is in accordance with other applicable State and Regional Water Board permits,
- The discharge does not contain toxic constituents in toxic amounts and does not cause toxicity in the receiving water body,
- The discharge complies with BMPs as described in the SWPPP.

All dewatering discharges from sediment basins (if they only contain stormwater or authorized non-stormwater) must be filtered or treated, using appropriate technology. The appropriate technology must be selected based on the discharge. Refer to the Caltrans *Field Guide to Construction Dewatering*, latest edition, for dewatering guidelines as some RWQCBs may require a separate NPDES permit or specific monitoring and reporting requirements for authorized discharges. Authorized non-stormwater dewatering discharges may require a permit because some RWQCBs have adopted General Permits for dewatering discharges. Check with the RE or the District Construction Stormwater Coordinator for requirements in the project area.

3.2.4.2 Unauthorized Non-Stormwater Discharges

Unauthorized non-stormwater discharges may not be discharged from the construction site. Examples of unauthorized non-stormwater discharges common to construction activities include:

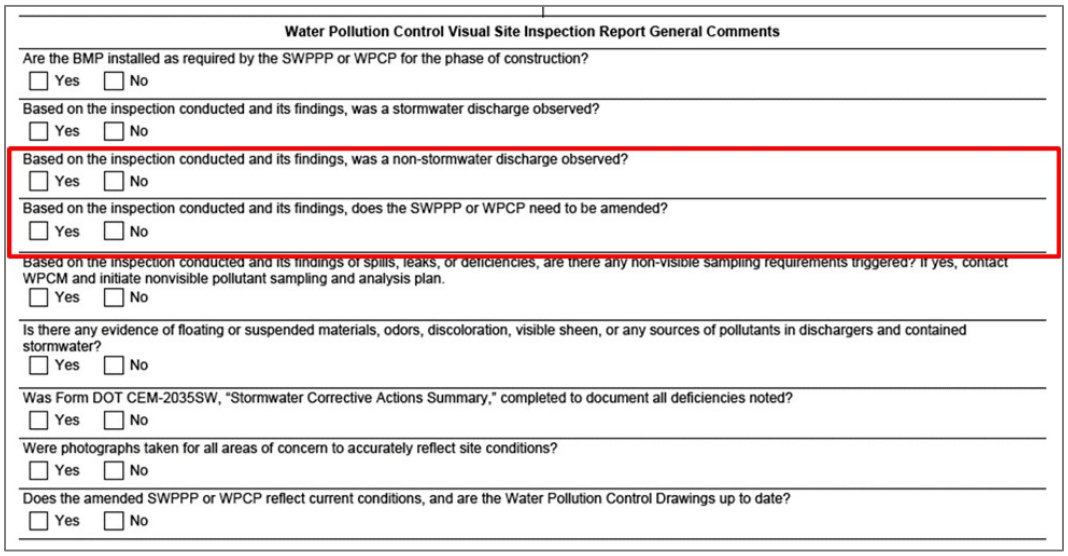
- Vehicle and equipment wash water, including concrete washout water.
- Slurries from concrete cutting and coring operations or grinding operations.
- Slurries from concrete or mortar mixing operations.
- Residue from high-pressure washing of structures or surfaces.
- Wash water from cleaning painting equipment.
- Runoff from dust control applications of water or dust palliatives.
- Sanitary and septic wastes.
- Chemical leaks and/or spills of any kind including but not limited to petroleum, paints, cure compounds, etc.

3.2.4.3 Non-Stormwater Discharge Inspection Process

Review the site map (WPCDs) to determine the location and number of drainage areas and drainage area locations. Review the previous forms to determine if any non-stormwater discharges were noted on the Stormwater Site Inspection Report form (DOT CEM-2030SW) or documented on the Notice of Discharge Report form (DOT CEM-2061SW). The WPC Manager must inform the RE of any discharges taking place so that appropriate measures and documentation takes place. Review the corrective actions and/or SWPPP revisions to determine if measures to address non-stormwater discharges were scheduled to be performed. Determine whether the corrective actions and/or SWPPP revisions were performed on schedule and record notes accordingly. If the actions were not performed on schedule, determine the reason and either revise the schedule or perform the actions immediately, if possible. The Stormwater Annual Report includes a section for reporting any non-stormwater discharges; all discharges (unauthorized, incidental, etc.) must be documented so they can be properly reported.

Observations must be made and recorded on the Stormwater Site Inspection Report form (CEM-2030) as follows:

If dry weather flow is observed (i.e., non-stormwater discharge) on the project site, the source of the discharge must be identified. For each non-stormwater discharge described, the discharge must be identified as an authorized or unauthorized non-stormwater discharge. Non-stormwater flows could originate from sources such as vehicle washing, chemical leaks and/or spills, or potentially illicit connections. If the source cannot be determined by visual observation, detailed testing that may include non-visible pollutant analyses should be performed. Document the source, quantity, frequency, and characteristics of the non-stormwater discharges and associated drainage area.



Water Pollution Control Visual Site Inspection Report General Comments

Are the BMP installed as required by the SWPPP or WPCP for the phase of construction?
☐ Yes ☐ No

Based on the inspection conducted and its findings, was a stormwater discharge observed?
☐ Yes ☐ No

Based on the inspection conducted and its findings, was a non-stormwater discharge observed?
☐ Yes ☐ No

Based on the inspection conducted and its findings, does the SWPPP or WPCP need to be amended?
☐ Yes ☐ No

Based on the inspection conducted and its findings of spills, leaks, or deficiencies, are there any non-visible sampling requirements triggered? If yes, contact WPCM and initiate nonvisible pollutant sampling and analysis plan.
☐ Yes ☐ No

Is there any evidence of floating or suspended materials, odors, discoloration, visible sheen, or any sources of pollutants in dischargers and contained stormwater?
☐ Yes ☐ No

Was Form DOT CEM-2035SW, "Stormwater Corrective Actions Summary," completed to document all deficiencies noted?
☐ Yes ☐ No

Were photographs taken for all areas of concern to accurately reflect site conditions?
☐ Yes ☐ No

Does the amended SWPPP or WPCP reflect current conditions, and are the Water Pollution Control Drawings up to date?
☐ Yes ☐ No

Figure 3-5. DOT CEM-2030SW Stormwater Site Inspection – General Comments

For both stormwater and non-stormwater runoff, BMPs treating the runoff must be inspected to identify and record any BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Also identify, where applicable, the need to implement any additional BMPs.

3.3 Data Evaluation

3.3.1 Reviewing Results Regarding CGP Requirements

Visual monitoring (inspections) must be performed to assess compliance and identify where corrective measures are needed.

3.3.2 Identifying Corrective Measures

Corrective measures must be implemented on an as-needed basis, as follows:

Discharges

Corrective measures must be implemented immediately following the discovery of a discharge that can cause adverse conditions in the storm sewer system or the receiving water. Corrective measures may include:

- Repairing and restoring proper operation of failed or inadequately maintained BMPs
- Implementing additional, alternative, or redesigned BMPs
- Isolating any breach, malfunction, leakage, or spill by covering or containing them with BMPs
- Cleaning up leaks or spills

BMPs

Corrective measures must be taken to restore proper operation of BMPs that are not properly installed, that need maintenance to operate effectively, that have failed, or that could fail to

operate as intended. If BMP failures or shortcomings are identified during inspections, repairs or design changes to BMPs (as directed by the WPC manager) must be completed within 24 hours of identification, unless a longer period is authorized in accordance with Caltrans *Standard Specifications*. Corrective measures can include:

- Removing sediment from barriers and sedimentation devices
- Replacement or repair of worn, missing, or damaged sediment control devices, such as silt fence fabrics or fiber rolls
- Replacement or repair of damaged structural controls (e.g., check for seepage, erosion and undercutting, structural soundness, damaged or obstructed inlet/outlet or spillway)
- Repair of damaged soil stabilization measures; (e.g., mulch, hydroseeding, geotextiles and mats)
- Other control maintenance as defined in the SWPPP or manufacturer's specifications

Spills, Leaks, or Uncontrolled Pollutant Sources

Implement corrective actions to reduce or prevent pollutants from contacting non-stormwater or stormwater discharges. Corrective actions could include:

- Removing the pollutant source by removing impacted soil, cleaning pavement, applying absorbent materials, then removing and disposing of absorbed materials
- Covering the pollutant source with methods such as tarps and closing lids
- Containing the pollutant source by implementing double containment, such as surrounding the source with a berm

Unauthorized Non-Stormwater Discharges

If dry weather flow is observed at a discharge location (i.e., non-stormwater discharge) during the inspection, the source of the discharge must be identified. Non-stormwater flows could originate from sources such as dust control measures or potentially illicit connections. If the source cannot be determined by visual observation, detailed testing that may include non-visible pollutant analyses should be performed. Document the source, quantity, frequency, and characteristics of the non-stormwater discharges and associated drainage area. For each non-stormwater discharge described, the discharge must be identified as an authorized or unauthorized non-stormwater discharge. Corrective actions must be taken to prevent any unauthorized discharge.

Stormwater Storage and Containment Areas

Repair any leaks and perform any required maintenance. Caltrans requires a dewatering plan to be approved before any dewatering takes place. Depending on the location, a separate dewatering permit might be required, or the dewatering might be allowed under CGP Attachment J.

3.3.3 Reporting

Complete the following forms for visual site monitoring inspections and submit to the RE as detailed in Section 11:

- DOT CEM-2030SW Stormwater Site Inspection Report
- DOT CEM-2035SW Stormwater Corrective Actions Summary (if required)
- DOT CEM-2061SW Notice of Discharge Report form (if required)

Section 4
Monitoring Implementation Protocols

This section covers topics relevant to implementing the CSMP, including training, preparation and logistics, sample collection, laboratory sample preparation and analytical methods, QA/QC data evaluation, and data reporting. The information presented in this section was adapted from the Caltrans *Stormwater Monitoring Guidance Manual* (Caltrans, 2020), available on the Caltrans website[7], and in compliance with S*urface Water Ambient Monitoring Program and Quality Assurance Program Plan* (SWAMP, 2022).

4.1 General Information

4.1.1 Project Risk Level Determination

The CGP requirements vary depending on the risk level of the project. A project's risk level (Risk Level 1, 2, or 3) is determined by using the methodology described in *Stormwater Quality Handbooks: Project Planning and Design Guide* (PPDG; Caltrans, 2023) and the Caltrans *Stormwater Quality Handbook for Risk Level Determination Guidance* (2024). The risk level determination method involves first assessing a site's sediment risk (the relative amount of sediment that might be discharged, given the project and location details) and second, assessing the receiving water risk (the relative risk that sediment discharges pose to the receiving waters). The risk level is determined prior to obtaining coverage under the CGP and is included as part of the Project Registration Documents required to be uploaded to SMARTS to obtain a WDID and is included as Attachment B of the SWPPP.

4.1.2 Timing – Monitoring During Project Working Hours and Safe Conditions

Visual monitoring and sample collection should be conducted only during scheduled project working hours (the Caltrans equivalent of "site business hours" as specified in the CGP). Visual monitoring or sample collection should not be performed during dangerous weather conditions, such as flooding and electrical storms.

If required monitoring was not conducted due to dangerous weather conditions or monitoring could not occur during project working hours, an explanation must be provided on the applicable form, DOT CEM-2030SW and DOT CEM-2051SW. The completed form(s) must document the reason(s) for not conducting sample collection. All pH field readings are to be reported to two decimal places (e.g. 7.92).

4.1.3 Who Should Monitor

All monitoring, maintenance, repair, and sampling activities must be performed or supervised by the WPC manager. Table 3-2 lists the inspections to be conducted by the QSD and QSP. A

[7] https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/ctws-ot-20-350-04-01-monitoring-guidance-manual-a11y.pdf

QSP delegate or assistant WPC manager may assist the WPC manager or the alternate WPC manager in implementing the SWPPP. The QSP delegate cannot conduct any SWPPP inspections until they have received the required training either by or verified by the WPC manager, which is documented in the SWPPP. When a QSP delegate conducts any water pollution control work, there must be a system in place to record and report back issues to the WPC manager for corrective actions.

4.2 Monitoring Location Selection

Selecting locations for Caltrans construction site monitoring requires the QSD to assess the project site to determine drainage patterns, type of activities taking place and figure out any location specific requirements. Following are the types of monitoring required by the CGP:

- **Stormwater discharge samples** must be collected from discharge points where the construction site's stormwater flows offsite. If there is reason to believe run-on may contribute to an exceedance of NALs or Receiving Water Monitoring Triggers, run-on also must be sampled.
- **Non-stormwater discharges** must be sampled from all discharge points where non-stormwater runoff is discharged offsite. If there is reason to believe run-on may contribute to an exceedance, or Receiving Water Monitoring Triggers, run-on also must be sampled.
- **Non-visible pollutant sampling** requires one grab sample to be collected at any discharge location identified as potentially containing non-visible pollutants. In addition, one grab sample also must be collected of stormwater that has not come in contact with the disturbed soil or materials stored or used onsite (uncontaminated sample), upstream/upgradient of the contaminated sample site.
- **Dewatering operations sampling** is required for any impounded or stored stormwater or non-stormwater that does not have a specific regional dewatering permit and comes under Attachment J of the CGP.
- **Receiving water sampling** is required for Risk Level 3 projects where the discharges are direct to surface waters; might need to conduct sampling at the receiving water if the stormwater discharges exceed pH or turbidity triggers of 6-9 and 500, respectively.
- **Active treatment system sampling** is required for projects that utilize an active treatment system for its discharges; must comply with Attachment F (specifically, Section D.2, Water Quality Monitoring) of the CGP and sample for turbidity and pH.

Once the requirements for each type of monitoring have been determined, consideration of the following items will help ensure selection of the most appropriate monitoring locations:

- Representativeness
- Personnel safety
- Site access
- Site selection assessment

Each of these considerations is discussed in detail below. The QSD should review these considerations when preparing the site-specific SAPs in the SWPPP template. Each of the monitoring locations are to be identified in the WPCDs.

4.2.1 Representativeness

Effective monitoring of construction sites requires selection of sampling locations that adequately represent runoff from the site prior to comingling with off-site sources. Select sampling sites that have the following characteristics:

- Monitoring sites should be located where runoff leaves the construction site, and where runoff from the site has combined to form a definable runoff stream of adequate depth to sample.
- Stormwater monitoring sites should be relatively fixed and stable (not subject to significant modification during construction) unless the project site physical drainage pattern is altered significantly during construction. Non-stormwater or non-visible pollutant sampling locations will likely vary.
- Discharge monitoring sites should be in an area of construction activity where the runoff stream well represents the flow and characteristics of the discharge.
- Monitoring sites should not be influenced significantly by construction equipment exhaust or be affected by surrounding land uses via atmospheric deposition or flows from non-Caltrans areas. For example, if possible, do not select sites close to agricultural fields that may be sprayed with pesticides that Caltrans uses, or industrial sites that may contribute airborne constituents, when deposition from those sites may affect onsite concentrations of monitoring project constituents.
- Monitoring sites should not be influenced by backwater, tidal conditions, or a high groundwater table (if groundwater reaches the surface and mixes with stormwater or non-stormwater runoff). If sampling dewatering non-stormwater discharges, it should be expected that the groundwater will be commingled.
- Discharge monitoring sites should be located where onsite runoff has not combined with runoff from offsite (non-Caltrans) sources.
- Discharge monitoring sites should be free of illegal discharges and illicit connections. An inspection of the site should include identification of any signs of illegal discharges, which generally include illegal discharge/dumping of wastes (used oil and other automotive fluids, trash and debris, etc.) and illicit connections of sanitary sewer lines to the storm drainage system. To adequately assess illegal discharges and illicit connections, sites should be visited during dry weather to observe any non-stormwater runoff. The following onsite observations should be made to identify illegal discharges and illicit connections and recorded on the Stormwater Site Inspection Report form (DOT CEM-2030SW):
  - Presence of debris or rubbish piles on roadway shoulders, at turnouts, in open channels or other areas of the potential monitoring site. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from

the traveled way. Approach containers, such as bottles or barrels, with caution as they may contain hazardous materials.

- Visible signs of staining or unusual colors on the pavement or surrounding adjacent soils.
- Pungent odors coming from the drainage system.
- Discoloration or oily substances in the water, or stains and residues detained within ditches, channels or drain boxes.
- Abnormal flow during dry weather.
- Unusual flows in subdrain systems.
- Excessive sediment deposits, particularly adjacent to or near active offsite construction projects.
- In rural areas, also check for non-standard junction structures and broken concrete, disturbed soil, removed vegetation, or other disturbances at or near junction structures.

All observations should be documented for potential future use. If an illegal discharge or illicit connection is observed on a Caltrans right-of-way, the RE should be notified immediately. If the nature of an observed discharge is unknown or suspected of being a hazardous substance, no further investigation should be conducted and should be reported immediately to the RE.

4.2.2 Personnel Safety

It is essential to ensure monitoring crew safety from such hazards as traffic, explosive or toxic gases, possible injury due to poor footing in slippery conditions, and hazards posed by poor visibility or other challenging conditions during adverse weather, especially at night.

Avoid locating sampling sites within the normal flow of either onsite construction traffic or the travel lanes of public rights-of-way.

The following is a general list of hazards that could be encountered at Caltrans monitoring sites; these hazards should be avoided or mitigated when selecting monitoring sites:

- Proximity to high-speed traffic or errant vehicles
- Poor visibility at night or during adverse weather conditions
- Poor footing on slippery surfaces
- Confined spaces (access requires Occupational Safety and Health Administration certification)
- Explosive or toxic gases
- Uncovered water conveyances where swift water and drowning hazards exist
- Heat – heat exhaustion, heat stroke
- Cold – exposure, frostbite
- Hazardous wildlife and plants
- People encountered onsite who are unknown to field personnel

It is important to note that this is only a general, partial list of possible hazards that field personnel may encounter. It is imperative that experienced WPC managers conduct a thorough

investigation of each monitoring site to identify other possible hazards before the monitoring phase of a project begins.

To help avoid hazards, personnel should be physically capable of performing all tasks required for sample collection and be familiar with the site's Health and Safety Plan in addition to the Caltrans *Code of Safe Practices* (Caltrans, 2021b). The Health and Safety Plan must be developed prior to the initiation of any sample collection activities and should include information on at least the following: hazard evaluation (chemical, physical, etc.), contingency plan, personal protective equipment, and emergency action information. Additional information regarding personnel safety during sample collection is provided in Section 4.6.1.

4.2.3 Site Access

Establish the ease of vehicular and personnel access to the monitoring locations for sample collection activities for the full range of weather conditions that may be encountered, especially during wet weather conditions. For example, ensure that the access point and available parking are at a safe distance from traffic, that any roads to the sampling location are adequate and reliable (e.g., limited potential to be muddy or flooded during wet weather), and that access does not require crossing private property. When in doubt, check with local agencies as to whether any permits will be required to gain legal access to the site(s). For stormwater outfall monitoring sites, access into the drainage line/outfall for sample collection must be safe and practical. Whenever feasible, access to monitoring locations should not involve confined space entry or exposure to fast-moving traffic.

To ensure that personnel can quickly locate and access monitoring locations, clear directions and detailed WPCD maps should be developed that diagram site access for each monitoring location. In addition, a list of special access instructions should be included within the CSMP, including information regarding required keys for locks, traffic control requirements, necessary permits, etc.

4.2.4 Location Selection Assessment

Each potential monitoring location should be visited to confirm the expected site characteristics and verify whether the monitoring location is suitable for collecting samples. When possible, a visit should be conducted during or after a storm, when the discharge flow conditions can be observed. For some types of sampling (e.g., representative sampling locations for stormwater discharges), this visit could coincide with the pre-storm site inspection. A wet weather visit can provide valuable information regarding logistical constraints that may not be readily apparent during dry weather. However, a dry weather visit should also be conducted to observe any non-stormwater flows, including evidence of any illicit connections or illegal discharges.

Criteria to be documented during a site visit include type of discharge, physical configuration of site, drainage area characteristics, potential safety issues, site access, and whether any of the following are present: commingling of runoff from non-Caltrans sources, illegal discharges or illicit connections, nearby sources of atmospheric deposition, high groundwater, tidal influence, staining, or discoloration.

4.3 Training Requirements

Familiarity with the requirements of the CGP, the SWPPP and the CSMP, and competence in the techniques and protocols specified in those documents are essential for the collection of samples in a manner that meets the requirements of the CGP, while protecting the health and safety of the monitoring staff. This section briefly describes the training necessary to provide monitoring personnel with the knowledge and skills to perform their assigned duties competently and safely. Training must be documented on the Stormwater Training Record (DOT CEM-2023SW) and Stormwater Training Log (DOT CEM-2024SW) and, if applicable, Qualified Stormwater Pollution Prevention Plan Practitioner (QSP) Delegate Training Record (DOT CEM-2020SW).

The QSD, the WPC manager and the alternate WPC manager (who must be, at a minimum, a QSP), and the trained QSP delegate must have Caltrans-approved stormwater training, as described on the Caltrans Stormwater and Water Pollution Control website[8].

Because storm-related monitoring events are difficult to predict, and construction projects often last for a year or more, one or more members of the field crew may be unavailable to monitor a given event due to sick leave, vacation, etc. Thus, it is necessary to designate an alternate field sampler who can fill in when primary members are unavailable. These alternate stormwater samplers must receive the same training as the primary members in the event a primary sampler is unavailable. Training of alternate field samplers must be documented in the SWPPP.

4.3.1 QSD and QSP Training

All monitoring, maintenance, repair, and sampling activities must be performed or supervised by the WPC manager, who must be a QSP. A QSP may implement the SWPPP under the supervision of the WPC manager. The CGP lists the certification and training requirements for QSD and QSPs.

4.3.2 WPC Manager Training

The designated QSD, the WPC manager, the assistant WPC manager, and the QSP responsible for assessing and overseeing compliance with water pollution control must complete the required WPC Manager 8-Hour Training. The Caltrans Storm Water and Pollution Control website lists the approved vendors who can provide the training. A certificate is presented upon completion which must be included as part of the SWPPP training documentation.

4.3.3 Field Monitoring Training

Field monitoring training must include the following basic elements:

- SWPPP general review and a detailed review of CSMP to become knowledgeable of project-specific CSMP requirements and particular SAPs based on project conditions and location, such as TMDL, dewatering, etc.
- Field instrument calibration and use

[8] https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control

- Laboratory analysis requirements including completing the chain-of-custody forms

Review SWPPP and CSMP

All field monitoring personnel and alternates should read the entire SWPPP, which includes the CSMP developed for the construction site, to obtain the background information required for an overall understanding of the project.

Monitoring personnel also should be made aware of potential hazards associated with sampling. These hazards can include slippery conditions, cold or hot temperatures, construction site traffic, and contaminated water. Crew members must read the contractor's Health and Safety Plan and become familiar with the methods to be employed to effectively handle those hazards.

Field Training/Monitoring Simulation (Dry Run)

A training session should be held for all the contractor's field sampling and testing personnel and alternates to review the monitoring techniques and protocols specified in the CSMP. Ideally, the training session should occur shortly before construction begins.

The contractor's training session should be organized in a chronological fashion, to follow the normal order of events from pre-monitoring preparations through post-monitoring activities. All standard operating procedures should be covered, along with the site-specific responsibilities of individual sampling and testing personnel. In addition, any questions arising from the document review should be addressed during this session.

Training personnel should circulate a copy of the SWPPP with the CSMP, and all other appropriate documentation during the training session. The following items should be available during a training session:

- Documentation (SWPPP, CSMP, forms, chains-of-custody, equipment manuals, etc.)
- Monitoring equipment
- Calibration standards
- Water, for demonstration purposes
- Sample bottles and example bottle labels

Key sections of the SWPPP and CSMP should be highlighted during the training session, and use of equipment should be demonstrated. To emphasize the importance of minimizing sample contamination, special attention should be given to proper sample handling techniques. Ample opportunity should be provided to answer questions posed by field sampling and testing personnel.

The training should include a visit to the construction site where a monitoring simulation, or "dry run," can be conducted under the supervision of the WPC manager. During the "dry run," field sampling and testing personnel travel to their assigned monitoring locations and run through the procedures specified in the CSMP, including:

- Site access and parking at the site
- Implementing traffic control measures (if any)
- Knowing the location of personal protective equipment
- Calibrating field equipment
- Checking/preparing the monitoring stations
- Placing ice in ice chests for grab samples (if applicable)
- Conducting field measurements

- Completing sample bottle labels (if applicable)
- Collecting water samples (if applicable)
- Completing field log forms (including calibration)
- Completing chain-of-custody forms for each laboratory (if applicable)
- Packing samples on ice for transport to laboratory (if applicable)
- Delivering or shipping samples to the laboratory (if applicable)

All equipment and materials required for monitoring a QPE should be mobilized and used to simulate, as closely as possible, the conditions of an actual monitoring event. All field sampling and testing personnel (including alternates) should receive hands-on training with all field equipment and sample handling procedures. The WPC manager should re-emphasize health and safety considerations during the field monitoring simulation.

4.4 Preparation and Logistics

Adequate pre-storm preparations are essential for a successful monitoring event. Prior to deployment of field sampling and testing personnel and the initiation of monitoring, it is imperative that weather systems are adequately tracked, field personnel are prepared, and all necessary equipment is inventoried. Monitoring preparation and logistics should include the following basic elements:

- Weather tracking
- Communications
- Ordering sample bottles (if applicable)
- Preparing sample bottle labels (if applicable)
- Field preparations, including:
  - Implementing traffic control measures (if any)
  - Calibrating and maintaining field equipment as necessary
  - Checking/preparing the monitoring stations
  - Placing ice in ice chests for grab samples (if applicable)
  - Completing sample bottle labels and chain-of-custody forms (if applicable)
  - Mobilization of field crews

The above elements are discussed in the following subsections.

4.4.1 Weather Forecast Tracking

Weather tracking must be performed daily to assist monitoring personnel in preparing for the arrival of rain and to comply with the standard specifications. The WPC manager may need to use the forecast as a basis to conduct a pre-storm inspection and prepare to conduct sampling activities. The WPC manager or other assigned contractor staff must be assigned to track weather conditions and evaluate potential storms.

- **Weather forecasts** provide the quantitative precipitation forecast and the associated probability for each impending precipitation event. The National Weather Service reports expected amounts of precipitation for individual 1-, 6-, 12-, and 24-hour periods in tabular and graphical formats. The quantitative precipitation forecast is the sum of these amounts for the expected duration of the storm. The quantitative precipitation forecast is

used to determine whether the predicted storm meets the Caltrans-specified criteria to conduct a pre-storm inspection or the Caltrans requirement for sampling.

- **Turbidity and pH sampling events** for each day the storm event is forecasted to be a qualifying rain event. The "qualifying precipitation event" is a single storm that produces at least 0.5 inch of rainfall. A qualifying precipitation event may occur over multiple days. A storm event is considered to have ended when no measurable precipitation (i.e., less than 0.25 inches) is recorded within a consecutive 48-hour period.

The National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters, and ocean areas. National Weather Service data are available for use by the public through their website[9].

Both written and graphical forecasts are available from the National Weather Service website, along with a "Forecast Discussion" which provides additional information on model results and the logic behind the current forecast. The website also provides access to radar, satellite, and land-based weather station data. To obtain the percent chance of precipitation and the forecasted precipitation amount, at the National Weather Service website, enter your zip code or city and state in the search box and click "go." Then, toward the bottom of the page, under "Additional Forecasts and Information," click on "Forecast Weather Table Interface" to show both the percent chance of precipitation and the precipitation amount forecast. Figure 4-1 presents an example of a forecast weather interface table.

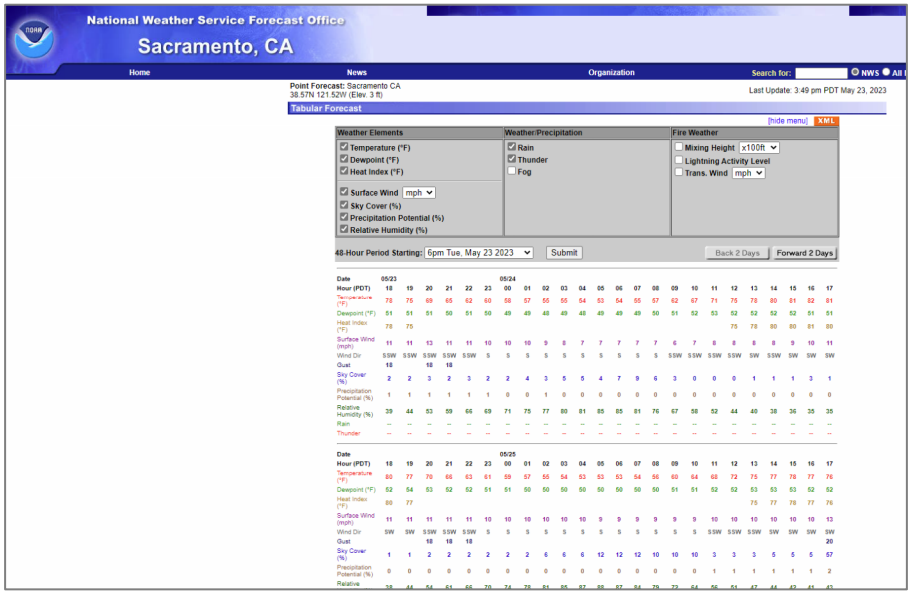


Figure 4-1. Forecast Weather Table Interface

To supplement forecasts from the National Weather Service, private and other weather forecasting services can be contracted to provide custom forecast services for specific locations on a regular basis. Private weather forecasting services are also available on an on-call basis for telephone consultations regarding impending precipitation events. Additionally, information

[9] https://forecast.weather.gov

can be obtained from weather news available on local television forecasts and The Weather Channel[10], as well as other sources available on the Internet.

For time periods of up to one week prior to the arrival of a storm system, National Weather Service model predictions and satellite imagery form the basis of the predictive information provided by National Weather Service and private forecasters. As candidate storms approach, National Weather Service radar observations and hourly reports from land-based National Weather Service weather stations may be used to track and evaluate storm progress. In particular, the High-Resolution Rapid Refresh (HRRR[11]) model can be used to make reliable, short-term predictions of the arrival time of a storm. Telephone communication with a contract forecaster is another effective way to access current information from these sources. As rainfall becomes imminent, observations from local field personnel can also be useful.

The WPC manager shall monitor the weather forecast daily for predicted precipitation within the following 96 hours. The WPC manager shall monitor and record the forecast at least daily for the next 24, 48, 72, and 96 hours to determine if the forecast for the probability of precipitation is 50% or greater for any 6-hour period. If the forecast for precipitation is 50% or greater, the WPC manager shall calculate the amount of precipitation forecasted for each 24-hour period and the total precipitation for the QPE and record the information. Weather forecast monitoring shall be filed in File Category 20.40: Weather Monitoring Logs.

4.4.2 Communications

The SWPPP and WPCP template include the contact information for stormwater staff, including emergency contact information. Some projects conduct night work or work weekends; coordination with the laboratories ahead of time might be needed to ensure they will be open, and the samples are received within the required holding time.

4.4.3 Ordering Sample Bottles

For field-tested samples, bottles for samples should be ordered for collection of samples for field measurements, as needed in cases where the field meter probe cannot be inserted directly into the sample stream. The order should specify wide-mouth bottles, as grab sampling is easier to perform with wide-mouth bottles.

For laboratory-tested samples, prior to the first sampling event, a sample bottle order is placed with the analytical laboratory. The laboratory provides clean bottles as part of their analytical services. The bottle order is based on all planned analyses that will be performed by the laboratory. Bottles are only used once and cannot be reused. Enough bottles should be ordered to cover multiple events, accidental breakage or contamination, QA/QC samples, and potential non-stormwater sampling. If field blank samples are to be performed, the bottle order should also include blank water.

Field personnel must inventory sample bottles upon receipt from the laboratory to ensure adequate bottles have been provided to account for the expected analytical requirements.

[10] https://weather.com/

[11] https://rapidrefresh.noaa.gov/hrrr/

Immediately following each monitoring event, the bottle inventory should be checked and additional bottles ordered as needed.

Sample bottles and laboratory-cleaned sampling equipment must be handled only while wearing clean, powder-free nitrile gloves. Sample bottles must be stored in a clean area with lids properly secured.

Sampling Locations

As part of the CSMP, the QSD must identify each of the potential sampling locations with a unique sample location identification code, as shown below. The identification code must start with a number and must be different for each location. If the construction site lies in a west-to-east orientation, starting with “01” from the east; the potential sampling locations shall be numbered toward the west. If the construction site lies in a south-to-north orientation, the potential sampling locations must be numbered toward the north (i.e., staring with “01” from the south). To further distinguish among the locations, the QSD must assign the following abbreviations to each potential sampling location based on the location type:

- Locations leaving Caltrans right-of-way: DL
- Discharge locations from areas with known non-visible pollutants: NVP
- Discharge locations upgradient of areas with known non-visible pollutants: UNVP
- Discharge locations to an MS4: MS
- Run-on locations: RO
- Discharge locations into a receiving water: RW
- Downstream of all discharge locations: RWD
- Upstream of all discharge locations: RWU
- Dewatering discharge locations: DDL
- Contained stormwater discharge locations: CSDL
- Discharge locations for active treatment systems: ATS

The unique Sample Location Identification Code shall follow this format, SSSTTTTXX, where:

SSS = sampling location identifier number (e.g., 010) TTTT = sampling location type (e.g., DL)

XX = identifier number for the discharge location

For example, the sampling location identification for the 15th sampling location based on starting from the south end of the project for a stormwater discharge location that has been identified to be the ninth discharge location would be 015DL09.

Sample Bottle Identification Labels

Sampling personnel shall assign a unique sample identification code, which shall follow this format, SSSTTTXX-YYMMDDHHmm-TT, where:

SSSTTTTXX = sample location identifier code (e.g., 015DL09)

YY = last two digits of the year (e.g., 22)

MM = month (01-12)

DD = day (01-31)

HH = hour sample collected (00-23)

mm = minute sample collected (00-59)

TT = Type
01 = grab
05 = field duplicate
09 = field blank

For example, the sample number for a grab sample collected from Station 015DL09 at 4:15 p.m. on December 8, 2022, would be 015DL09-2212081615-01.

4.4.4 Sample Bottle Labels

Bottle labels should be prepared prior to each monitoring event. The laboratory typically provides blank bottle labels. Standard labels must be applied to each sample bottle that will be submitted to a laboratory for analysis. Labels should be completed to the extent possible and applied to sample bottles prior to the mobilization of field crews in the field. Pre-labeling of sample bottles simplifies field activities, leaving only date, time, and sample identification number to be noted on the label in the field. The laboratory should be able to provide pre-labeled bottles with waterproof labels that have ample space for writing in the site- and event-specific information. A standardized bottle label should include the following information:

- Project name
- Project number
- Site name
- Sample type (stormwater, non-stormwater, non-visible pollutants, etc.)
- Sample Location Identification Code
- Collection date/time
- Collected by: (names of field personnel)
- Preservative (if any)
- Analytical constituent(s)
- Each project site, monitoring location, and monitoring event should be assigned a unique identification number per the Caltrans naming guidelines described in the Caltrans *SWPPP Template* (Caltrans, 2024a)

Custom bottle labels may be produced using blank waterproof labels and labeling software. Computer labeling programs can save a great deal of time in generating bottle labels. The sites and analytical constituent information can be entered in the computer program for each monitoring program in advance, and printed as needed prior to each monitoring event.

Because field blank and field duplicate samples are typically sent to the analytical laboratory “blind,” bottle labels for these QA/QC samples must be completed with pseudonym site names and sample IDs. Actual QA/QC sample collection site information must be carefully noted in the field log. See Section 4.9 and Section 4.10 for detailed QA/QC sample information.

Bottles should be labeled in a dry environment prior to sampling. Attempting to apply labels to sample bottles that are wet after filling will cause problems, as labels usually do not adhere to wet bottles and it is difficult to write on wet labels. The labels should be applied to the bottles rather than to the caps. See Table 4-1 for required sample bottle types and preservatives that may be required on a project.

Table 4-1. Sample Collection, Preservation and Analysis

Constituent	Analytical Method[1]	Sample Preservation	Minimum Sample Volume	Sample Bottle	Maximum Holding Time	Recommended Reporting Limit[2]
pH	Field test with calibrated portable instrument; EPA Method 150.1	None	100 mL	250 mL P	15 min	+/- 0.2 pH[4]
Turbidity	Field test with calibrated portable instrument; EPA Method 180.1	None	100 mL	250 mL P	48 hours	1 NTU
Temperature	Field test with calibrated portable instrument; SM 2550	None	100 mL	250 mL P	Immediately	+/- 0.1 C[5]
Dissolved oxygen	Field test with calibrated portable instrument; EPA Method 360.1	None	100 mL	250 mL P	Immediately	+/- 0.05 mg/l[5]
Specific Conductance	Field test with calibrated portable instrument; SM 2510	Store at 2-6˚ C; filter if hold time >24 hours	100 mL	250 mL P	28 days	+/- 1 µmhos/cm[5]
Total Petroleum Hydrocarbons – Gasoline	EPA SW8015M, EPA 8260	Store at 2-6˚ C	40 mL	3 x 40 mL VOA-glass	14 days	50 µg/l
Total Petroleum Hydrocarbons – Diesel	EPA SW8015M	HCl to pH <2	500 mL	2 x 1 L Glass- Amber	Extract 7 days; analyze 40 days	50 µg/l
Oil and Grease	EPA 1664 Rev. A; EPA 1664 Rev. B	Store at 2-6˚ C; HCl or H_2SO_4 to pH <2	100 mL	250 ml Glass- Amber	28 days	5 mg/l
Benzene	EPA 624.1, EPA 1624B	Store at 2-6˚ C; 0.008% $Na_2S_2O_3$; HCl to pH <2	40 mL	3 x 40 mL VOA-glass	14 days; 7 days if not adjusted to pH 2	0.5 - 50 µg/l
Ethylbenzene	EPA 624.1, EPA 1624B	Store at 2-6˚ C; 0.008% $Na_2S_2O_3$; HCl to pH <2	40 mL	3 x 40 mL VOA-glass	14 days; 7 days if not adjusted to pH 2	0.5 - 50 µg/l
Toluene	EPA 624.1, EPA 1624B	Store at 2-6˚ C; 0.008% $Na_2S_2O_3$; HCl to pH <2	40 mL	3 x 40 mL VOA-glass	14 days; 7 days if not adjusted to pH 2	0.5 - 50 µg/l
Xylene	EPA 1624C/1666/624.1	Store at 2-6˚ C; 0.008% $Na_2S_2O_3$; HCl to pH <2	40 mL	3 x 40 mL VOA-glass	14 days; 7 days if not adjusted to pH 2	0.5 - 50 µg/l
Volatile Organic Compounds - Solvents	EPA 624					
Semi-Volatile Organic Compounds	EPA 625					
Phenols	EPA 625.1, EPA 1625B					

Table 4-1. Sample Collection, Preservation and Analysis

Constituent	Analytical Method[1]	Sample Preservation	Minimum Sample Volume	Sample Bottle	Maximum Holding Time	Recommended Reporting Limit[2]
Organophosphate Pesticides	EPA 625.1, EPA 525.2	Store at 2-6˚ C	1 L	2 x 1 L Glass- Amber	Extract 7 days; analyze 40 days	0.05 µg/l
Organochlorine Pesticides	EPA 625.1, EPA 525.1, EPA 525.2	Store at 2-6˚ C	1 L	2 x 1 L Glass- Amber	2 x 1 L Glass-Amber	0.05 - 1.0 µg/l
Carbaryl	EPA 625.1	Store at 2-6˚ C	1 L	2 x 1 L Glass- Amber	2 x 1 L Glass-Amber	0.07 - 3.5 µg/l
Polychlorinated biphenyls	EPA 625.1					0.05 - 1.0 µg/l
Polynuclear Aromatic Hydrocarbons	EPA 625.1, EPA 1625B					0.05 µg/l
Cations (barium, potassium, calcium, iron, sodium, magnesium)	EPA 200.8, Rev. 5.4 (1994)	HNO_3 to pH <2, or at least 24 hours prior to analysis	100 mL	250 mL P	6 months	1 mg/l
Metals (Al, Sb, As, Be, Cd, Cr, Co, Cu, Pb, Mn, Mo, Ni, Se, Ti, V, Zn)	EPA 200.8, Rev. 5.4 (1994), SM 3500-Cr C-2011	HNO_3 to pH <2, or at least 24 hours prior to analysis	100 mL	250 mL P	6 months	0.2 - 25 µg/l
Metals (Chromium VI, dissolved)	EPA 218.6, Rev. 3.3 (1994)	0.45-micron filtration; store at 2-6 °C, pH = 9.3-9.7	50 mL	250 mL P	28 days	1 µg/l
Mercury, total (low level)	EPA 1631E	Store at 2-6˚ C ; 5 mL/L 12N HCl or 5 mL/L BrCl	Within kit	Low Level Mercury Collection Kit	28 days	0.5 ng/l
Residual Chlorine	SM 4500-Cl B,C,E,F, or G-2011	Do not expose to light (foil wrapped)	100 mL	250 mL Glass	15 minutes[7]	0.1 mg/l
Chloride	SM 4500-Cl B,C,D, or E	None	100 mL	250 mL P	28 days	1 mg/l
Sulfate	300.0, Rev. 2.1 (1993) and 300.1; Rev. 1.0 (1997), SM4500-SO4 C,D,E,F or G-2011	Store at 2-6˚ C	100 mL	250 mL P	28 days	1 mg/l
Total Dissolved Solids	SM 2540 C-2015	Store at 2-6˚ C	100 mL	250 mL P	7 days	1 mg/l
Total Suspended Solids	SM 2540 D-1997	Store at 2-6˚ C	100 mL	250 mL P	7 days	1 mg/l
Suspended Sediment Concentration	ASTM Method D 3977-97[3]	Store at 2-6˚ C	100 mL	250 mL P		5 mg/l
Biological Oxygen Demand	SM 5210 B				48 hours	3 mg/l
Chemical Oxygen Demand	EPA 410.3 (Rev. 1978/ SM 5220 B, C or D-2011				28 days	10 mg/l
Total/Dissolved Organic Carbon	SM 5310 B-2014, C-2014, or D-2011	Store at 2-6 °C; H_2SO_4 to pH<2	250 mL	250 mL Glass-Amber	28 days	1 mg/l

Table 4-1. Sample Collection, Preservation and Analysis

Constituent	Analytical Method[1]	Sample Preservation	Minimum Sample Volume	Sample Bottle	Maximum Holding Time	Recommended Reporting Limit[2]
Total Kjeldhal Nitrogen (organic nitrogen)	SM4500-Norg B-2011 or C-2011 and SM 4500-NH3 B-2011	Store at 2-6˚ C; H_2SO_4 to pH <2	50 mL	1 L P	28 days	0.1 mg/l
Nitrate – Inorganic Nitrogen (NO3-N)	EPA 300.0, Rev. 2.1 (1993)' EPA 300.1, Rev. 1.0 (1997)/SM 4110 B or C-2011	Store at 2-6˚ C	100 mL	250 mL P	48 hours	0.1 mg/l
Nitrate (NO_3)	EPA 300.0, Rev. 2.1 (1993); EPA 300.1, Rev. 1.0 (1997)	Store at 2-6˚ C	100 mL	250 mL P	48 hours	0.1 mg/l
Nitrite (NO_2)	EPA 300.0, Rev. 2.1 (1993); EPA 300.1, Rev. 1.0 (1997)	Store at 2-6˚ C	100 mL	250 mL P	48 hours	0.1 mg/l
Orthophosphate, dissolved	EPA 365.3 (Issued 1978)					
Alkalinity as $CaCO_3$	SM 2320 B-2011					
Hardness as $CaCO_3$	SM 2340 B-2011	HNO_3 or H_2SO_4 to pH <2	100 mL	250 mL P	6 months	2 mg/l
Coliform bacteria (total/fecal)	SM 9221 B-2014/SM 9221 E-2014, SM 9221 F-2014	Store at 2-6˚ C, 0.008% $Na_2S_2O_3$	100 mL	100 mL Sterile P	8 hours [6]	1 MPN/100 ml

Table Note

Adapted from Attachment S of *SWPPP and WPCP Preparation Manual* (Caltrans, 2016), *Stormwater Monitoring Guidance Manual* (Caltrans, 2020), and 40 CFR 136.3 (where possible).

Table Footnotes

1 Alternative test procedures can be used if listed in 40 CFR 136.3 or approved through the process specified in 40 CFR part 136.4-136.6.

2 Reporting limits can vary by analyte and by laboratory.

3 ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, ASTM D 3977-97 (2007), Vol. 11.02, pp. 389- 394.

4 Measured on a scale of 0-14; must be able to read within +/- 0.2 pH units.

5 Must be able to report to +/- 0.1 of the nearest standard measurement unit.

6 Sample analysis should begin as soon as possible after receipt; sample incubation must be started no later than 8 hours from time of collection.

7 Residual chlorine must be analyzed within 15 minutes of sampling. In this way, it is similar to field measurements like temperature in that it must be measured in situ. pH within 2 hours for laboratory analysis.

Acronyms Found in Table

°C = degrees Celsius
P = Polyethylene
MPN = Most probable number (of colonies)
NTU = Nephelometric turbidity units

4.4.5 Field Equipment Preparations

Prior to the first precipitation event, and immediately after each monitored event, the field crews will inventory, restock, replace, clean, calibrate, maintain, and test field equipment as needed. Calibration solutions should be ordered if necessary. A standard checklist should be used to perform an inventory of field meters, equipment, and supplies.

Figure 4-2 presents an example field equipment checklist. Field equipment should be kept in one location, which is used as a staging area to simplify field crew mobilization.

- ⇒ CSMP, which identifies the sampling locations
- ⇒ Safety gear and personal protective equipment (i.e., rain gear, rain boots, high-visibility reflective vest, high visibility hard hat, safety glasses, nitrile gloves)
- ⇒ Field meters for the determination of pH and turbidity, calibrated within 24 hours of use
- ⇒ Spare batteries for field meters
- ⇒ Deionized or distilled water to rinse the field meter probes after use
- ⇒ Sample bottles provided by the analytical laboratory for all parameters to be tested, including spare bottles
- ⇒ Bottle labels
- ⇒ Permanent markers and/or water-proof pens (e.g., space pens, rite-in-the-rain pens, etc.)
- ⇒ Chemical resistant nitrile sampling gloves, powder-free
- ⇒ Standard field log forms printed on waterproof paper

Figure 4-2. Field Equipment Checklist

4.4.6 Mobilization for Monitoring

When a storm approaches that may generate a discharge, the WPC manager or other contractor staff assigned to track weather conditions will alert the field sampling and testing personnel and analytical laboratory. Field sampling and testing personnel will be given notice to mobilize when precipitation is imminent or has begun. For non-stormwater or non-visible pollutant monitoring, field sampling and testing personnel will be given notice to mobilize when conditions required for sampling are present, as documented on the Stormwater Site Inspection Report form (DOT CEM-2030SW). Field crews may already be onsite conducting an inspection when non-stormwater or non-visible pollutant monitoring is required. The WPC manager should have a contingency plan to collect potential non-stormwater or non-visible pollutant samples prior to conducting site inspections (e.g., weekly, before, during, and after a qualifying precipitation event). The contingency plan for sampling should include having stormwater samplers available on short notice.

When first alerted, field sampling and testing personnel should consult their event sampling plan and check field equipment and supplies to ensure they are ready to conduct the required monitoring. Battery levels should be checked in all field equipment, and portable meters should

be calibrated prior to commencing field measurements. For projects that require laboratory analysis of samples, the laboratory should be informed of incoming samples and field crew will need to obtain ice for sample preservation. Ice should be kept in ice chests for storage of filled grab sample bottles awaiting transport to the laboratory. Keeping ice in sealable bags facilitates clean, easy ice handling, particularly if shipping coolers by commercial carrier. Re-freezable ice packets are an alternative to wet ice.

Once given the go-ahead, the field sampling and testing personnel will travel to the assigned monitoring locations and conduct final preparations for monitoring, including field equipment calibration.

4.5 Rainfall Measurement

The WPC manager shall have the primary responsibility to monitor weather at the project site as required by the specifications. The WPC manager shall monitor the weather and record the weather conditions daily.

The CGP requires rain gauge readings to be measured and recorded for monitoring events. Rain gauge readings must be made and recorded from the onsite rain gauge before, during, and after qualifying precipitation events.

Precipitation can be measured using either a portable “direct-reading” rain gauge (graduated collector that is read manually) or an electronic “tipping bucket” rain gauge. Use of an electronic “tipping bucket” rain gauge is recommended whenever possible, due to improved accuracy and electronic recording of the data. This type of rain gauge collects rainfall in a small “bucket” in increments, usually 0.01 to 0.05 inch. The bucket automatically tips and is emptied after each increment. The rain gauge is normally connected to a data logger, which counts the number of tips. Total rainfall is recorded automatically by the data logger.

If a portable, direct-reading rain gauge is used to collect precipitation data, field personnel must be present onsite during the precipitation event to take periodic readings.

Rain gauges should be installed and maintained according to manufacturer specifications. Important installation factors include:

- Rain gauges must be installed in a secure fashion in a location where no buildings, trees, overpasses, or other objects obstruct or divert rainfall prior to entering the rain gauge.
- A rain gauge should always be placed in an elevated position (at least 4 feet above ground surface) so that activity on the ground (field technicians, animals, nearby traffic) does not splash water or debris into it.
- Rain gauges must be positioned so that the openings are horizontal and level.
- Rain gauges must be installed securely so they maintain the secure position throughout the study; this is often accomplished by securing the gauge to a post or other object that will not bend in high winds.

The rain gauge should be installed over undisturbed land at least 4 feet above the ground surface. In areas having an accumulation of over 20 inches of snow per year, the rain gauge should be raised at least 12 inches above the usual seasonal total snow level. In addition, wind

obstructions should not be closer than two to four times the obstruction height, and objects with a height of over 3 feet that deflect wind should not be located less than 16.5 feet away from the collector. The rain gauge must be positioned in an area clear of obstruction with a 45-degree angle of clearance all around the gauge (see Figure 4-3 for an illustration of the required imaginary 90-degree cone of clearance above the meter).

Typical rain gauges do not operate in freezing conditions. Heated rain gauges may be used in colder climates where alternating current power is available. Rain gauges using antifreeze are also available but are susceptible to malfunction in high wind situations. As such, rain gauges using antifreeze must be mounted securely to safeguard against disturbance by strong winds.

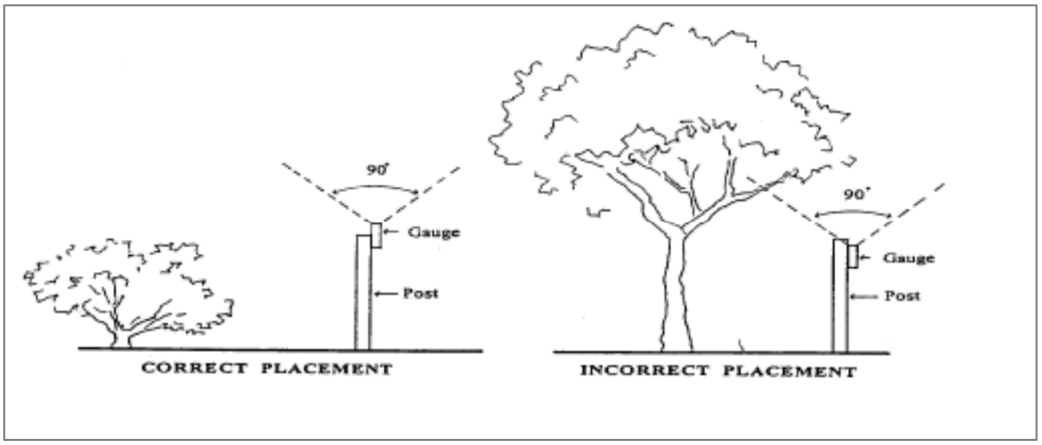


Figure 4-3. Required Rain Gauge Clearance

Electronic rain gauges typically are mounted on top of rigid metal pipe. Wiring that connects the gauge to a monitoring station enclosure is run through this pipe and additional metal conduit as necessary to protect it against vandalism and the elements.

To function properly, rain gauges must be frequently maintained. The most common issue is fouling of the tipping bucket apparatus by bird droppings, leaves, or other materials. The gauge should be inspected prior to every potential monitoring event and cleaned, as necessary.

The rain gauge must be calibrated following the manufacturer specifications, at a minimum prior to each stormwater monitoring season. The gauge should be recalibrated following any instance of fouling from bird dropping or other materials, and at any time that anomalous readings are observed.

Weather monitoring must be documented. Completed weather monitoring documentation must be kept in File Category 20.40: Weather Monitoring Logs. Within two working days of the last date shown on the completed weather monitoring documentation, a copy must be submitted to the RE.

4.6 Sample Collection

For storm events, the selection of the actual sampling locations for non-visible pollutants by the WPC manager will be documented. At least 48 hours before a QPE, the WPC manager must

review the pre-storm inspection report to determine if there are any locations that trigger non-visible sampling.

Field measurements will be made for pH and turbidity (and possibly other field-tested parameters such as chlorine) at each monitoring location during each storm event, and where necessary, grab sample(s) will be collected for laboratory analysis for other parameters. Field measurements may be made by directly submerging the probe in the discharge stream, or by collecting a sample aliquot for immediate measurement in the field. Field measurements and grab sample collection times will be recorded on standard field forms (e.g., Storm Event Sampling or Receiving Water Monitoring Report, DOT CEM-2052SW).

The CGP requires samples to be collected, maintained, and shipped in accordance with the *Surface Water Ambient Monitoring Program Quality Assurance Program Plan* (SWAMP, 2022).[12]

The CGP also requires all sample collection and sample preservation be performed in accordance with the current edition of *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, 2023).

The following elements pertain to sample collection and handling:

- Personal safety
- Sample containers and volumes
- Clean sampling techniques
- Grab sample collection
- Sample preservation
- Sample delivery/chain-of-custody

These elements are described in the subsections below.

4.6.1 Personal Safety

Before samples are collected, field personnel must ensure samples can be collected safely at each sampling location. Personal safety must be of paramount importance when selecting monitoring sites, as described in Section 4.2.2, above. Field personnel must be trained in site health and safety requirements and be trained in sample collection and safety protocols. All monitoring activities must be supervised by the WPC manager. Sample collection should not be performed during dangerous weather conditions, such as flooding, electrical storms, or high wind events. Adherence to the following recommendations will minimize risks to field personnel:

- At no time during storm conditions or when significant flows are present should any field personnel enter a confined space (e.g., manhole or vault). Furthermore, confined space entry shall take place only when all safety protocols are met (i.e., three-person trained crew, signed entry permit, atmospheric testing instrument, retrieval harness, tripod and winch).

[12] Additional information regarding SWAMP's Quality Assurance Program Plan is available online at http://www.waterboards.ca.gov/water_issues/programs/swamp/ and https://www.waterboards.ca.gov/water_issues/programs/swamp/docs/swamp-qaprp-2022.pdf .

- Two-person field crews should be available for all fieldwork to be conducted under adverse weather conditions, or whenever there are risks to personal safety.
- Personnel must be trained regarding appropriate traffic control measures, and appropriate traffic control measures must be employed in accordance with the project SWPPP, CSMP, and Health and Safety, Plan including the Caltrans *Code of Safe Practices* (Caltrans, 2016b).

4.6.2 Sample Containers and Volumes

Appropriate sample bottles and equipment must be used for each parameter to be measured. Use of improper bottles and equipment can introduce contaminants and cause other errors, which can invalidate the data. Table 4-1 specifies sample bottle types and volumes required for each analysis.

Polyethylene or glass sampling equipment and bottles can be used for collection of samples for analysis for pH, turbidity, and other conventional pollutants, including solids and nutrients. All sampling equipment used for trace metals determinations must be non-metallic and free from any material that may contain metals. Acceptable materials for metals analysis include Teflon®, polyethylene, and borosilicate glass (e.g., Pyrex®). Sampling equipment used for trace organics determination must be glass or Teflon®. Borosilicate glass is generally adequate when analysis is to be performed for a mixture of organic and inorganic constituents (such as metals). All sampling equipment used for bacteriological determination must be sterile.

Whenever possible, samples should be collected directly into the designated sample container. If this is not possible due to safety or access reasons, then a grab pole can be used to lower the sample container into the water body from a safe location. In rare instances it might be necessary to use a scoop, bailer, or pump to deliver sample water into the designated container. All sample collection equipment that directly contacts the sample water during collection must be compatible with the specific constituents to be analyzed. If a scoop, bailer, or pump is used to aid in sample collection, the wetted materials must be made of non-contaminating materials; must be pre-cleaned; and, if not certified-clean by the manufacturer, must be blanked by the analytical laboratory before use.

To ensure sufficient sample volume is collected, all sample containers should be filled to the fill line or to the shoulder of the bottle.

Immediately prior to the filling of grab sample bottles, the bottle labels should be checked, and site- and event-specific information added using a waterproof pen. Attempting to label grab sample bottles after sample collection is not advised, as it is difficult to write on wet labels.

4.6.3 Clean Sampling Techniques

Stormwater sampling must employ “clean” sampling techniques to minimize potential sources of sample contamination, particularly from trace pollutants. Care must be taken during all sampling operations to minimize exposure of the samples to human, atmospheric, and other potential sources of contamination. Care must be taken to avoid contamination whenever handling bottles and lids.

For projects that sample for field parameters (i.e., turbidity, pH, dissolved oxygen, and conductivity), sample bottles/equipment must be cleaned according to the protocols presented

in *Standard Operating Procedures for Manual Field Measurement of Turbidity, pH, Dissolved Oxygen, and Conductivity* (Caltrans, 2012). For example, turbidity meter sample cells must be rinsed with deionized water after use. Measurements of dissolved oxygen taken with a field meter must be made directly in the water body and must not be measured from a grab sample.

For projects that require laboratory analysis of samples, clean sample bottles must be ordered from the analytical laboratory. Sample bottles must be prepared by the laboratory as specified by analytical method protocols. This includes the addition of sample preservatives where applicable. See Table 4-1 for specific bottle and preservative requirements. Sample bottles should be stored in a clean environment with lids securely fastened until the time of use.

Reusable sampling equipment used to collect samples for field parameters (e.g., turbidity and pH) must be cleaned according to the protocols presented in *Standard Operating Procedures for Manual Field Measurement of Turbidity, pH, Dissolved Oxygen, and Conductivity* (Caltrans, 2012). New, pre-cleaned, single-use sampling equipment, such as disposable plastic bailers, do not need to be cleaned prior to use.

Samples should be collected upstream and upwind of field personnel to minimize introduction of contaminants. To reduce potential contamination, sample collection personnel must adhere to the following rules while collecting stormwater samples:

- No smoking during or immediately before or after sample collection.
- Never sample near a running vehicle. Do not park vehicles in the immediate sample collection area (even non-running vehicles).
- Always wear clean, powder-free nitrile gloves when handling bottles, containers, and lids.
- Never touch the inside surface of a sample bottle or lid, even with gloved hands.
- Never allow the inner surface of a sample bottle or lid to be contacted by any material other than the sample water.
- Never allow any object or material to fall into or contact the collected sample water.
- Do not allow rainwater to drip from rain gear or other surfaces into sample bottles.
- Do not eat or drink during sample collection.
- Do not breathe, sneeze, or cough in the direction of an open sample bottle.

4.6.4 Grab Sample Collection

Manual grab sampling techniques will be used to collect samples whenever possible. A grab sample is an individual, discrete sample collected at one specific location at one point in time. Analysis of a grab sample provides a “snapshot” of water quality. Grab samples will not be composited. Samples may only be collected when discharge locations can be safely accessed.

Manual grab samples should be collected by direct filling of each individual sample bottle in the sample stream. Generally, samples will be collected at a location where flow is concentrated and is deep enough to easily fill each sample container. In some cases, overland sheet flow that is shallow may need to be sampled. For sheet flows, an intermediate container such as a second (unpreserved) sample bottle can be used to collect multiple sample aliquots to fill a single sample bottle. To collect shallow or sheet flows the intermediate container must be placed as close to the ground as possible without touching the ground. Samples from areas of sheet flow can be collected using the collection procedures shown in the video at http://www.youtube.com/watch?v=AmEJUNp44aU.

For collection of sheet flow samples using an intermediate container, an appropriate container or sample collection equipment must be used as specified in Section 4.6.2. Conventional sandbags and other unapproved devices to aid in sample collection may not be used as such materials may contaminate samples. Refer to Section 4.6.2 for a list of approved materials.

If an approved transfer container is used, keep sediment in suspension during transfer of each sample aliquot by swirling the transfer container. Otherwise, a portion of the sediment may settle out in the intermediate container and not be included in the sample that will be analyzed.

A grab pole can be employed to extend the sample bottle or container out or down into the flow. The pole is designed so the sample bottle or container can be attached to the end. An example grab pole is the Nasco® Swing Arm Sampler.

As described in Section 4.6.2, sample collection devices must be made of chemically resistant materials that will not affect the quality of the sample. It is important to evaluate each component used to collect a sample for possible sources of sample contamination. Intermediate containers or sampling devices cannot be used to collect samples for oil & grease or for bacterial analysis.

Water quality in stormwater runoff may vary both laterally and vertically throughout the cross-section of flow, and with time. For instance, floatable materials (oil, grease, light particles and debris, scum) may be present in significant amounts near the water surface, while heavier sediments are often concentrated near the bottom of the conveyance. Also, concentrations of some constituents may be higher in the first hour or two of runoff; this scenario is often referred to as a “first flush” effect. During a storm, rainfall intensity also may increase, raising runoff flow rates to the point where sediments are mobilized and scour occurs, resulting in temporarily higher concentrations of sediment and sediment-bound constituents.

For these reasons, the sampling location should be approached from downstream. Samples or field measurements must be collected facing upstream to avoid stirring up sediment or otherwise affecting the sample water. Sample bottles should be filled to the bottle shoulder. Where possible, grab samples should be collected by completely submerging the bottle or container below the surface of the water. This method will help avoid biasing the sample with too much floating material if the bottle mouth is kept at the surface. When submerging the bottle, avoid hitting the bottom of the conveyance, as this may disturb the sediment and impact the sample. If hitting the bottom cannot be avoided due to water depth, lower the bottle slowly into the water to minimize the disturbance.

When the sample bottle can be fully submerged, the bottle should be opened at the last possible moment and the lid screwed back on immediately after the sample is collected. The lid should be handled carefully during collection to avoid contaminating the inner lining. For sample bottles without preservatives, hold the lid around the rim and face it down. Do not touch the inside of the bottle or lid. The outside of the bottle must also be kept clean before sample collection.

Samples for pH and turbidity analyses may be collected in the same manner as grab samples, as described above. If flow depth is sufficient, and site conditions allow safe access, the pH and turbidity field meter probe may be inserted into the sample stream for direct measurement, without collection of grab samples for those analytes. In either case, analyze samples for pH immediately in the field, and in general, analyze samples for turbidity immediately in the field even through there is a 48-hour hold time for turbidity. Turbidity samples should be analyzed as

soon as possible so that NAL exceedance can be evaluated without delay and for determining if dewatering should be allowed.

4.6.5 Sample Preservation

All samples that will be sent to an analytical laboratory are kept on ice or refrigerated to 4 °C +/- 2 degrees from the time of sample collection until delivery to the analytical laboratory. The grab samples are placed in an ice chest filled with ice in the field immediately following collection. In addition to keeping the samples cool, it is also important to minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample, resulting in unreliable analytical results. Therefore, all samples are covered or placed in an ice chest with a closed lid immediately following collection.

Note that analyses for pH are to be performed in the field immediately following sample collection; therefore, these samples are not placed on ice. If turbidity is not analyzed in the field immediately upon collection, then the sample must be placed on ice up to the method hold time of 48 hours.

Sample bottles for some nutrients, metals, and some organics compounds may contain acid or other chemical preservatives. Laboratories clearly mark each bottle if it contains a preservative. Normally, the volume added is small, such as 1 or 2 milliliters, so the actual preservative may be hard to see. Do not rinse or over fill sample bottles that contain a preservative. Do not submerge these bottles in the flow. Overfilling the bottle may flush out the preservative or dilute it to the point where it will no longer be effective.

Be careful when handling bottles that contain acid. Spilling the acid can cause burns to the skin and eyes or damage clothes. Flush the area with water if an open bottle containing an acid preservative is accidentally spilled.

4.6.6 Laboratory Sample Delivery/Chain-of-Custody Forms

All samples must be kept on ice, or refrigerated, from the time of sample collection to the time of receipt by laboratory personnel. If samples are being shipped to the laboratory, place sample bottles inside coolers with ice (wet ice in Ziploc® bags or re-freezable ice packs); ensure the sample bottles are well packaged to prevent breakage, and secure cooler lids with packaging tape. It is imperative that all samples be delivered to the analytical laboratory and analysis begun within the maximum holding times specified by laboratory analytical methods (see Table 4-1). The holding times for water quality analyses range from six hours to one year. To minimize the risk of exceeding the holding times for bacteria (6 hours), biochemical oxygen demand (48 hours), and nutrients (48 hours), samples must be transferred to the analytical laboratory as soon as possible after sample collection. The field sampling and testing personnel must in such cases coordinate activities with the analytical laboratory to ensure that holding times can be met. Special arrangements for the laboratory to work during the weekend may be necessary.

Chain-of-custody for samples is to be filled out by the field sampling and testing personnel for all samples submitted to the analytical laboratory. The purpose of chain-of-custody forms is to keep a record of the transfer of sample custody and the requested analyses. Sample date and time, sample location, and analyses requested are noted on each chain-of-custody form.

Any special instructions for the laboratory should also be noted, such as specifications of laboratory QC requirements (e.g., laboratory duplicate samples and matrix spike/matrix spike duplicate [MS/MSD] samples; see Section 4.8).

Chain-of-custody forms should be checked by the WPC manager to ensure all analyses specified by the sampling plan are included. When chain-of-custody forms are reviewed immediately following a precipitation event, the WPC manager can address any field notes and notify the laboratory of additional analyses or provide necessary clarification. Copies of chain-of-custody forms are filed to the appropriate SWPPP File Category.

4.7 Field Measurements

Analysis of pH must be performed in the field by monitoring personnel using portable field meters immediately after sample collection. Analysis of turbidity is generally analyzed immediately but can be held up to a maximum of 48 hours until analysis. The measurements are made according to the test methods, detections limits, and reporting units specified in Table 4-2. Field measurements must be performed according to the manufacturer's specifications for the field measurement device employed. For pH, the meter will be equipped with a probe-mounted sensor. For turbidity, the meter may have either a probe-mounted sensor or require filling a cuvette or sample cell with a separate sample aliquot that is read by the turbidity meter. If required by RWQCB, other common field parameters may also be measured in the field, such as electrical conductivity, dissolved oxygen, and temperature.

Table 4-2. Test Methods, Reporting Limits, Reporting Units, and Applicable NALs and Receiving Water Monitoring Triggers

Parameter	Test Method/ Protocol	Discharge Type	Reporting Limit	Reporting Units	Maximum Holding Time	Numeric Action Level	Receiving Water Monitoring Trigger[2]
pH	Field test with calibrated portable instrument	Risk Levels 2 and 3	0.2[1]	pH units	15 minutes	Lower NAL = 6.5 Upper NAL = 8.5	Lower Trigger = 6.0 Upper Trigger = 9.0
Turbidity	Field test with calibrated portable instrument	Risk Levels 2 and 3	1	NTU	48 hours	250 NTU	500 NTU

Table Footnotes

1 Measured on a scale of 0-14; must be able to read within +/- 0.2 pH units.

2 For Risk Level 3 projects with direct discharge to receiving water only.

Field measurements may be made by inserting the probe directly into the sample stream, or by using a clean container to collect a sample for measurement. When site conditions require collection of a sample for field measurement, a clean laboratory sample bottle may be used at each site to avoid cross contamination. Field measurements are made immediately, under ambient temperatures, without placing the samples on ice. The United States Environmental Protection Agency (EPA) requires pH measurements to be performed within 15 minutes of sample collection. The field meter probes must be thoroughly rinsed in the field after each measurement using deionized or distilled water. Deionized or distilled water can be carried into the field and applied using a plastic squirt bottle dedicated to the purpose.

The pH is a measure of the acid/base condition of water, and technically represents the negative logarithm of the hydrogen ion concentration. It is measured on a scale of 0-14 pH units, where pH below 7 is acidic, 7 is neutral, and above 7 is basic or alkaline.

Field measurement of pH should be performed using a portable meter equipped with a glass electrode in which the electrolyte solution can be replaced. Such electrodes provide more reliable measurement of surface water pH than plastic, gel-filled electrodes, and the replaceable electrolyte allows for maintenance to ensure long-term reliability. Because the accuracy of field pH measurement depends principally upon the condition of the electrode, the probe must be scrupulously maintained according to manufacturer specifications. Note that glass electrodes are fragile and care must be taken not to break the electrode in the field.

Turbidity is a measure of the cloudiness of water, or, more accurately, the degree to which a water sample scatters light at a 90° angle because of the presence of suspended matter. The most common cause of turbidity in stormwater is suspended sediment, although other materials such as phytoplankton and algae can also contribute to the turbidity of a stormwater sample.

The instrument used to analyze turbidity is called a nephelometer; the units of a turbidity measurement are nephelometer turbidity units (NTUs). Nephelometers are commonly referred to as turbidimeters.

When using a turbidity meter that does not have a probe-based sensor, a turbidity sample is poured into a clean cuvette or sample cell and placed into the meter. The meter is activated and light is shined through the sample. The meter then measures light scatter within the sample, and computes turbidity in NTUs.

Field meters must be calibrated and maintained according to manufacturer's specifications to ensure accurate measurements. Calibration records for pH and turbidity must be reported on Stormwater Sample Field Test Report form (DOT CEM-2052SW). Calibration records for specialty meters must be documented as described in Appendix A (A11.3).

4.8 Laboratory Analysis

Laboratory analyses must be conducted according to test procedures approved by EPA under 40 CFR Part 136, unless other test procedures have been specified in the CGP or by RWQCB. Except for field analysis for turbidity and pH, and any other parameters for which field analysis is specified, all samples should be sent to laboratories that are certified for all the analyses they perform, where applicable. Laboratories will be certified under either the California Environmental Laboratory Certification Program (ELAP) or the National Environmental Laboratory Certification Program (NELAP).

All testing laboratories must receive samples within 48 hours of sample collection unless otherwise required by the laboratory or EPA protocols (e.g., bacteria samples must be delivered to the laboratory within six hours of sample collection), and samples must be collected only in appropriate sample containers as provided by the laboratory.

When the project includes requirements for analysis of samples by analytical laboratories, several steps must be undertaken to make the necessary arrangements with the laboratories, and to ensure the laboratories are prepared for monitoring events. The following topics are discussed below:

- Laboratory selection and contracting
- Pre-sampling preparations
- Analytical methods, including holding times and reporting limit (RL) requirements
- Laboratory data package deliverables

4.8.1 Laboratory Selection and Contracting

Important considerations in selecting an analytical laboratory include location, past performance, ability to meet analytical RLs, ability to meet all analytical holding times, laboratory report turnaround time, and experience with stormwater and other types of samples that will be generated by the monitoring program.

ELAP and/or NELAP certification is required for laboratory analytical work. A list of state-certified laboratories that are ELAP approved is available online: https://www.waterboards.ca.gov/drinking_water/certlic/labs/documents/AllELAPCertifiedLabs.pdf.

NELAP approved laboratories in the state of California can also be found online: https://lams.nelac-institute.org/Search.

4.8.2 Pre-Sampling Preparations

The analytical laboratory will be involved in a number of activities prior to the actual analysis of samples, including:

- Determination of key laboratory performance requirements (e.g., analytical methods, maximum RLs, and turnaround times) for analytical services contract.
- Discussion of the data quality evaluation procedures, QC sample schedule/frequency, and QC sample volumes.
- Providing clean sample containers, blank water, and other equipment/support as needed.
- Coordination with field sampling and testing personnel prior to each anticipated storm-based monitoring event, including number of samples anticipated, approximate date and time of sampling and sample delivery (if known), and when sample containers will be required.

4.8.3 Analytical Methods

Samples typically will be analyzed for one or more of the constituents presented in Table 4-1. Required analytical method, sample bottle type, target RL, volume required for analysis, sample preservation, and maximum holding time are presented for each analyte in Table 4-1.

The recommended analytical methods shown in Table 4-1 are specified by EPA in 40 CFR 136 and described either in *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, 2023) or in the listed EPA method.

Samples must be analyzed within established holding times to ensure reliability and validity of the results. Maximum acceptable holding times are method-specified for various analytical methods. The holding time starts for each individual grab sample when it is collected, and the

time is counted until analysis of the sample. If a sample is not analyzed within the designated holding times, the analytical results may be suspect. Prompt analysis also allows the laboratory time to review the data and, if analytical problems are found, reanalyze the affected samples.

The RL is the minimum concentration at which the analytical laboratory can reliably report detectable values. The RL varies by analyte and can vary by laboratory. It is important to ensure the RLs produced for the project are low enough to provide useful results.

4.8.4 Laboratory Data Package Deliverables

As a part of the laboratory contract, the data package to be delivered to the contractor and the timing of its delivery (turnaround time) should be defined. The data package should be delivered both in hard copy, where applicable, and electronic copy (typically by email or rigid media like a thumb drive).

The hard copy data package will be a report (also known as “lab report”) that should include a narrative that outlines any problems, corrections, anomalies, and conclusions, as well as completed chain-of-custody documentation. A summary of the following QA/QC elements must be in the data package: sample analysis dates, RLs, results of method blanks, summary of analytical accuracy (MS recoveries, blank spike recoveries, surrogate compound recoveries), and summary of analytical precision (comparison of laboratory split results and MSD results, expressed as relative percent difference [RPD]). Because the laboratory must keep the backup documentation (raw data) for all data packages, raw data (often called Contract Laboratory Program Level IV data packages) should not be requested.

In addition to the hard copy data report, an electronic copy of the data can be requested from the laboratory. The electronic copy includes all the information found in the hard copy data package. These results should be reported in a standardized electronic format (typically Adobe Portable Document Format [PDF]). The electronic copy should also include the data in a spreadsheet file that is in California Environmental Data Exchange Network (CEDEN) chemistry format. CEDEN data file templates and information about them can be found at http://ceden.org/ceden_datatemplates.shtml.

Common turnaround times for laboratory data packages are two to three weeks for emailed (PDF format) data, and three weeks to 30 days for hard copy and electronic copy. Receiving the faxed or emailed data quickly allows an early data review to identify any problems that may be corrected through sample reanalysis.

4.9 QA/QC – Field Measurements

The quality of analytical data is dependent on the ways in which samples are collected, handled, and analyzed. For field measurements, QA/QC measures pertaining to field testing that should be included in the CSMP include:

- Daily calibration of field meters prior to use during each monitoring event
- Maintenance of field meters – especially probes
- Thorough rinsing of probes between measurements
- Field duplicates of field measurements

Daily calibration of field meters (prior to any monitoring event) is an essential part of QA/QC for field measurements (see details in Section 4.7).

Proper maintenance of field equipment—particularly probes—is essential. Follow the manufacturer's specifications for maintenance; replace probes as needed.

The field meter probes must be thoroughly rinsed in the field after each measurement, using laboratory-supplied, reagent grade, deionized water. Deionized water can be carried into the field and applied using a plastic squirt bottle dedicated to the purpose.

4.9.1 Duplicate Field Measurements

To verify the precision of field measurements, duplicate measurements must be conducted in the field on not less than 1 in every 20 samples. The duplicate measurements should be performed in rapid succession in the field, from duplicate samples collected side-by-side or in rapid succession from the same spot. If the measurement is made by inserting the probe into the discharge flow, the duplicate measurements should be made in rapid succession. After recording the initial result, withdraw the probe following the first measurement, and then immediately reinsert the probe into the same spot for the duplicate measurement.

In contrast to field duplicate samples collected for laboratory analysis (see Section 4.10.1), which must be sent in to the laboratory "blind" (i.e., labeled to appear to be regular samples), both replicates for field measurements can be done by the same personnel, and are generally not done as a "blind" test (i.e., the same personnel may perform and observe both measurements).

The results of the field duplicates should be reported on the Stormwater Sample Field Test Report form (DOT CEM-2052SW). The RPD between each pair of duplicate measurements must then be calculated and compared to the data quality objectives as specified in the CSMP (see Section 4.11.1).

4.10 QA/QC – Laboratory Analysis

The quality of analytical data is dependent on the ways in which samples are collected, handled, and analyzed. Various procedures discussed above, such as clean sampling techniques and documentation (i.e., forms) are essential elements in the overall QA/QC effort. Additional measures pertaining to samples submitted for laboratory testing should be included in the CSMP to maximize the data's quality and usefulness, as described in this section. The information presented in this section was adapted from Section 11 of the Caltrans *Stormwater Monitoring Guidance Manual* (Caltrans, 2022).

Improved control of laboratory data quality is achieved by incorporating the following elements within the sample collection effort:

- Duplicate samples
- Blank samples
- MS/MDS samples
- QC sample schedule

Each of these types of samples and the relevant responsibilities of monitoring field personnel are described below, followed by a discussion of recommended minimum frequencies for the

various types of QC samples. The results of the field QC samples are then used to evaluate the quality of the reported data (data evaluation is discussed in Section 4.11).

4.10.1 Duplicate Samples

Analytical precision is a measure of the reproducibility of data and is assessed by analyzing two samples that are presumed to be identical. Any significant differences between the samples indicate an unaccounted-for factor or a source of bias. There are typically two types of duplicate samples that require special sampling considerations: field duplicates and laboratory duplicates.

Field Duplicate Samples

Field duplicates are used to assess variability attributable to sample collection procedures. For grab samples, duplicate samples are collected by simultaneously or sequentially (in rapid succession) filling two grab sample bottles at the same location. If intermediate containers are used, first pour an incremental amount into one sample bottle, and then pour a similar amount into the second. Continue going back and forth until both bottles are full.

For laboratory analyses, the field duplicate sample should be submitted to the laboratory “blind” (i.e., not identified as QC sample, but labeled as if it were a normal sample that uses “05” for the Type portion of the sample identification code).

A field duplicate sample should be analyzed once for every 20 samples collected from a project site, or one duplicate sample per project site annually, whichever is more frequent.

Laboratory Duplicate Samples

Laboratory duplicates (also called laboratory splits) are used to assess the precision of the analytical method and laboratory sample handling. For the laboratory duplicate analysis, the analytical laboratory will split one sample into two portions and analyze each one.

Laboratory duplicate samples are initiated by the laboratory. They will request extra sample water for these analyzes. When collecting samples to be analyzed for laboratory duplicates, typically double the normal sample volume is required. This effort requires filling a larger size sample bottle, or filling two normal size sample bottles that are both labeled with the sample identification code plus labeling one with "Bottle 1 of 2” and the second with "Bottle 2 of 2.”

4.10.2 Blank Samples

Potential sample contamination is assessed using blank samples. Blanks are prepared to identify potential sample contamination occurring during field collection, handling, shipment, storage, and laboratory handling and analysis. Blanks are evaluated during various stages of the sampling and analytical process to determine the level of contamination, if any, introduced at each step. The collection and uses of the types of blank samples associated with typical stormwater monitoring field procedures are described below.

“Blank water” refers to contaminant-free, reagent-grade water provided by the laboratory performing the environmental and blank analyses. Typically, this water is the laboratory’s reagent water that is used in the analytical or cleaning processes, as well as for the lab’s internal method blanks. The analytical laboratory should provide the blank water used for equipment and field blanks.

Equipment Blanks

Equipment blank samples are prepared as required by the analytical method of each target analyte and when sample collection equipment is involved (i.e., when the sample bottles are not filled by direct submersion). In these cases, before using sampling equipment for sample collection activities, blanks should be collected to verify that the equipment is not a source of sample contamination. To account for any contamination introduced by sampling equipment or intermediate containers, equipment blanks are prepared by using the equipment to fill a clean container with blank water. The concentrations of the specific parameters of concern are then measured. These blanks may be submitted "blind" to the laboratory by field personnel or prepared internally by the laboratory.

Collection of equipment blanks from intermediate sample containers may not be required if certified pre-cleaned bottles are used as the intermediate sample containers. The manufacturer can provide certification forms that document the concentration to which the bottles are "contaminant-free." These concentrations should be equivalent to or less than the program RLs. If the certification level is above the program RLs, 2% of the bottles in a "lot" or "batch" should be blanked at the program detection limits with a minimum frequency of one bottle per batch.

Field Blanks

Field blanks are prepared as required by the analytical method of each target analyte. Field blanks are necessary to evaluate whether contamination is introduced during field sampling activities.

Field blanks are prepared by the field crew, under normal sample collection conditions, at some time during the collection of normal samples. Field blanks are prepared by transporting a container of laboratory-provided blank water into the field and processing the water through the same procedures used for sample collection. For samples collected by direct submersion, grab sample field blanks should be prepared by pouring a sample directly from the bottle of blank water into the grab sample containers in the field. When intermediate containers or equipment are used, field blanks should be collected using clean intermediate containers or other clean equipment with laboratory-supplied blank water in the same manner as normal sample collection. The filled blank sample bottles should be sealed, placed on ice, and sent to the laboratory to be analyzed for the required constituents.

As with field duplicate samples, field blank samples should be submitted to the laboratory "blind" (i.e., not identified as a QC sample, but labeled as if it were a normal sample that uses "09" for the Type portion in the sample identification code).

Field blanks should be collected at a frequency of no less than once per year per project site, or once every 20 samples at a given site annually, whichever is more frequent. Additional blanks should be collected when there is a change in field personnel, equipment, or procedures.

Trip Blanks

Otherwise known as travel blanks, trip blanks are used only when samples are being collected for laboratory analysis for conventional parameters, nutrients, synthetic organic compounds, semi-volatile organic compounds, and volatile organic compounds and are required by the analytical method. Trip blanks are used to determine whether sample contamination is introduced during sample transportation and delivery. Trip blanks are prepared at the analytical laboratory, by filling the sample bottle with blank water and securing the bottle lid. Trip blanks

are transported unopened to and from the sampling location along with normal sample bottles. Trip blanks are analyzed like normal samples.

Method Blanks

For each batch of samples, method blanks (also called control blanks) are typically run by the laboratory to determine the level of contamination associated with laboratory reagents and glassware. The laboratory prepares method blanks using laboratory reagent-grade blank water. Results of the method blank analysis should be reported with the sample results. At a minimum, the laboratory should report method blanks at a frequency of 5% (one method blank with each batch of up to 20 samples).

4.10.3 Laboratory Matrix Spike (MS) and MSD (MS Duplicate) Analyses

MS and MSD analyses are typically used only when samples are being collected for trace metals, nutrients, and trace organics analysis. MS/MSD analyses are used to assess the accuracy (MS, MSD) and precision (MSD) of the analytical methods in the sample matrix. The analytical laboratory prepares MS samples by splitting off three aliquots of the environmental sample and adding known amounts of target analytes to two of the three environmental sample aliquots. The results of the analysis of the unspiked environmental sample are compared to the MS analysis results, and “percent recovery” of each spike is calculated to determine the accuracy of the analysis. The results of the two MS analyses are compared to calculate RPD as an additional measure of analytical precision.

When collecting samples to be specified for MS/MSD analysis, typically triple the normal sample volume is required. This effort will require filling a larger size sample bottle, or filling three normal size sample bottles, labeling each with the sample identification code. With one bottle, add “Bottle 1 of 3” to the label. The other two should be labeled with the sample identification code and either “Bottle 2 of 3” or “Bottle 3 of 3”, in no particular order. MS/MSD samples are collected, handled, and delivered to the analytical laboratory in the same manner as other environmental samples. Analytical laboratories often will perform MS/MSD analyses at no charge on a specified sample when a certain minimum number of samples are submitted for analysis.

Enough extra sample volume for the laboratory to create MS/MSD samples should be collected once every 20 samples collected at a given project site, or once annually per project site, whichever is more frequent. Unlike laboratory duplicate samples, you must request that MS/MSD samples be analyzed to meet field QC sample frequency requirements. As such, the chain-of-custody that lists the sample should include a statement to the effect that an MS/MSD sample is to be created and analyzed by the laboratory from the extra sample water collected for this purpose.

4.10.4 QC Sample Schedule

Table 4-3 summarizes the minimum frequencies of QC sample collection/preparation for the Caltrans stormwater monitoring programs. These frequencies are minimal and may be increased depending on the nature and objectives of the study being undertaken, or if QA/QC problems (e.g., contamination) are discovered.

Table 4-3. Recommended Frequencies for Collecting Field QC Samples [1]

Repeated Field Measurements	Field Blank	Field Duplicate	Matrix Spike/Dup	Equipment Blank	Travel Blank
Two per trip [2]	One per every 20 samples collected per project, or at least once per project.	One per every 20 samples collected per project, or at least once per project.	One per every 20 samples collected per project, or at least once per project.	One per each batch of equipment cleaned by the laboratory, or when new equipment is deployed	One per event at each location where samples are collected for volatile organic compounds or low-level metals. Travel blanks should be held by the laboratory and not analyzed unless directed to do so by the consultant

Table Footnotes

1 Derived from the Caltrans *Stormwater Monitoring Guidance Manual* (Caltrans, 2020) and the SWAMP Field Measurements for In-Situ Water Quality Monitoring in Fresh and Marine Water (https://www.waterboards.ca.gov/water_issues/programs/swamp/docs/mqo/field_measurements_for_in-situ_fresh_and_marine_water.pdf).

2 Repeat a field measurement at least twice by removing the probe from the water, re-submerging the probe and allowing the probe to stabilize. After the instrument stabilizes, record the reading and calculate the RPD between the readings. If the RPD exceeds the measurement quality objectives (MQO), perform the test again to ensure that the required stabilization period is adhered to. If the instrument continues to provide measurements that exceed the MQO, the instrument must be re-calibrated.

A QC sample schedule should be developed, included in the CSMP, and followed closely by field personnel. The project QC sample schedule should meet the minimum QC sample frequency criteria each year over the term of the project.

4.11 Data Management

4.11.1 Field Data Screening and Validation

When the field data sheets are received following each sampling event, it is important for the WPC manager to check the reported data as soon as possible to identify any errors committed in sampling or reporting, as well as exceedance of NALs, Receiving Water Monitoring Triggers (for Risk Level 3 sites with direct discharge to receiving water), and NELs (for ATS). The initial screening includes the following checks:

- Completeness. The field sheets should be checked to ensure all field tests and measurements specified in the CSMP were performed, including the requested QA/QC analyses.
- Labeling Errors. On occasion, field personnel commit errors on sample labels, field log forms, or chain-of-custody forms. Reported values that appear out of range or inconsistent are indicators of potential field reporting or equipment problems and should be investigated when detected.
- Irregularities found in the initial screening should immediately be reported to the monitoring field crew for clarification or correction. This process can identify and correct errors that would otherwise cause problems further along in the data evaluation process, or in subsequent uses of the data for higher-level analysis.

Field QA/QC parameters that should be reviewed are classified into the following categories:

Precision (analysis of duplicate field measurements)

The RPD between the initial result and the duplicate result is calculated to evaluate differences in duplicate results for pH or turbidity. See Section 4.12.2 for detailed information on calculating RPD. A duplicate measurement RPD of +/- 10% or greater indicates an unacceptable level of difference between the two measurements.

Field measurement duplicate results exceeding 10% RPD may indicate either inconsistent sample collection/measurement, or highly variable discharge quality. The duplicate measurements should be repeated with new samples, with special care taken to collect consistent duplicate samples.

Accuracy (field meter calibration)

For all field meters, record the results on Storm Event Sampling or Receiving Water Monitoring Report (DOT CEM-2052SW).

Evaluation of QA/QC Results

Each of these field measurement QA/QC parameters should be compared to the data quality objectives established for the study. The key steps in the analysis of each of these field QA/QC parameters are as follows:

- Compile a complete set of the QA/QC results for the parameter being analyzed
- Compare the field QA/QC results to accepted criteria
- Compile any out-of-range values and report them to the monitoring crew for verification
- Attach appropriate qualifiers to data that do not meet QA/QC acceptance criteria
- Prepare a report that tabulates the success rate for each QA/QC parameter analyzed

4.11.2 Laboratory Data Package Review

Laboratory Data Screening

When the laboratory reports are received following each sampling event, it is important to check the reported data as soon as possible to identify errors committed in sampling, analysis, or reporting. The laboratory must report results in a timely fashion (as defined in the contractor's contract with the laboratory and in compliance with the Caltrans contract) and the results then must be reviewed immediately upon receipt. This review may allow for reanalysis of questionable (out-of-range) results within the prescribed holding times. The initial screening includes the following checks:

- **Completeness.** The chain-of-custody forms should be checked to ensure all laboratory analyses specified in the CSMP were requested. The laboratory reports should also be checked to ensure all laboratory analyses are performed as specified on the chain-of-custody forms, including the requested QA/QC analyses.
- **Holding Times.** The laboratory reports should be checked to verify that all analyses were performed within the prescribed holding times.
- **Reporting Limits.** The reported analytical limits should meet or be lower than the levels agreed upon prior to laboratory submission.

- **Reporting Errors.** On occasion, laboratories commit typographical errors or send incomplete results. Reported concentrations that appear out of range or inconsistent are indicators of potential laboratory reporting problems and should be investigated when detected. Examples of this would be a reported value that is an order of magnitude different than levels reported for the same constituent for other events.

Irregularities found in the initial screening should immediately be reported to the laboratory for clarification or correction. This process can identify and correct errors that would otherwise cause problems further along in the data evaluation process, or in subsequent uses of the data for higher-level analysis. When appropriate, reanalysis of out-of-range values can increase confidence in the integrity of questionable data.

Laboratory Data Validation

The data quality evaluation process is structured to provide checks to ensure that the reported data accurately represented the concentrations of constituents present in water quality samples. Data evaluation can often identify sources of contamination in the sampling and analytical processes, as well as detect deficiencies in the laboratory analyses or errors in data reporting. Data quality evaluation allows monitoring data to be used in the proper context with the appropriate level of confidence.

QA/QC parameters that should be reviewed are classified into the following categories:

- Contamination check results (method, field, and equipment blanks)
- Precision analysis results (laboratory, field, and MSDs)
- Accuracy analysis results (MSs and laboratory control samples)

Each of these QA/QC parameters should be compared to the data quality objectives listed in Table 4-2. The key steps in the analysis of each of these QA/QC parameters are as follows:

- Compile a complete set of the QA/QC results for the parameter being analyzed
- Compare the laboratory QA/QC results to accepted criteria
- Compile any out-of-range values and report them to the laboratory for verification
- Attach appropriate qualifiers to data that do not meet QA/QC acceptance criteria
- Prepare a report that tabulates the success rate for each QA/QC parameter analyzed

Refer to Chapter 13 of the Caltrans *Stormwater Monitoring Guidance Manual* (Caltrans, 2022) for specific direction for evaluating the results of contamination, accuracy, and precision checks, and on qualifying data that do not meet data quality objectives.

Table 4-4. Control Limits for Precision and Accuracy for Water Samples

Constituent [1]	Maximum Allowable RPD	Recovery Lower Limit [2]	Recovery Upper Limit [2]
VOCs – Solvents	25%	50% [3]	150% [3]
SVOCs	25%	50% [3]	150% [3]
Synthetic Organic Compounds (e.g., pesticides)	25%	50% [3]	150% [3]
TDS	25%	80%	120%
BOD	25%	80%	120%
Total Phosphorus	25%	80%	120%
NH_3-N	25%	80%	120%
NO_3-N	25%	80%	120%
Alkalinity	25%	80%	120%
Phosphate	25%	80%	120%
Metals	25%	75%	125%
Coliform bacteria	N/A	N/A	N/A
pH	10%	N/A	N/A
Turbidity	10%	N/A	N/A

Table Footnotes

1 Refer to the SWAMP Measurement Quality Objectives for unlisted constituents (https://www.waterboards.ca.gov/water_issues/programs/swamp/mqo.html)

2 Recovery, lower and upper limits, refers to analysis of spiked samples

3 Based on historical laboratory control limits (average ± 3SD)

Acronyms Found in Table

BOD = biochemical oxygen demand
N/A = not applicable
NH_3-N = ammonia nitrogen
NO_3-N = nitrate nitrogen
RPD = relative percent difference between duplicate analyses
TDS = total dissolved solids
VOC = volatile organic compounds VOC/SVOC = volatile/semi-volatile organic compounds

4.12 Data Evaluation

4.12.1 Calculating Relative Percent Difference

The RPD is calculated using the following formula:

$$RPD = \frac{100 \times (Sample\ result\ A - Sample\ result\ B)}{\left(\frac{Sample\ result\ A + Sample\ result\ B}{2}\right)}$$

where Sample result A is greater than Sampler result B[13].

For example, a sample and a duplicate sample were collected for a project site with total dissolved solids results of 260 and 300, respectively. The RPD would be calculated by taking the positive difference between the results, dividing this by the calculated mean of the results, and multiplying by 100 (i.e., 100 x (300-260))/([300+260]/2)), resulting in a percent difference of 14.3%. This would be an acceptable RPD.

[13] This always makes the RPD a positive number.

Note that pH is defined as the negative log (base ten) of the hydrogen (or hydronium) ion concentration, represented by the following equation: pH = -log10[H+]. Calculating the percent difference for pH results, therefore, requires taking the antilog (inverse of each negative pH value) prior to calculating the RPD. On the log scale, a difference of 25% corresponds to a difference of just over 0.1 pH unit. Therefore, duplicate pH measurements may be simply compared directly; a difference greater than 0.1 pH units is considered an unacceptable level of difference.

RPD should not be calculated from any results reported as “non-detect” or less than the RL. In these cases, the RPD should be reported as “Not Calculable.”

4.12.2 Monitoring and Reporting Run-On

Run-on from surrounding areas must be monitored and reported if there is reason to believe run-on may contribute to an exceedance of NALs or Receiving Water Monitoring Triggers. To determine if the source of an observed exceedance is run-on to the construction site, the levels of pH, turbidity from run-on samples should be evaluated. High levels will indicate that the sources outside of the construction site may be contributing to the measured pH level or sediment load. Identification of adjacent landowner discharges and implementation of other BMP measures should be the first steps taken to remove pollutants from run-on or eliminate unauthorized discharges from run-on.

Inspect the site perimeter for evidence of run-on flowing onto the site from outside areas. Existing drainage channels (large and small) and their flow paths through the construction site should be noted. Non-stormwater run-on could be caused by a forest fire or any other natural disaster or could be from authorized or unauthorized discharges from an adjacent property.

4.12.3 Assessing the Need for Corrective Measures

If an NAL exceedance occurs, the project site should be evaluated to determine the cause or source of the exceedance. Runoff patterns should be examined to determine whether the exceedance is due to run-on or a failed, missing, or poorly maintained BMP. Information gathered from the site inspection will be used to identify the source(s). The following list are potential conditions or areas on a construction site that may cause sediment, silt, and/or turbidity in runoff:

- Exposed soil areas with inadequate erosion control measures
- Active grading areas
- Poorly stabilized slopes
- Lack of perimeter sediment controls
- Areas of concentrated flow on unprotected soils
- Poorly maintained erosion and sediment control BMP
- Unprotected soil stockpile
- Failure of an erosion or sediment control BMP

Document on the Stormwater Site Inspection Report form (DOT CEM-2030SW) any instances where the discharge flow path crosses one or more of the conditions or areas listed above. If any one of these conditions and areas is found during the inspections, their presence should be documented, preferably with GPS coordinates and photographs.

Section 5
Non-Visible Pollutants Monitoring

5.1 Permit Requirements

Non-visible pollutant sampling and analysis must be conducted when there is evidence of a pollutant release (due to a BMP breach, failure, malfunction, leakage, or spill) that is not visually detectable in stormwater discharges, or if there is a release of substances which could cause or contribute to an exceedance of water quality objectives or standards in the receiving waters if discharged during a storm event. This may be due to a failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction. Non-visible pollutant monitoring is only required when a storm event producing a discharge occurs during project working hours.

5.2 What and When to Monitor

Sample collection for non-visible pollutant(s) is required only:

- During a storm event when pollutants associated with construction activities may be discharged with stormwater runoff in the event of a BMP breach, failure, malfunction, leak or spill.
- When a non-visible pollutant is identified as a potential discharge and is known to be from construction activities and/or materials.
- When there has been a failure to adequately clean an area of material and pollutants and implement appropriate BMPs prior to the storm event.
- When a storm event produces runoff during project working hours.

Samples must be collected and analyzed as follows:

- Collect one grab sample of the discharge from all locations that meet the criteria above and that can be safely accessed within the first eight hours of discharge occurring during project working hours. Discharges from a project site can occur any time during a storm event but may not occur for some time after the start of the rain. Therefore, the site will need to be monitored throughout the day when rain is falling. Continue to collect at least one grab sample from all locations for each 24-hour period that there is a discharge, until the necessary corrective actions are completed to control further discharge of the pollutant.
- Collect one grab sample of stormwater that has not come in contact with the disturbed soil or the materials stored or used onsite (uncontaminated sample) within the first 8 hours of discharge.
- Collect the appropriate number and type of QA/QC samples (see Section 4.10).
- Analyze the discharge samples and uncontaminated samples for all non-visible pollutant parameters that were identified in the pollutant source assessment conducted as part of

the SWPPP, and that could be discharged into surface waters based on the last visual inspection.

Conditions Triggering Sampling

The SWPPP pollutant source assessment may identify areas within the project site that require monitoring to be performed, if the area is exposed to stormwater that produces a discharge during project working hours, and pollutant(s) could be discharged into surface waters. Construction activities or BMP failures that may trigger sampling include:

- The use and application of certain products, if application occurred during a storm event or within 24 hours preceding a storm event, and the products are exposed to stormwater that produces a discharge during project working hours. Examples include methyl methacrylate concrete sealant applied to bridge decks; solvents that have been used to clean equipment; fertilizers, herbicides, or pesticides applied for landscaping; or soil amendments, including soil stabilization products, with the potential to alter pH levels or contribute toxic pollutants to stormwater runoff.
- Materials or wastes containing potential non-visible pollutants not stored under watertight conditions. Examples include the storage of lead-contaminated soils without plastic covers, or pressure-treated wood in stockpiles without plastic covers.
- Materials or wastes containing potential non-visible pollutants stored under watertight conditions, but (a) a breach, leakage, malfunction, or spill is observed; and (b) the leak or spill has not been cleaned up prior to the rain event producing discharge; and (c) there is the potential for discharge of non-visible pollutants to surface waters or drainage system during the storm event.

Sampling and analysis is not required under the following conditions:

- Where a construction project is self-contained and does not allow any contaminated runoff to exit the site. This project might qualify for a Notice of Non-Applicability (NONA) (SWRCB, 2024).
- Where construction materials and compounds are kept or used so they never come in contact with stormwater (in water-tight containers, under a water-tight roof, inside a building, etc.).
- Where, for specific materials, the BMPs implemented at the construction site fully contain the exposed pollutants (e.g., bermed concrete washout area).
- For building or landscape materials that are in their final constructed form or are designed for exposure (fence materials, guardrails, painted structures, support structures and equipment that will remain exposed at the completion of the project, etc.).
- Where pollutants may have been spilled or released onsite, but have been properly cleaned up and stormwater exposure has been eliminated prior to a rain event.
- When the rain event discharge occurs outside of project working hours or does not produce a discharge.
- For a project site where no potential pollutants were identified.

- For a project site where the last visual inspection does not identify any breach, malfunction, leakage, or spill.

Sample Analysis

Samples must be analyzed for the non-visible pollutant parameters identified in the SWPPP pollutant source assessment that are suspected to be present in a discharge, including applicable TMDL-specific pollutants for the local watershed. Construction material inventories and the project SWPPP provide information on materials currently in use or proposed for use on the construction site. Table 5-1 lists common materials used at construction sites that can contaminate runoff with non-visible pollutants, their potential pollutants, and water quality indicators. This list is not meant to be inclusive but to provide information to the QSD and WPC manager. Table 5-2 includes Non-Visible TMDL Pollutant Testing Guidance to be used if a project is in a TMDL watershed and the pollutant assessment identifies the constituent as being available or used as part of project operations. This is to be documented in Section 300 of the SWPPP.

For some construction materials, the pollutant parameter will be the compound itself. For example, if the pesticide malathion is used on the site, samples of runoff will be analyzed specifically for the malathion concentration. For sites contaminated by historic practices, runoff samples are typically analyzed for specific compounds known to be historical contaminants. For other materials, an associated indicator will be measured. In the case of general masonry products, their potential impact on water quality involves alteration of the pH level. Some potential pollutants are visually observable and do not require testing (i.e., petroleum products including gasoline, diesel, and lubricants; colored paints; sand, gravel, or topsoil; asphalt cold mix; Portland cement; antifreeze).

Table 4-1 includes sample collection and analysis methods for typical non-visible pollutants. Some of the indicators potentially can be analyzed in the field (i.e., pH, residual chlorine, total dissolved solids); others require analysis in laboratories. It is important that the method of measurement be consistent during each sampling event and throughout the program to maximize the comparability of the various samples. Samples analyzed by different methods cannot be easily compared.

Table 5-1. Pollutant Testing Guidance Table[1]

Construction Site Material	Visually Observable?	Pollutant Indicators[2]	Suggested Analyses Field[3]
Asphalt Products			
Hot Asphalt	Yes, rainbow surface or brown suspension	Visually observable, no testing required	
Asphalt Emulsion	Yes, rainbow surface or brown suspension	Visually observable, no testing required	
Liquid Asphalt (tack coat)	Yes, rainbow surface or brown suspension	Visually observable, no testing required	
Cold Mix	Yes, rainbow surface or brown suspension	Visually observable, no testing required	
Crumb Rubber	Yes, black, solid material	Visually observable, no testing required	
Asphalt Concrete (any type)	Yes, rainbow surface or brown suspension	Visually observable, no testing required	
Cleaning Products			
Acids	No	pH, Acidity, Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH meter
Bleaches	No	Residual Chlorine	Chlorine test kit
Detergents	Yes, foam	Visually observable, no testing required	Chlorine test kit
TSP	No	Phosphate	None
Solvents	No	VOC	None
Solvents		SVOC	None
Portland Concrete Cement and Masonry Products			
Portland Cement (PCC)	Yes, milky liquid	Visually observable, no testing required	None
Masonry products	No	pH	pH meter
Masonry products	No	Alkalinity	pH meter
Sealant (Methyl Methacrylate)	No	Methyl Methacrylate	None
Sealant (Methyl Methacrylate)	No	Cobalt	None
Sealant (Methyl Methacrylate)	No	Zinc	None
Incinerator Bottom Ash, Bottom Ash Steel Slag, Foundry Sand Fly Ash, Municipal Solid Waste	No	Aluminum Calcium Vanadium Zinc	None
Mortar	Yes, milky liquid	Visually observable, no testing required	None
Concrete Rinse Water	Yes, milky liquid	Visually observable, no testing required	None
Non-Pigmented Curing Compounds	No	Acidity	pH meter
Non-Pigmented Curing Compounds	No	Alkalinity	pH meter
Non-Pigmented Curing Compounds	No	pH	pH meter
Non-Pigmented Curing Compounds	No	VOC	pH meter
Non-Pigmented Curing Compounds	No	SVOC	pH meter
Landscaping and Other Products			
Aluminum Sulfate	No	Aluminum	TDS meter
Aluminum Sulfate	No	TDS	TDS meter
Aluminum Sulfate	No	Sulfate	TDS meter
Sulfur – Elemental	No	Sulfate	None

Table 5-1. Pollutant Testing Guidance Table[1]

Construction Site Material	Visually Observable?	Pollutant Indicators[2]	Suggested Analyses Field[3]
Fertilizers – Inorganic[4]	No	Nitrate	None
Fertilizers – Inorganic[4]	No	Phosphate	None
Fertilizers – Inorganic[4]	No	Organic Nitrogen	None
Fertilizers – Inorganic[4]	No	Potassium	None
Fertilizers – Organic	No	TOC	None
Fertilizers – Organic	No	Nitrate	None
Fertilizers – Organic	No	Organic Nitrogen	None
Fertilizers – Organic	No	COD	None
Natural Earth (Sand, Gravel, and Topsoil)	Yes, cloudiness and turbidity	Visually observable, no testing required	None
Herbicide	No	Herbicide	None
Pesticide	No	Pesticide	None
Lime	No	Alkalinity	pH meter
Lime	No	pH	pH meter
Painting Products			
Paint	Yes	Visually observable, no testing required	
Paint Strippers	No	VOC	None
Paint Strippers	No	SVOC	None
Resins	No	COD	None
Resins	No	SVOC	None
Sealants	No	COD	None
Solvents	No	COD	None
Solvents	No	VOC	None
Solvents	No	SVOC	None
Lacquers, Varnish, Enamels, and Turpentine	No	COD	None
Lacquers, Varnish, Enamels, and Turpentine	No	VOC	None
Lacquers, Varnish, Enamels, and Turpentine	No	SVOC	None
Thinners	No	VOC	None
Thinners	No	COD	None
Portable Toilet Waste Products			
Portable Toilet Waste	Yes	Visually observable, no testing required	
Contaminated Soil			
Aerially Deposited Lead[5]	No	Lead	None
Petroleum	Yes, rainbow surface sheen and odor	Visually observable, no testing required	
Mining or Industrial Waste	No	Contaminant-specific	Contaminant-specific, check with laboratory
Line Flushing Products			
Chlorinated Water	No	Total chlorine	Chlorine test kit

Table 5-1. Pollutant Testing Guidance Table[1]

Construction Site Material	Visually Observable?	Pollutant Indicators[2]	Suggested Analyses Field[3]
Adhesives			
Adhesives	No	COD	None
Adhesives	No	Phenols	None
Adhesives	No	SVOC	None
Dust Palliative Products			
Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Chloride	None
Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	TDS	TDS meter
Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Cations (Sodium, Magnesium, Calcium)	None
Vehicle			
Antifreeze and Other Vehicle Fluids	Yes, colored liquid	Visually observable, no testing required	
Batteries	No	Sulfuric Acid	None
Batteries	No	Lead	None
Batteries	No	pH	pH meter
Fuels, Oils, Lubricants	Yes, rainbow surface sheen and odor	Visually observable, no testing required	
Soil Amendment/Stabilization Products			
Polymer/Copolymer [6, 7]	No	Organic Nitrogen	None
Polymer/Copolymer [6, 7]	No	BOD	None
Polymer/Copolymer [6, 7]	No	COD	None
Polymer/Copolymer [6, 7]	No	DOC	None
Polymer/Copolymer [6, 7]	No	Nitrate	None
Polymer/Copolymer [6, 7]	No	Sulfate	None
Polymer/Copolymer [6, 7]	No	Nickel	None
Straw/Mulch	Yes, solids	Visually observable, no testing required	None
Lignin Sulfonate	No	Alkalinity	None
Lignin Sulfonate	No	TDS	TDS meter
Psyllium	No	COD	None
Psyllium	No	TOC	None
Guar/Plant Gums	No	COD	None
Guar/Plant Gums	No	TOC	None
Guar/Plant Gums	No	Nickel	None
Gypsum	No	pH	pH meter
Gypsum	No	Calcium	None
Gypsum	No	Sulfate	None
Gypsum	No	Aluminum	None
Gypsum	No	Barium	
Gypsum	No	Manganese	None
Gypsum	No	Vanadium	None

Table 5-1. Pollutant Testing Guidance Table[1]

Construction Site Material	Visually Observable?	Pollutant Indicators[2]	Suggested Analyses Field[3]
Treated Wood Products			
Ammoniacal copper zinc arsenate, Chromated copper arsenate, Ammoniacal copper arsenate, Copper naphthenate	No	Arsenic	None
Ammoniacal copper zinc arsenate, Chromated copper arsenate, Ammoniacal copper arsenate, Copper naphthenate	No	Total Chromium	None
Ammoniacal copper zinc arsenate, Chromated copper arsenate, Ammoniacal copper arsenate, Copper naphthenate	No	Copper	None
Ammoniacal copper zinc arsenate, Chromated copper arsenate, Ammoniacal copper arsenate, Copper naphthenate	No	Zinc	None
Creosote	Yes, rainbow surface or brown suspension	Visually observable, no testing required	None

Table Footnotes

1 If a specific pollutant is known, analyze only for that specific pollutant. See Material Data Safety Sheet to verify.

2 For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.

3 See www.hach.com , www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits.

4 If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.

5 Only if special handling requirements are required in the Standard Special Provisions for aerially deposited lead.

6 If used with a dye or fiber matrix, it is considered visually observable and no testing is required.

7 Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is not required: SuperTak®, M-Binder®, Fish Stik®, Pro40dc®, Fisch-Bond®, Soil Master WR™, and EarthGuard®

Acronyms Found in Table

BOD = biochemical oxygen demand
COD = chemical oxygen demand
DOC = dissolved organic carbon
EPA = United States Environmental Protection Agency
HACH = Global company that provides advanced analytical systems and technical support for water quality testing.
TDS = total dissolved solids TKN = total kjeldahl nitrogen
TOC = total organic carbon
TSP = tri-sodium phosphate
VOC = volatile organic compounds
SM = Standard Method
SVOC = semi-volatile organic compounds

Table 5-2. Non-Visible TMDL Pollutant Testing Guidance

Possible Source	TMDL Pollutant	Laboratory EPA Method	Container Type / Holding Time
Metals			
Mining, discarded nickel-cadmium batteries, pigments/paint, industrial operations	Cadmium (total)	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Mining, pesticides, wood preservatives, electronics, water pipes, brake pads, antifouling paint	Copper (total and dissolved)	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Mining, legacy soil contamination from leaded fuel, lead-based paint, old water pipes, tire balancing weights, discarded lead-acid batteries	Lead (total and dissolved)	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Mining, aerial deposition from burning of coal, aerial deposition from vehicle exhaust, manufacture of cement, discarded fluorescent light bulbs, discarded batteries, volcanism, forest fires, weathering of rock	Mercury (total)	1631E	Glass or fluoropolymer / 28 days
Same sources as mercury	Methylmercury (total)	1630	Glass or fluoropolymer / 28 days
Naturally occurring in serpentine rock and soil, discarded nickel-cadmium batteries	Nickel (total)	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Industrial applications, electronics, photographic processes	Silver (total)	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Tire wear, galvanized steel infrastructure and hardware, naturally occurring in rock and soil	Zinc (total and dissolved)	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Trace Element			
Mining, industrial operations, naturally occurring in sedimentary rock	Selenium	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Sediment			
Construction, farming, logging, mining, soil erosion, improper control of disturbed soil areas, dumping	Suspended Sediment Concentration	ASTM D3977-97 B	HDPE / 7 days
Construction, farming, logging, mining, soil erosion, improper control of disturbed soil areas, dumping	Total Suspended Solids	160.2 or SM 2540 D-97	HDPE / 7 days
Pyrethroid Pesticides			
Present day pesticide	Bifenthrin	625 or 8270	Amber Glass / 7 days
Organophosphate Pesticide			
Legacy pesticides	Chlorpyrifos	625 or 8270	Amber glass / 7 days
Legacy pesticides	Diazinon	625 or 8270	Amber glass / 7 days
Organochlorine Pesticide			
Legacy pesticides	DDD (all congeners)	625	Amber glass / 7 days
Legacy pesticides	DDE (all congeners)	625	Amber glass / 7 days
Legacy pesticides	DDT (all congeners)	625	Amber glass / 7 days
Legacy pesticides	Total DDTs	625	Amber glass / 7 days

Table 5-2. Non-Visible TMDL Pollutant Testing Guidance

Possible Source	TMDL Pollutant	Laboratory EPA Method	Container Type / Holding Time
Legacy pesticides	Chlordane	625	Amber glass / 7 days
Legacy pesticides	Dieldrin	625	Amber glass / 7 days
Legacy pesticides	Toxaphene	625	Amber glass / 7 days
PCBs			
Legacy pollution from industrial operations, electrical transformers and capacitors, electrical components, oil in motors and hydraulic equipment, fluorescent light ballasts, caulks, sealants, oil-based paint, improper disposal of waste	40 PCB Congeners, Total[1]	1668	Amber glass / 1 year
Legacy pollution from industrial operations, electrical transformers and capacitors, electrical components, oil in motors and hydraulic equipment, fluorescent light ballasts, caulks, sealants, oil-based paint, improper disposal of waste	PCB Aroclors, Total	625	Amber glass / 1 year
PAHs			
Fossil fuel combustion, forest fires, aerial deposition from vehicle exhaust, burning of wood and trash	16 PAH compounds[2]	625 or 8270	Amber Glass / 7 days
Nutrients / Biostimulatory Substances			
Fertilizers, sewage	Ammonia	350.1 or SM 4500-NH3 D	HDPE / 28 days
Fertilizers, sewage	Un-ionized Ammonia[3]	350.1 or SM 4500-NH3 D	HDPE / 28 days
Fertilizers, sewage	Nitrate as nitrogen	300	HDPE / 48 hours
Fertilizers, sewage	Nitrite as nitrogen	300	HDPE / 48 hours
Fertilizers, sewage	Orthophosphate	365.3	HDPE / 48 hours
Fertilizers, sewage	Phosphorus, Total	365.2	HDPE / 28 days
Salts			
Seawater, sea spray aerosols, weathering of rock, road salt, atmospheric deposition, decomposition of organic matter, fertilizers	Boron	200.8	HDPE / 48 hours to acidify; 6 months thereafter
Seawater, sea spray aerosols, weathering of rock, road salt, atmospheric deposition, decomposition of organic matter, fertilizers	Chloride	300	HDPE / 28 days
Seawater, sea spray aerosols, weathering of rock, road salt, atmospheric deposition, decomposition of organic matter, fertilizers	Sulfate	SM 2510B	HDPE / 28 days
Seawater, sea spray aerosols, weathering of rock, road salt, atmospheric deposition, decomposition of organic matter, fertilizers	TDS	160.1 or SM 2540 C-97	HDPE / days

Table 5-2. Non-Visible TMDL Pollutant Testing Guidance

Possible Source	TMDL Pollutant	Laboratory EPA Method	Container Type / Holding Time
Bacteria			
Animal and human waste products	Total Coliform	SM 9221B	Sterile PP / 6 hours
Animal and human waste products	Fecal Coliform	SM 9221E	Sterile PP / 6 hours
Animal and human waste products	*E. coli*	SM 9221C	Sterile PP / 24 hours
Animal and human waste products	Enterococcus	SM 9230B	Sterile PP / 24 hours

Table Footnotes

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

2 The USEPA priority list of 16 PAH compounds include: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benao[a]pyrene, indeno[1,2,3-cd]pyrene, dibenz[a,h]anthracene, and benzo[ghi]perylene.

3 Un-ionized ammonia can be calculated as a function of total ammonia, pH, temperature, and ionic strength. Ionic strength is computed from ether total dissolved solids or electrical conductivity.

Acronyms Found in Table

ASTM = American Society for Testing and Materials
DDT = Dichlorodiphenyltrichloroethane
HDPE = high density polyethylene
PAH = polynuclear aromatic hydrocarbon
PCB = polychlorinated biphenyl
SM = Standard Methods the Examination of Water and Wastewater

5.3 Where to Monitor

One grab sample must be collected at all discharge locations identified as potentially discharging non-visible pollutants, per the criteria stated above. See Section 4.2 for monitoring location selection guidelines. For non-visible pollutants, samples should be collected only from sites that can be safely accessed within the first 8 hours of discharge occurring during project working hours.

One grab sample of uncontaminated stormwater that has not come in contact with the disturbed or contaminated soil or with the exposed materials stored or used onsite also must be collected within the first 8 hours of discharge. The uncontaminated sample could be collected upgradient from the non-visible pollutant source/spill or from discharge locations whose drainage areas do not come into contact with the non-visible pollutant source/spill. Historical (pre-construction) contamination or exposed materials, such as soil amendments, may be widely spread throughout the site. An uncontaminated sampling location may not exist on the site itself and may have to be located at the perimeter of the site.

Discharge location(s) are sites where the construction site's stormwater runoff flows offsite, whether to a municipal separate storm sewer system or receiving water body. Discharge locations could include catch basin inlets, sheet flow, culverts, or outfalls. A site's discharge locations are identified in the SWPPP and Water Pollution Control Drawings (WPCDs).

5.4 How to Monitor

Manual grab sampling techniques will be used to collect samples. See Section 4.6.4 for detailed information on grab sample collection and analysis.

5.5 Data Evaluation, Follow-up, and Reporting

5.5.1 Data Evaluation

Once the field and laboratory test results of the non-visible pollutant monitoring are available, compare the results of the uncontaminated sample to the results of the discharge sample. To identify substantial changes of non-visible pollutants in the runoff, the RPD between the uncontaminated sample result and the discharge sample result is calculated for the constituents of concern. See Section 4.12.1 for detailed information on calculating RPD.

If the result for the uncontaminated sample is not detected and the result for the contaminated sample is detected, then there is an impact from a non-visible pollutant.

Document whether the contaminated sample test results are lower or higher than the uncontaminated test results.

5.5.2 Assessing the Need for Corrective Measures

Corrective measures are required for any breach, malfunction, leakage, or spill observed during a visual inspection.

5.5.3 Implementing Corrective Measures

If any breach, malfunction, leakage, or spill is observed during a visual inspection, corrective measures must be taken to repair any break, malfunction, or leakage, and to remove or prevent pollutants from contacting stormwater discharges.

If the construction site is found to be contributing non-visible pollutants to the runoff, the following steps should be taken as soon as possible:

- Identify the source
- Repair or replace any BMP that has failed or clean up any spilled pollutants
- If there are elevated levels in run-on, notify the RE
- Maintain any BMP that is not functioning properly due to lack of maintenance
- Evaluate whether additional, alternative, or redesigned BMPs should be implemented

If sampling and analysis results do not show a substantial change in water quality, non-visible sampling can be stopped. If sampling and analysis results show a substantial change in water quality, then repeat the steps above until the analytical results of upstream and downstream samples are relatively comparable.

Examples of corrective actions include:

- Removing the pollutant source by removing impacted soil, cleaning pavement, applying absorbent materials, then removing and disposing of absorbed materials

- Covering the pollutant source with methods such as tarps or closing lids
- Containing the pollutant source by implementing double containment, such as surrounding the source with an impermeable berm

5.5.4 Reporting

For non-visible pollutant monitoring and sampling, complete the following forms and submit to the RE as detailed in Section 11.

Prior to storm event:

- DOT CEM 2030SW Stormwater Site Inspection Report

During storm event:

- DOT CEM-2051SW Storm Event SWPPP Sampling Log Form
- DOT CEM-2052SW Storm Event Sampling or Receiving Water Monitoring Report form
- DOT CEM-2061SW Notice of Discharge Report form.

Document whether the contaminated sample test results are substantially greater than the uncontaminated test results. See Section 11 for additional information on data reporting and recordkeeping requirements.

If the sampling results for any of the TMDL non-visible sampling exceeds those listed in Table 5-3, an exceedance report must be submitted to the RE and must be uploaded to SMARTS. The following CEM forms must be completed, and laboratory results need to be attached (with appropriate chain-of-custody forms).

- DOT CEM-2062SW Numeric Action Level Exceedance Report form
- DOT CEM-2063SW Numeric Effluent Limitation Violation Report form

Table 5-3. TMDL NAL/NEL Exceedance

Region	TMDL	Pollutant	NAL/NEL Exceedance
Region 3	Pajaro River Nutrients TMDL	Nitrate-Nitrogen	NAL of 8.0 mg/L
Region 3	Pajaro River Nutrients TMDL	Orthophosphate-Phosphorus	NAL of 0.3 mg/L
Region 3	Pajaro River Nutrients TMDL	Nitrate-Nitrogen	NAL of 8.0 mg/L
Region 3	Pajaro River Nutrients TMDL	Orthophosphate-Phosphorus	NAL of 0.3 mg/L
Region 3	Pajaro River Nutrients TMDL	Un-ionized Ammonia	NAL of 0.025 mg/L
Region 3	Pajaro River Nutrients TMDL	Nitrate-Nitrogen	NAL of 10.0 mg/L
Region 4	Calleguas Creek Watershed Metals and Selenium TMDL	Total Copper	Interim NAL of 0.204 mg/L
Region 4	San Gabriel River Metals and Selenium	Total Copper	NAL of 0.027 mg/L
Region 4	San Gabriel River Metals and Selenium	Total Lead	NAL of 0.106 mg/L
Region 4	San Gabriel River Metals and Selenium	Total Zinc	NAL of 0.158 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	4,4-DDT	Final NAL of 5.9 X10-7 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Chlordane	Final NAL of 5.9 X10-7 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Dieldrin	Final NAL of 1.4 X10-7 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	PAHs	Final NAL of 4.9 X10-5 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Copper	Final NAL of 0.0058 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Lead	Final NAL of 0.221 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total PCBs	Final NAL of 1.7 X10-7 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Zinc	Final NAL of 0.095 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Copper	Interim NAL of 0.20751 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Copper	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Lead	Interim NAL of 0.12288 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Lead	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Zinc	Interim NAL of 0.89887 mg/L
Region 4	Los Angeles and Long Beach Harbor Waters TMDL	Total Zinc	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Chlordane	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Dieldrin	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total Nitrogen	NAL of 1.33 mg/L
Region 4	Los Angeles Area Lakes TMDL	Total PCBs	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total Phosphorous	NEL of 0.16 mg/L
Region 4	Los Angeles Area Lakes TMDL	Total Nitrogen	NAL of 1.8 mg/L
Region 4	Los Angeles Area Lakes TMDL	Total Phosphorous	NEL of 0.64 mg/L
Region 4	Los Angeles River Nutrients TMDL	Ammonia	NAL of 4.7 mg/L
Region 4	Los Angeles River Nutrients TMDL	Ammonia	NAL of 8.7 mg/L
Region 4	Los Angeles River Nutrients TMDL	Ammonia	NAL of 10.1 mg/L
Region 4	Los Angeles River Nutrients TMDL	Nitrate-Nitrogen	NAL of 8.0 mg/L
Region 4	Los Angeles River Nutrients TMDL	Nitrate-Nitrogen + Nitrite-Nitrogen	NAL of 8.0 mg/L
Region 4	Los Angeles River Nutrients TMDL	Nitrite-Nitrogen	NAL of 1.0 mg/L

Table 5-3. TMDL NAL/NEL Exceedance

Region	TMDL	Pollutant	NAL/NEL Exceedance
Region 4	Los Angeles River Metals TMDL	Total Cadmium	NAL of 0.0031 mg/L
Region 4	Los Angeles River Metals TMDL	Total Copper	NAL of 0.06749 mg/L
Region 4	Los Angeles River Metals TMDL	Total Lead	NAL of 0.094 mg/L
Region 4	Los Angeles River Metals TMDL	Total Zinc	NAL of 0.159 mg/L
Region 4	Los Cerritos Channel Metals TMDL	Total Copper	NAL of 0.0098 mg/L
Region 4	Los Cerritos Channel Metals TMDL	Total Lead	NAL of 0.0558 mg/L
Region 4	Los Cerritos Channel Metals TMDL	Total Zinc	NAL of 0.0956 mg/L
Region 4	Machado Lake Nutrients TMDL	Total Nitrogen	NAL of 1.0 mg/L
Region 4	Machado Lake Nutrients TMDL	Total Phosphorus	NAL of 0.1 mg/L
Region 4	Los Angeles Area Lakes TMDL	Chlordane	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Dieldrin	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total DDTs	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total Nitrogen	NAL of 3.61 mg/L
Region 4	Los Angeles Area Lakes TMDL	Total PCBs	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total Phosphorous	NEL of 0.37 mg/L
Region 4	Los Angeles Area Lakes TMDL	Chlordane	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Dieldrin	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total DDTs	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total Nitrogen	NAL of 2.0 mg/L
Region 4	Los Angeles Area Lakes TMDL	Total PCBs	NEL of 100mg/L TSS (if applicable per Section I.G.5)
Region 4	Los Angeles Area Lakes TMDL	Total Phosphorous	NEL of 0.4 mg/L
Region 4	Calleguas Creek Watershed Metals and Selenium TMDL	Total Copper	Interim NAL of 0.204 mg/L
Region 4	San Gabriel River Metals and Selenium	Total Lead	NAL of 0.166mg/L
Region 4	Santa Clara River Nitrogen Compounds TMDL	Ammonia	NAL of 4.2 mg/L
Region 4	Upper Santa Clara River Chloride TMDL	Chloride	Chloride NAL of 100 mg/L
Region 4	Santa Clara River Nitrogen Compounds TMDL	Ammonia	NAL of 5.2 mg/L
Region 4	Ventura River Algae TMDL	Total Nitrogen	NAL of 7.4 mg/L
Region 4	Ventura River Algae TMDL	Nitrate-Nitrogen + Nitrite-Nitrogen	NAL of 10 mg/L
Region 4	Ventura River Algae TMDL	Nitrate-Nitrogen + Nitrite-Nitrogen	NAL of 5 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Copper	NAL of 0.00578 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Lead	NAL of 0.221 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Zinc	NAL of 0.095 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Cadmium	NAL of 0.0097 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Copper	NAL of 0.027 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Lead	NAL of 0.194 mg/L

Table 5-3. TMDL NAL/NEL Exceedance

Region	TMDL	Pollutant	NAL/NEL Exceedance
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Zinc	NAL of 0.21 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Cadmium	NAL of 0.042 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Copper	NAL of 0.00578 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Lead	NAL of 0.221 mg/L
Region 8	San Diego Creek and Newport Bay Toxics TMDL	Total Zinc	NAL of 0.095 mg/L
Region 9	Chollas Creek Metal TMDL	Dissolved Copper	Interim NAL of 0.083 mg/L
Region 9	Chollas Creek Metal TMDL	Dissolved Copper	Final NEL of 0.083 mg/L
Region 9	Chollas Creek Metal TMDL	Dissolved Lead	Interim NAL of 0.068 mg/L
Region 9	Chollas Creek Metal TMDL	Dissolved Lead	Final NEL of 0.068 mg/L
Region 9	Chollas Creek Metal TMDL	Dissolved Zinc	Interim NAL of 0.175 mg/L
Region 9	Chollas Creek Metal TMDL	Dissolved Zinc	Final NEL of 0.175 mg/L

Section 6

Non-Stormwater Discharge Monitoring

6.1 Permit Requirements

If feasible, eliminate all non-stormwater discharges. If non-stormwater runoff is discharged offsite, Risk Level 2 and 3 projects must conduct non-stormwater effluent sampling and testing to comply with the CGP. Discharge (effluent) samples must be collected at all non-stormwater discharge locations that can be safely accessed. The samples must be tested for pH and turbidity, as well as any other pollutants considered likely to be present in the discharge. Effluent samples must also be collected from groundwater dewatering discharges for all Risk Level projects and analyzed for pH and turbidity. Some types of non-stormwater discharges authorized by a RWQCB permit must also be sampled for additional parameters for which monitoring is required by the permit.

6.2 What and When to Monitor

Effluent must be monitored from all discharge locations where non-stormwater runoff is discharged offsite. Effluent samples must be collected and tested from both authorized and unauthorized non-stormwater discharges using the same protocols as those required for stormwater discharge monitoring (see Section 7.2). The appropriate number and type of QA/QC samples must also be collected (see Section 4.10).

During dewatering activities, monitoring must be performed within the first hour of discharge and daily when discharging continuously. Each sample collected must be analyzed for pH and turbidity. If either the pH or turbidity NAL result is exceeded, dewatering shall be ceased immediately, and appropriate measures shall be taken to modify activities so future discharges will be in compliance.

In addition, run-on from surrounding areas must be monitored and reported in the Stormwater Site Inspection Report form (DOT CEM-2030SW) if there is reason to believe run-on may contribute to an exceedance of NALs.

All stormwater site inspections include specific requirements for identification and assessment of non-stormwater discharges (see Section 3.2.2). Non-stormwater effluent samples must be collected when the discharges are identified. The WPC manager should be prepared to collect potential non-stormwater samples prior to conducting stormwater inspections. Sample collection should be conducted during daylight hours. Sample collection should not be performed during dangerous weather conditions.

Authorized Non-Stormwater Discharges

The CGP authorizes certain non-stormwater discharges that may be necessary for the completion of construction projects. Authorized non-stormwater discharges may include those from dechlorinated potable water and non-potable sources—such as fire hydrant flushing;

irrigation of vegetative erosion control measures; water line/pipe flushing and testing; water to control dust; uncontaminated groundwater or spring water from dewatering activities; and other discharges—not subject to a separate NPDES permit adopted by a RWQCB. The CGP requires that the above non-stormwater discharges are authorized under the following conditions:

- The discharge is not routed through site areas with exposed soil, except for water used for dust control or to vegetation irrigation to stabilize areas.
- The discharge does not cause or contribute to an exceedance of water quality standards in the receiving water.
- The discharge complies with NALs for pH and turbidity, and other applicable effluent limitations, and monitoring and reporting requirements.
- The discharge is not prohibited by an applicable regional or statewide water quality control plan.
- The discharge is in accordance with other applicable State and Regional Water Board permits.
- The discharge does not contain toxic constituents in toxic amounts and does not cause toxicity in the receiving water body.
- The discharge complies with BMPs as described in the SWPPP.

If non-stormwater is impounded, it is possible to conduct dewatering under the requirements of CGP Attachment J. However, the nine RWQCBs throughout the state have different requirements for dewatering. Some RWQCBs may require a separate NPDES permit or specific monitoring and reporting requirements for authorized discharges. Because of these requirements, dewatering discharges cannot be considered as an automatic authorized non-stormwater discharge through the CGP (unless conditions of Attachment J are met), but rather it may be authorized once the proposed discharge is reported, reviewed, and approved on a case-by-case basis by the appropriate RWQCB. Authorized non-stormwater dewatering discharges may require a permit because some RWQCBs have adopted General Permits for dewatering discharges. Check with the RE or the applicable RWQCB for requirements in the project area. *The Field Guide to Construction Site Dewatering* (Caltrans, 2014)[14] includes details for all nine RWQCBs.

Unauthorized Non-Stormwater Discharges

Examples of unauthorized non-stormwater discharges common to construction activities include:

- Vehicle and equipment wash water, including concrete washout water
- Slurries from concrete cutting and coring operations, or grinding operations
- Slurries from concrete or mortar mixing operations
- Residue from high-pressure washing of structures or surfaces
- Wash water from cleaning painting equipment
- Runoff from dust control applications of water or dust palliatives

[14] The field guide is planned for update and the latest version can be found at: https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control/manuals-and-handbooks

- Sanitary and septic wastes
- Chemical leaks and/or spills of any kind, including but not limited to petroleum, paints, cure compounds, etc.

Non-stormwater samples must be tested for pH and turbidity, and any other likely pollutant in the discharge as identified by the WPC manager. Likely non-stormwater discharge pollutants should be determined by evaluating the non-stormwater discharge source and the non-stormwater flow path to the discharge location. Table 6-1 shows unauthorized non-stormwater sources common to construction sites, their potential pollutants, and water quality indicators. Except for field analyses, including the measurements performed in the field for turbidity and pH, all analyses must be performed by a laboratory accredited by ELAP for such analyses.

Table 6-1. Common Construction Site Potentially Unauthorized Non-Stormwater Sources, Potential Pollutants, and Water Quality Indicator Constituents

Unauthorized Non-Stormwater Source	Potential Pollutants	Water Quality Indicator Constituent
Vehicle and equipment wash water	Hydrocarbons and other organic compounds Oils and greases Nutrients Trisodium phosphate or other phosphate-containing detergents Metals Suspended solids	**TOC**, VOCs, SVOCs TOC Nitrate Phosphate Al, Cu, Fe, Pb, Ni, Zn Turbidity
Batteries	Metals, acids	Pb, **pH**
Concrete washout water	Suspended solids Concrete	Turbidity pH
Slurries from concrete cutting and coring operations, Portland cement concrete grinding or asphalt concrete grinding operations	Suspended solids Concrete Hydrocarbons (gasoline, oil, grease, lubricants)	Turbidity pH TOC, SVOCs
Slurries from concrete or mortar mixing operations	Masonry products Sealant (MMA) Ash, slag, sand, waste Curing compounds	**pH**, alkalinity **Methyl Methacrylate Al, Ca, V, Zn** **pH,** VOC, SVOC
Blast residue from high-pressure washing of structures or surfaces	Suspended solids Masonry products Metals	Turbidity **pH,** alkalinity Al, Cu, Fe, Pb, Ni, Zn TOC, SVOCs
Wash water from cleaning painting equipment	Resins Thinners Paint Strippers Solvents Lacquers, varnish, enamels, turpentine Sealants	**COD,** SVOCs VOCs, **COD** **VOCs**, SVOCs, COD **COD**, VOCs, SVOCs **COD**
Runoff from dust control applications of water or dust palliatives	Salts	Chloride, **TDS**, cations (Ca, Mg, Na, K)
Sanitary and septic wastes	Bacteria, disinfectants	Total/fecal coliform, disinfectant (chemical specific)
Chemical leaks and/or spills of any kind including but not limited to petroleum, paints, cure compounds, etc.	Chemical specific	Chemical specific

Table 6-1. Common Construction Site Potentially Unauthorized Non-Stormwater Sources, Potential Pollutants, and Water Quality Indicator Constituents

Unauthorized Non-Stormwater Source	Potential Pollutants	Water Quality Indicator Constituent

Table Notes

Bolded water quality indicator indicates lowest analysis cost or best indicator. However, the composition of the specific chemical, if known, is the first criterion for selecting which analysis to use.

Acronyms Found in Table

Al = aluminum
BOD = biochemical oxygen demand
Br = bromine
Ca = calcium
COD = chemical oxygen demand
DOC = dissolved organic carbon
Mn = manganese
Ni = nickel
NO_3 = nitrate
PO^4 = phosphate
SO^4 = sulfate
TDS = total dissolved solids
TKN = total Kjeldahl
TOC = total organic carbon
V = vanadium

6.3 Where to Monitor

Samples must be collected from all discharge locations that can be safely accessed where non-stormwater runoff is discharged offsite. Discharge location(s) are the sites where the construction site runoff flows offsite, whether to a municipal separate storm sewer system or receiving water body. Discharge locations could include catch basin inlets, sheet flow, culverts, or outfalls. Project discharge locations are identified in the project-specific SWPPP. See Section 4.2 for monitoring location selection guidelines.

6.4 How to Monitor

Manual grab sampling techniques will be used to collect samples. See Section 4.6.4 for detailed information on grab sample collection and analysis. See Table 4-1 for sample collection and analysis methods for typical non-stormwater pollutants. See Table 4-2 for details on field testing for pH and turbidity.

6.5 Data Evaluation, Follow-up, and Reporting

6.5.1 Data Evaluation

Once pH and turbidity sampling and analysis are completed, sample results from each sampled discharge point are compared to NALs (see Table 4-2). For all non-stormwater discharges, including those from dewatering, the CGP requires that the turbidity of any sample not exceed 250 NTU. The pH value of any sample must be within the range of 6.5 to 8.5 pH units. Corrective measures must be implemented if sample results exceed either of these values (see Section 6.5.4 for additional information on implementing corrective measures).

Results for monitoring of other constituents are also compared to other standards as required by RWQCB, such as total maximum daily load (TMDL) waste load allocations (if specifically required by RWQCB). In the event a parameter exceeds TMDL waste load allocation or other standard designated by RWQCB, follow RWQCB-required reporting instructions.

6.5.2 Monitoring and Reporting Run-On

Run-on from surrounding areas must be monitored and reported if there is reason to believe run-on may contribute to an exceedance of NALs or elevated non-visible pollutant levels in discharges. See Section 4.12.2 for additional information.

6.5.3 Assessing the Need for Corrective Measures

Sample results are compared to NALs as designated in Table 4-2. Corrective measures are required for unauthorized non-stormwater discharges and NAL exceedances of either authorized or unauthorized non-stormwater discharges.

6.5.4 Implementing Corrective Measures

If an NAL exceedance occurs, the project site should be evaluated to determine the cause or source of the exceedance. See Section 4.12.3 for additional information. If the source of the exceedance is run-on to the construction site, the levels of pH and turbidity from run-on samples should be evaluated. High levels in run-on samples will indicate that sources outside of the construction site may be contributing to the measured pH level or turbidity. Identification of adjacent landowner discharges and implementation of other BMP measures should be the first steps taken to remove pollutants from run-on or eliminate unauthorized discharges from run-on.

If an unauthorized non-stormwater discharge occurs and discharges offsite, corrective measures must be taken immediately to eliminate the unauthorized non-stormwater discharge. If an unauthorized non-stormwater discharge occurs onsite but does not discharge offsite, corrective measures must be taken to reduce or prevent pollutants from contacting stormwater and authorized non-stormwater discharges. Corrective actions to prevent pollutants from contacting non-stormwater discharges may include:

- Removing the pollutant source by removing impacted soil, cleaning pavement, applying absorbent materials, then removing and disposing of absorbed materials
- Covering the pollutant source with methods such as tarps
- Containing the pollutant source by implementing double containment, such as surrounding the source with an impermeable berm

6.5.5 Reporting

For non-stormwater discharge monitoring, complete the following forms and submit to the RE as detailed in Section 11.

- DOT CEM-2030SW Stormwater Site Inspection Report
- DOT CEM-2051SW Storm Event SWPPP Sampling Log
- DOT CEM-2052SW Storm Event Sampling or Receiving Water Monitoring Report
- DOT CEM-2061SW Notice of Discharge Report
- DOT CEM-2062SW NAL Exceedance Report

The RE must be notified of sample testing results and discharges per Caltrans specifications. See Section 11 for detailed information on reporting and recordkeeping requirements.

Section 7

Stormwater Discharge (pH and Turbidity) Monitoring

7.1 Permit Requirements

For all Risk Level 2 and 3 projects, stormwater discharge (effluent) monitoring must be performed to characterize discharges associated with construction activity from the entire project disturbed area during qualified precipitation events. Effluent samples must be collected from all discharge points (defined below in Section 7.3) where stormwater is discharged offsite and from accumulated stormwater discharges (e.g., stormwater held in a detention basin/pond); these samples must be tested for pH and turbidity at a minimum if they fall under Attachment J of the CGP. For Risk Level 3 projects, receiving water monitoring is required when either the pH or turbidity sampling results from the stormwater discharge location are outside of acceptable limits (trigger).

7.2 What and When to Monitor

One effluent sample must be collected and analyzed daily from each representative discharge location (defined in Section 7.3) during qualifying precipitation events. A “qualifying precipitation event” is a single storm that is forecasted to have a 50% or greater chance of 0.5 inches or more in a 24-hour period. Qualifying precipitation events are extended for each subsequent 24-hour period forecast to have at least 0.25 inches of precipitation. The qualifying precipitation event ends when there are two consecutive 24-hour periods of less than 0.25 inches of precipitation forecast. The National Weather Service forecast must be checked, as described in Section 4.4.1, at least once per day during the entire qualifying precipitation event. Rain gauge readings must be made before, during, and after storm events from an onsite rain gauge. See Section 4.5 for additional information on rain gauge readings.

Samples are to be collected during project working hours and within 8 hours of each storm event. Discharges from a project site can occur anytime during a storm event but may not occur for some time after the start of the rainfall; sampling timing is important to take into consideration. Sample collection should not be performed during dangerous weather conditions, such as flooding and electrical storms as described in Section 4.1.2. Road conditions on the way to the project may also pose a dangerous condition, such as snow or ice on mountain passes. In these situations, sample collection should not be performed. Document the road conditions and safety concerns as a sample exception in Storm Event Sampling or Receiving Water Monitoring Report (DOT CEM-2052SW).

Samples must also be collected during the dewatering of accumulated stormwater or groundwater, such as from excavations, trenches, foundations, vaults, and/or water collected in impoundments like sedimentation basins, ponds, puddles, low points on the active site, or other similar accumulation points. The discharge shall be analyzed for pH and turbidity at the discharge location within the first hour of discharge and daily for continuous dewatering discharges if discharge is subject to CGP Attachment J. A dewatering discharge exceeding the

NAL shall immediately cease until measures are taken to ensure the dewatering discharge will meet compliance.

Risk Level 3 projects that discharge directly into a receiving water body, such as a stream, lake or ocean, are also required to monitor that receiving water if sampling results from the discharge monitoring location exceeds the NAL for either pH or turbidity. Stormwater runoff from a construction site is not considered a direct discharge to a receiving water if it first flows through a MS4 or a separate stormwater conveyance system where there is commingling of site stormwater with offsite (non-Caltrans) sources. Refer to Section 10 for a complete discussion of receiving water monitoring.

7.3 Where to Monitor

Stormwater grab samples must be collected from all discharge locations as defined below. Discharge locations are the sites where the construction site's stormwater flows offsite, whether to a municipal separate storm sewer system or receiving water body. Discharge locations could include catch basin inlets, sheet flow, culverts, or outfalls. For Risk Level 3 projects where stormwater discharges cannot be sampled before a direct discharge to receiving water, safe receiving water sampling locations upstream and downstream of the discharge must be identified, as described in Section 10; the WPC manager determines the exact receiving water monitoring locations. A project's discharge locations are identified in its SWPPP and are shown on the SWPPP Water Pollution Control Drawings.

Samples must be collected from all discharge locations incorporating runoff from a project construction site, while discharge is occurring and within site operating hours. The samples shall be representative of the discharge flow and characteristics.

If construction activity has not started within the drainage area at a monitoring location, and there is no disturbed soil within a drainage area, monitoring at discharge locations from that drainage area is not required. If a turbidity test result for any single stormwater discharge location exceeds 250 NTU or a pH test result is outside the range of 6.5 to 8.5 pH units, it is considered an NAL exceedance and must be reported as such. For Risk Level 3 projects that discharge directly into a receiving water body, a stormwater discharge pH result that falls outside of the range of 6.0 and 9.0 pH units, or a turbidity that exceeds 500 NTU, triggers receiving water monitoring (refer to Section 10 for additional information on receiving water monitoring).

7.4 How to Monitor

Manual grab sampling techniques will be used to collect samples. See Section 4.6.4 for detailed information on grab sample collection and analysis for pH and turbidity. Samples must be collected such that they are representative of the flow and characteristics of the discharge. The sampled stormwater discharge should represent the effluent in each drainage area, based on visual observation.

7.5 Rain Gauge Readings

Rain gauge readings must be made from the onsite rain gauge before, during, and after storm events, and the event rainfall total must be computed.

7.5.1 Data Evaluation

Once pH and turbidity sampling and analysis are completed, the sample results from each discharge location are calculated and compared to the NALs and, for Risk Level 3 sites with direct discharges to surface waters, to Receiving Water Monitoring Triggers (see Table 4-2).

For accumulated stormwater discharges (e.g., stormwater held in a detention basin, holding pond or settling basin), Caltrans requires the turbidity of any effluent sample not exceed 250 NTU. The pH value of any effluent sample must be within the range of 6.5 to 8.5 pH units. Corrective measures must be implemented if turbidity or pH sample results exceed these limits (see Section 7.5.4 for additional information on implementing corrective measures).

7.5.2 Monitoring and Reporting Run-On

Run-on from surrounding areas must be monitored and reported if there is reason to believe run-on may contribute to an exceedance of NALs or Receiving Water Monitoring Triggers. See Section 4.12.2 for additional information.

7.5.3 Assessing the Need for Corrective Measures

Sample results are compared to NALs for Risk Level 2 and 3 sites and to Receiving Water Monitoring Triggers for Risk Level 3 sites with direct discharges to receiving water, as defined in Table 4-2. If stormwater discharges exceed an NAL or a Receiving Water Monitoring Trigger, the source needs to be identified and corrective measures implemented. See Section 4.12.3 for additional information.

7.5.4 Implementing Corrective Measures

If the project site or run-on is found to be contributing to an NAL or Receiving Water Monitoring Trigger exceedance, the following steps should be taken as soon as possible:

- Notify the RE and submit required forms as described in Section 11.1 and Section 11.2.
- Repair or replace any BMP that has failed, resulting in a discharge and/or elevated levels of pH or turbidity in the runoff.
- Improve maintenance at all BMPs that did not function as designed, resulting in a discharge and/or elevated levels of pH or turbidity in the runoff.
- Implement BMPs in areas identified as generating discharges or sources of elevated pH or turbidity.
- Implement additional, alternative, or redesigned BMPs to provide an effective combination of control measures on the site.
- Identify the source of run-on resulting in a discharge and/or elevated levels of pH or turbidity in project site runoff.

7.5.5 Reporting

Complete the following forms and submit to the RE as detailed in Section 11.

Prior to storm event or monitoring:

- DOT CEM-2030SW Stormwater Site Inspection Report

During or after monitoring:

- DOT CEM-2051SW Storm Event SWPPP Sampling Log
- DOT CEM-2052SW Storm Event Sampling or Receiving Water Monitoring Report
- DOT CEM-2061SW Notice of Discharge Report
- DOT CEM-2062SW NAL Exceedance Report

See Section 11 for detailed information on reporting and recordkeeping requirements.

Section 8
RWQCB-Required Monitoring

8.1 Permit Requirements

RWQCBs enforce the CGP and retain discretionary authority over certain issues that may arise from the discharges in their respective regions. RWQCB may issue orders (including NPDES permits) with additional monitoring and sampling requirements. The orders could regulate stormwater discharges, non-stormwater discharges (i.e., dewatering), receiving water monitoring, etc.

The CGP does not apply to discharges of stormwater within the Lake Tahoe Hydrologic Unit. The Lahontan RWQCB has adopted its own permit to regulate stormwater discharges from construction activity in the Lake Tahoe Hydrologic Unit (RWQCB 6SLT; Caltrans District 3). Owners of construction projects in this watershed must apply for the Lahontan RWQCB CGP permit rather than the statewide CGP. Lahontan RWQCB Order No. R6T-2016-0010, NPDES No. CAG616002 requires analysis of stormwater discharge samples in the Lake Tahoe region for settable solids, turbidity, and non-visually detected pollutants. The Order establishes NELs for total nitrogen, total phosphorus, total iron, turbidity, and oil & grease.

Projects located within the watershed of a Clean Water Act (CWA) § 303(d) impaired water body, for which a TMDL has been adopted by the State of California and approved by EPA, must comply with the approved TMDL. The TMDL may include a specific waste load allocation. Specific requirements for TMDL compliance are included in Section 5.

8.2 What and When to Monitor

Specific requirements for monitoring will be included in the specific RWQCB Order.

Sample collection and analysis protocols must conform to the test methods, detections limits, and reporting units specified in Table 4-1 and Table 4-2, unless other methods are specified by the RWQCB.

8.3 Where to Monitor

Monitoring locations will be based on the specific requirements of the RWQCB Order.

8.4 How to Monitor

Monitoring methods will be based on the specific requirements of a RWQCB Order. However, typically manual grab sampling techniques will be used to collect samples. Grab sample collection is described in Section 4.6.4. For receiving water sampling, see Section 10.

8.5 Data Evaluation, Follow-up, and Reporting

Data evaluation, follow-up, and reporting will be based on the RWQCB Order and the type of discharge. For typical data evaluation requirements, see Section 5 for non-visual pollutants, Section 6 for non-stormwater discharges, Section 7 for information for stormwater discharges (pH and Turbidity), Section 9 for active treatment system discharges, and Section 10 for receiving waters.

Complete the following forms and submit to the RE as detailed in Section 11 prior to storm event or sampling:

- CEM-2045 Rain Event Action Plan (as required by Tahoe CGP)

During or after sampling:

- DOT CEM-2051SW Storm Event SWPPP Sampling Log
- DOT CEM-2052SW Storm Event Sampling or Receiving Water Monitoring Report
- DOT CEM-2061SW Notice of Discharge Report
- DOT CEM-2062SW NAL Exceedance Report

See Section 11 for detailed information on reporting and recordkeeping requirements.

Section 9

Active Treatment System Caltrans Oversight Monitoring Protocols

9.1 Permit Requirements

The use of an active treatment system (ATS) may be necessary on construction sites where traditional erosion and sediment controls do not effectively control accelerated erosion, or under circumstances where stormwater discharges leaving the site may cause or contribute to an exceedance of a receiving water quality standard. An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to reduce turbidity caused by fine suspended sediment. Additionally, it may be appropriate to use an ATS when site constraints prohibit the construction of a correctly-sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.

An ATS is operated in one of two modes, either batch or flow-through. In batch treatment, water is held in a basin or tank, and is not discharged until treatment is complete. In flow-through treatment, water is pumped into the ATS directly from the runoff collection system or stormwater holding pond, where it is treated and filtered as it flows through the system and is then continuously discharged.

The CGP (Attachment F) requires visual monitoring, operational and (effluent) compliance monitoring, and, for an ATS operating in batch mode, toxicity monitoring. Guidance to perform the CGP-required monitoring is provided in Appendix B of this manual. This section presents only additional Caltrans-required monitoring, beyond what is required by the CGP. This monitoring of the ATS is to provide QA and independent verification by Caltrans, to ensure that the ATS instrumentation, which automatically measures and records effluent water quality data, is working properly.

9.2 What and When to Monitor

When an ATS is discharging water from the project site, Caltrans requires effluent grab samples to be collected and analyzed for specific criteria detailed in the approved ATS plan. This approved ATS plan is included as an attachment and details of it are discussed in Section 1400 of the Caltrans *SWPPP Template*.

The Caltrans stormwater site inspector and contractor inspector must coordinate activities to schedule the time to meet for collection of simultaneous samples for QA/QC purposes. The contractor must notify the RE at least 24 hours prior to potential ATS sampling events.

9.3 Where to Monitor

The effluent samples must be collected from the discharge pipe or another location representative of the nature of the discharge.

9.4 How to Monitor

The required grab samples must be collected from the outlet pipe such that they are representative of the flow and characteristics of the discharge. Grab sampling techniques are described in detail in Section 4.6.4

9.5 Data Evaluation, Follow-up, and Reporting

9.5.1 Data Evaluation

Results of effluent testing for pH and turbidity are compared to the test results from the ATS operator to determine if further action is required. To identify substantial differences between the monitoring test results and the ATS operator's daily recorded test results, the RPD between the data sets is calculated. See Section 4.12.1 for detailed information on calculating RPD.

9.5.2 Assessing the Need for Corrective Measures

If the RPD of the monitoring test results and the ATS daily recorded test results are greater than 25%, then the WPC manager or other personnel must evaluate the potential causes of the discrepancy and determine the probable cause for the non-verification.

9.5.3 Implementing Corrective Measures

Corrective actions must be implemented as soon as possible. The test results, sample collection methods and timing, and testing methods should be compared with the ATS operator, and potential corrective measures discussed with the ATS operator.

9.5.4 Reporting

An evaluation of the ATS water quality sample analytical results must be submitted to the RE depending on the results. If exceedance of residual chemical or water quality standards, submit within 48 hours. If NEL exceedance, then within 6 hours.

Complete the following forms and submit to RE as detailed in Section 11.

During or after sampling:

- DOT CEM-2051SW Storm Event SWPPP Sampling Log
- DOT CEM-2052SW Storm Event Sampling or Receiving Water Monitoring Report
- DOT CEM-2061SW Notice of Discharge Report
- DOT CEM-2062SW NAL Exceedance Report
- DOT CEM-2063SW NEL Violation Report

See Section 11 for detailed information on reporting and recordkeeping requirements.

Section 10
Receiving Water Monitoring

10.1 Permit Requirements

Receiving water monitoring is required by the CGP for all Risk Level 3 projects that exceed a Receiving Water Monitoring Trigger and have direct discharge into receiving waters (also referred to as “waters of the state”). Receiving water is a water body, such as a creek, river, lake, ocean, or other water course, into which stormwater is discharged. Stormwater runoff from the construction site is not considered a direct discharge to a receiving water if it first flows through a MS4 or a separate stormwater conveyance system where there is co-mingling of site stormwater with offsite (non-Caltrans) sources. Upon exceedance of a Receiving Water Monitoring Trigger, for Risk Level 3 project sites with direct discharges to receiving water, the receiving waters must be subsequently monitored for pH, and turbidity (if discharge exceeds Receiving Water Monitoring Trigger) for the duration of the project’s coverage under the CGP.

The CGP allows RWQCBs the authority to require additional monitoring and reporting program requirements.

10.2 What and When to Monitor

When the discharge of a Risk Level 3 project that has direct discharge into receiving waters is found to exceed a Receiving Water Monitoring Trigger in a discharge (effluent) sample, receiving water samples must be collected and analyzed for pH and turbidity (if the discharge exceeds Receiving Water Monitoring Trigger). Analysis must be performed according to the test methods, RLs, and reporting units specified in Table 4-2.

For any additional receiving water monitoring required by RWQCB[15], conduct monitoring as specified by RWQCB Order. Analysis must be performed according to the test methods, RLs, and reporting units specified in Table 4-4, unless otherwise specified. Suspended solids and turbidity levels are highly variable in receiving water bodies, especially during wet weather events. Collecting a single sample at the upstream and downstream locations during a discharge event may not provide a set of samples that represent the typical conditions at either location.

Receiving water samples should be collected following collection of stormwater discharge samples (daily during qualifying precipitation events; see Section 7), assuring that receiving water monitoring occurs after the project site’s stormwater begins to discharge into the receiving water. Sample collection should be conducted only during scheduled project working hours. Sample collection should not be performed during dangerous weather conditions, such as flooding and electrical storms, or when site conditions are unsafe.

[15] For example, the North Coast RWQCB (Region 1) has issued multiple 401 Water Quality Certifications for Caltrans projects requiring effluent, upstream (background), and downstream monitoring four times daily for flow, pH, temperature, dissolved oxygen, total dissolved solids, turbidity, and specific conductance.

10.3 Where to Monitor

Both upstream and downstream samples from a discharge location must be collected. If two or more discharge locations discharge to the same receiving water, the receiving water may be sampled at a single upstream and downstream location.

- **Upstream/up-gradient receiving water samples.** Samples must be collected from a representative and accessible receiving water location as close as possible and upstream from the effluent discharge point.
- **Downstream/down-gradient receiving water samples.** Samples must be obtained from a representative and accessible receiving water location downstream from the effluent discharge point. The receiving water sampling location must be as close as possible to the effluent discharge point, but also where the discharge is fully mixed with the receiving water stream.

The upstream location is required to establish the water quality of the receiving water prior to coming in contact with the discharges from the construction site. The downstream location is required to establish the water quality of the receiving water after coming in contact with the discharges.

Upstream and downstream receiving water sampling may take place on a variety of water bodies, including rivers and creeks, lakes, or tidally-influenced bays, estuaries, and sloughs. Each type of water body will have a unique pair of upstream/downstream sampling points.

10.3.1 Rivers and Creeks

Establishing upstream and downstream monitoring locations on rivers and creeks is relatively straightforward because the flow typically occurs in the downstream direction. Exceptions include tidally influenced or flow-controlled rivers and creeks; for such situations, see discussion of bays, estuaries and sloughs in Section 10.3.3.

The upstream sampling location should be established at a point along the stream bank that is upstream of all possible direct discharge points from the construction site. The actual samples should be collected in or as near as possible to the mainstream flow/current. If the discharge creates a visible plume in the river or creek, avoid collecting a sample near this plume.

The downstream sampling location should be established along the stream bank downstream of all direct discharge points from the construction site. Inspect the stream bank (and opposite stream bank if possible) for discharge points from other sites or sources that could add pollutants to the downstream sampling location and avoid locating downstream sampling locations where they may be affected by other discharges. If possible, the location should be far enough downstream so the project discharge(s) has mixed with the upstream flows, but not so far downstream that other discharges may affect stream quality. Avoid establishing the sampling location near the point of discharge or in the initial zone of dilution (within 5 meters or 20 feet). Establishing the sampling point at least 15 meters (50 feet) downstream from the discharge is a good general rule.

Be prepared to change locations for each event. The actual downstream sampling location will depend on the size of the plume and most likely vary for each event. The size of the plume will depend on the upstream flow rate and associated sediment load as well as the discharge flow

rate and associated sediment load. Section 10.4 includes further details of the sample collection process.

10.3.2 Lakes

Establishing upstream and downstream stations along lakes presents a challenge because there is no consistent flow direction, and often there is no discernible flow pattern. Wind direction usually dictates the direction of flow, if any. Sampling personnel should expect to identify both the upstream and downstream locations during each individual sampling event.

The upstream sampling location should be established well away from any discharge point. Wave action may stir up sediments near the shore, so samples should be collected out from the shore and away from any visual plume.

The downstream sampling location should be established based on the direction the plume travels. Samples should be collected at the point closest to the discharge where the plume has mixed with the surrounding water, but before the plume commingles with another discharge or with sediment stirred up by the action of waves. If the plume heads out from shore, sampling may have to be performed from a boat.

10.3.3 Bays, Estuaries, and Sloughs (Tidally Influenced Waters)

For bays, estuaries, and sloughs, the flow direction is dictated by tides and/or wind. The direction of the flow typically will change throughout the day as the tide flows in and out. Sampling personnel should consult daily tide charts to know whether the tide is coming in or going out. Upstream and downstream locations will depend on the flow patterns at the time sampling takes place.

For linear water bodies (estuaries, sloughs, rivers, creeks) that are tidally influenced, collect samples on the outgoing (ebb) tide whenever feasible.

The upstream sampling location should be established at a point along the shore that is upstream of all possible direct discharge points from the construction site. Wave or tidal action may stir up sediments near the shore so samples should be collected out from the shore and away from any other visual plume.

The downstream sampling location should be established based on the direction the plume travels. Samples should be collected at the point closest to the discharge where the discharge has mixed with the surrounding water, but before the plume commingles with either another discharge or sediment stirred up by the action of waves. If the plume heads out from shore, sampling may have to be performed from a boat.

10.3.4 General Considerations

In general, each potential monitoring location should be visited in advance to confirm the expected site characteristics and verify whether the site is suitable for monitoring. Access into the monitoring locations must be feasible, practical, legal, and safe. Ease of vehicle and personnel access to the monitoring locations should be assured for the full range of weather conditions that may be encountered. Safe access must be confirmed, especially during wet weather conditions. For example, ensure that the access point and available parking are at a

safe distance from traffic, that any roads to the sampling location are adequate and reliable (e.g., limited potential to be muddy or flooded during wet weather), and that access does not require crossing private property. Check with local agencies as to whether any permits will be required to gain legal access to the sites.

When possible, a visit should be conducted during a storm, when the in-stream flow conditions can be observed. A wet weather visit can provide valuable information regarding logistical constraints that may not be readily apparent during dry weather. However, a dry weather visit should also be conducted to observe any non-stormwater flows. A number of potential sampling locations will have to be identified at constructions sites along lakes, bays, estuaries, and sloughs, as the actual direction of the flow will not be known until the time of the discharge.

Information to gather during a site visit may include whether an appropriate sampling location exists, potential safety issues, and site access. In addition, it is useful to identify potential contributions of runoff from adjacent areas and in-stream conditions such as other point sources, backwater effects, tidal or wind influences, and poorly mixed flows.

Monitoring locations for upstream and downstream sampling stations may vary with each event. Field sampling and testing personnel should be prepared to modify sampling locations to maximize the representativeness of the samples. Sampling locations must be identified on the WPCDs. Detailed field notes and or photographs should be used to document the conditions and reasons for selecting a specific monitoring location, including GPS coordinates, post miles, etc. to define locations. Photographs are helpful to show the discharge(s), in-stream conditions, and sample collection methods.

10.4 How to Monitor

10.4.1 Grab Sample Collection

Manual grab sampling techniques will be used to collect receiving water samples. A grab sample is an individual sample collected at one specific site at one point in time. Analysis of a grab sample provides a “snapshot” of the water’s quality. Manual grab samples are typically collected by direct submersion of each individual sample bottle into the flow stream. See Section 4.6 for additional detail on sample collection techniques.

When collecting samples at the upstream/downstream stations, samples should be collected at the downstream station first. Sampling may disturb the bottom sediment. If the upstream sample is collected first, the disturbed sediment may be carried downstream and possibly impact the downstream sample. At both sites, face upstream to collect a sample, and always collect the sample upstream of the sampler’s body and/or sampling vessel.

Wading into a water body to collect a sample should be avoided when feasible. Wading will disturb the bottom sediment and increase the suspended sediment levels in the water column where the samples will be collected. Wading into a river or creek is also dangerous during wet weather events because flow rates are often higher. Wading should only be performed if the flow depth is less than 1 foot. Approach the sampling point from the downstream direction.

Standing on the bank and using a sampling pole to collect a sample is a preferred technique when it is necessary to reach into a stream for the sample. A boat can be used to access sites out in lakes, bays, estuaries, sloughs, and large slow-moving rivers.

Samples should be collected from below the surface of the receiving water body, at a depth of approximately 4 inches, if possible.

10.4.2 Measurement of pH and Turbidity

When feasible, pH and turbidity measurements should be made in the field by immersing the probe directly into the receiving water body, below the surface, at a depth of approximately 8 inches. The probe may be attached to the end of the sampling rod to reach the receiving water sampling location. When that is not possible, the measurements should be made from a sample collected in an intermediate sample container from a depth of approximately 4 inches. If pH and turbidity measurements are taken using separate meters, the measurements should be made in separate containers to ensure sample integrity. Samples that are used to measure pH and turbidity should not be sent to the laboratory for other analyses.

10.4.3 Sampling and Analysis Requirements

See Table 4-1 and Table 4-2 for sampling and analysis requirements.

10.5 Data Evaluation, Follow-up, and Reporting

10.5.1 Data Evaluation

The CGP requires that projects ensure all stormwater discharges and authorized non-stormwater discharges to any surface or groundwater will not adversely affect human health or the environment. In addition, stormwater discharges and authorized non-storm water discharges may not cause or contribute to an exceedance of any applicable WQOs or water quality standards. Water quality standards are published in Basin Plans adopted by each RWQCB, the California Toxics Rule, the National Toxics Rule, and the Ocean Plan.

The applicable water quality standards for a given receiving water can be determined by consulting the Regional “Water Quality Control Plans” (commonly called “Basin Plans”), which are available on each RWQCB website. The WQOs are generally specified in Chapter 3 of the Basin Plan, listed alphabetically by constituent. The WQOs listed in a Basin Plan generally cover all surface water bodies within that region; exceptions for specific water bodies are listed under the WQOs for each constituent. The Basin Plans are available by accessing the SWRCB web site.[16]

10.5.2 Assessing the Need for Corrective Measures

If a comparison of the upstream and downstream samples indicates a substantial increase in pH or turbidity (i.e., concentration exceeds WQOs), the source needs to be identified and corrective measures identified. See Section 4.12.3 for additional information.

[16] To select the link for the appropriate RWQCB, visit www.swrcb.ca.gov. Each individual RWQCB web page includes a link to access the corresponding Basin Plan.

10.5.3 Implementing Corrective Measures

If the project site conditions or run-on from offsite are found to be contributing sediment, silt, or other RWQCB-specified constituent to the runoff, the following steps should be taken as soon as possible:

- Repair or replace any BMP that has failed, resulting in a discharge and/or elevated levels of pH, turbidity, or SSC in the runoff.
- Improve maintenance at all BMPs that did not function as designed, resulting in discharge and or elevated levels of pH or turbidity in the runoff.
- Implement BMPs in areas identified as generating discharges or sources of elevated pH or turbidity.
- Implement additional, alternative, or redesigned BMPs to provide an effective combination of control measures on the site.

10.5.4 Reporting

See Section 11 for reporting and recordkeeping requirements.

Section 11

Timeline, Reporting, and Recordkeeping

This section summarizes the monitoring and sampling schedule by Risk Level. This section also describes recordkeeping and reporting requirements necessary to implement the CSMP.

11.1 Monitoring Timeline

All Caltrans SWPPP projects must conduct visual monitoring and runoff water quality sampling and testing to comply with the CGP. Table 2-1 summarizes the CGP requirements. A summary of the timeline of requirements is presented below.

11.1.1 Risk Level 1 Timeline for Storm-Based Monitoring

Within **2 business days *before*** a forecasted storm event:[17]

Conduct pre-storm inspections

Within **8 hours** of discharge occurring during project working hours:

Collect non-visible pollutant samples (if required)

At least once each **24-hour period** during extended storm events:

Conduct stormwater BMP inspections

Sample accumulated stormwater discharges during qualifying precipitation events[18] and during forecasted storm events (even if the storm event has not yet produced 0.5 inch of rain on the day of sampling). In addition, for sampling discharges of groundwater dewatering discharge:

Collect effluent (accumulated stormwater and groundwater discharge) samples
Perform field pH and turbidity measurements

Within **48 hours** of a discharge event or discovery of evidence of a prior discharge:

Submit Notice of Discharge Report form (DOT CEM-2061SW) to the RE

[17] Caltrans defines a “storm event” as qualifying precipitation event in the Caltrans *Standard Specifications*.

[18] A qualifying precipitation event is defined as any weather pattern that is forecast to have a 50% chance or greater probability of precipitation and a quantitative precipitation forecast of 0.5 inches or more within a 24-hour period. The event begins with the 24-hour period when 0.5 inches has been forecast and continues for subsequent 24-hour periods when 0.25 inches of precipitation or more is forecast.

Within **2 business days *after*** each qualifying precipitation event:

Conduct post-storm inspections

Within **48 hours** after collecting non-visible pollutant samples:

Submit field analysis measurements to the RE

Within **30 days** of collecting non-visible pollutant samples:

Submit laboratory analyses to the RE

11.1.2 Risk Level 2 Timeline for Storm-Based Monitoring

Within **2 business days (48 hours) *prior*** to each forecasted storm event:

Conduct pre-storm inspections

Within **first 8 hours** of discharge occurring during project working hours:

Collect non-visible pollutant samples (if required)

At least **once each 24-hour period** during extended storm events:

Conduct stormwater BMP inspections

Daily sampling of each representative monitoring location (defined in Section 7.3 and from accumulated stormwater discharges during qualifying precipitation events and during forecasted storm events (even if the storm event has not yet produced 0.5 inch of rain on the day of sampling). Caltrans also requires collecting samples from discharges of groundwater dewatering discharge:

Collect effluent (stormwater, accumulated stormwater, and groundwater discharge) samples
Perform field pH and turbidity measurements

Within **48 hours** of a discharge event or discovery of evidence of a prior discharge:

Submit Notice of Discharge Report form (DOT CEM-2061SW) to the RE

Within **2 business days (48 hours) *after*** each qualifying precipitation event:

Conduct post-storm inspections

Within **48 hours *after*** storm event:

Contractor submits exceedance report (DOT CEM-2062SW or DOT CEM-2063SW) to the RE if an NAL or NEL exceeded.

Within **10 days *after*** storm event:

RE submits testing results to SWRCB via SMARTS if pH or turbidity NAL exceeded

Within 1**0 days *after*** receiving analytical laboratory results for TMDL-related NAL or NEL:

RE submits testing results to SWRCB via SMARTS

If NAL exceedance report is requested by RWQCB:

RE submits NAL exceedance report to RWQCB

Within **48 hours** of collecting samples:

Submit field analysis measurements to the RE

Within **30 days** of collecting samples:

Submit laboratory analyses to the RE

11.1.3 Risk Level 3 Timeline for Storm-Based Monitoring

Within **2 business days (48 hours)** ***prior*** to each forecasted storm event:

Conduct pre-storm inspections

Within **first 8 hours** of discharge occurring during project working hours:

Collect non-visible pollutant samples (if required)
Conduct stormwater storm BMP inspections

At least **once each 24-hour period** during extended storm events:

Conduct stormwater BMP inspections

Daily sampling of each representative monitoring location (defined in Section 7.3 and from accumulated stormwater discharges during qualifying precipitation events and during forecasted storm events (even if the storm event has not yet produced 0.5 inch of rain on the day of sampling). Caltrans also requires collecting samples from discharges of groundwater dewatering discharge:

Collect effluent (stormwater, accumulated stormwater, and groundwater discharge) samples
Perform field pH and turbidity measurements

Within **24 hours** of a discharge event or discovery of evidence of a prior discharge:

Submit Notice of Discharge Report form (DOT CEM-2061SW) to the RE

Within **2 business days (48 hours)** ***after*** each qualifying precipitation event:

Conduct post-storm inspections

Within **48 hours** ***after*** storm event:

Contractor submits exceedance report (DOT CEM-2062SW or DOT CEM-2063SW) to the RE if an NAL or NEL exceeded

Within **10 days** ***after*** storm event:

RE submits testing results to SWRCB via SMARTS if pH or turbidity NAL exceeded

Within 1**0 days** ***after*** receiving analytical laboratory results for TMDL-related NAL or NEL:

RE submits testing results to SWRCB via SMARTS

If NAL exceedance report is requested by RWQCB:

RE submits NAL exceedance report to RWQCB

Within **48 hours** of collecting samples:

Submit field analysis measurements to the RE

Within **30 days** of collecting samples:

Submit laboratory analyses to the RE

Within **6 hours** after Receiving Water Monitoring Trigger exceedance (for site with direct discharge into a receiving water):

Contractor submits results to the RE

When Receiving Water Monitoring Trigger is exceeded (for site with direct discharge into a receiving water):

Sample upstream and downstream of discharge in receiving water

Within **48 hours** of collecting samples:

Submit field analysis measurements to the RE

Within **30 days** of collecting samples:

Submit laboratory analyses to the RE

11.2 Data Reporting

To facilitate data management, analysis, and the comparison of results to NALs, NEL or Receiving Water Monitoring Triggers, a standard system for data reporting should be followed for each project. Both electronic and hardcopy data must be filed in Category 20 of the project files in an organized and easily accessible fashion (see Section 11.3).

To keep the data organized, each monitoring site, location, and sampling event should be assigned a unique sample identification code. All the data should be organized and associated with them. See Section 4.4.3 for additional information on assigning unique identification codes.

The RE must be notified of sample testing results per the contract specifications. The RE will access the SWRCB's Storm Water Multi-Application and Report Tracking System (SMARTS) and electronically upload any required reports or field data. Results must be submitted to the RE within:

- 6 hours after a Receiving Water Monitoring Trigger exceedance is identified (Risk Level 3 sites with direct discharge to receiving water only)
- 48 hours after an NAL or NEL exceedance is identified (Risk Level 2 or 3 sites)
- 48 hours of field analysis measurements (with no exceedance)
- 30 days of collecting samples for laboratory analyses

All test results shall be documented on either the Storm Event Sampling or Receiving Water Monitoring Report form (DOT CEM-2052SW), with the laboratory report (as applicable), and entered on the Storm Event SWPPP Sampling Log form (DOT CEM-2051SW). These forms

shall be considered accountable documents. If an error is made on an accountable document, the individual responsible for the error shall make corrections by lining through the error and entering the correct information. The erroneous information shall not be obliterated. All corrections shall be initialed and dated by the individual responsible.

A copy of all water quality analytical results and QA/QC data shall be submitted to the RE within 48 hours of sampling for field analyzed samples, and within 30 days for laboratory analyses. For field tests, the submitted information shall include a signed copy of the Sample Information, Identification and Chain-of-Custody Record, Storm Event Sampling or Receiving Water Monitoring Report form (DOT CEM-2052SW), and an updated Storm Event SWPPP Sampling Log form (DOT CEM-2051SW).

Attribute data (also known as meta data) also should be collected to assist with data interpretation. The attribute data usually describes the sample, event, and site; each of these attribute types is described below.

The sample description may provide information on the sample itself: when and how it was collected, what it was analyzed for, the method and laboratory used to perform the analysis, and the result of the analysis. This section also can characterize the sample source, as well as the portion of a rain event that is represented by the sample.

The event information describes the discharge event itself. This includes when the rain started and stopped, when runoff started and ended, when the discharge to the receiving stream started and ended, and antecedent dry days.

Site description information spans a range of categories from geographic information and boundaries, such as coordinates, hydrologic sub-area, land use, and size of the watershed, to local data such as county, Caltrans district, and RWQCB district.

All original data documented on sample bottle identification labels, chain-of-custody forms, sampling activity logs, and inspection checklists will be recorded using waterproof ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information must not be obliterated. All corrections must be initialed and dated.

In addition to a paper copy of the water quality test results, the test results shall be submitted electronically in Microsoft Excel (.xls) format, and shall include, at a minimum, the following information from the laboratory: Sample ID Number, Contract Number, Constituent, Reported Value, Laboratory Name, Method Reference, Method Number, Method Detection Limit, and Reported Detection Limit. When possible, electronic data should be reported in a format consistent with the Caltrans *Comprehensive Protocols Guidance Manual* (Caltrans, 2003). Electronic copies of stormwater data shall be forwarded by e-mail to the RE.

Requirements for reporting discharges are detailed in Section 3.2.2 and include completing and submitting the Notice of Discharge Report form (DOT CEM-2061SW). Completed Notice of Discharge Reports must be submitted to the RE within 48 hours of a discharge event or discovery of evidence of a prior discharge. Copies of the Notice of Discharge Reports must be kept in SWPPP File Category 20.11 “Notice of Discharge Reports.”

Reporting requirements for non-visible pollutants are detailed in Section 5. Reporting requirements for NAL or Receiving Water Monitoring Trigger exceedances for non-stormwater discharges are detailed in Section 6, stormwater discharges are detailed in Section 7, active

treatment system discharges are detailed in Appendix B), and receiving waters (Section 10) are detailed below.

11.2.1 Procedure for Reporting and Correcting NAL or NEL Exceedances

In the event the measurement exceeds an applicable NAL or NEL:

- Submit Numeric Action Level Exceedance Report (DOT CEM-2062) to the RE within 48 hours per the contract specifications. The RE will electronically submit sampling results to SWRCB via SMARTS no later than 10-30 days after the conclusion of the storm event based on type of exceedance.
- Assess the need for corrective actions. For example, determine whether the exceedance is due to run-on or a failed BMP. The WPC manager must inspect all BMPs to determine if any repairs are required. If the BMPs do not require repairs and the exceedance is not due to run-on, the WPC manager must redesign or implement new BMPs.
- Implement corrective actions (if necessary), such as repairs or design changes, to BMPs.

If RWQCB requires an NAL Exceedance Report (DOT CEM-2062SW) or NEL Violation Report (DOT CEM-2063SW), the report must be certified by the discharger in accordance with Section IV.B of the CGP and include:

- The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit must be reported as “less than the method detection limit”).
- The date, place (sampling location), time of sampling, visual inspections results, and/or measurements, including rain gauge readings.
- An assessment of the existing BMPs associated with the sample that exceeded the NAL and each of the proposed corrective actions taken including photographs, and date of implementation.
- Run-on monitoring results if there is reason to believe run-on may contribute to an exceedance.

If TMDL-related numeric effluent limitation exceedance

- All dischargers shall comply with the water quality-based corrective action requirements in Section VI.Q of the CGP.

11.2.2 Procedure for Reporting and Correcting Receiving Water Monitoring Trigger Exceedances

If any effluent measurement exceeds an applicable Receiving Water Monitor Trigger (Risk Level 3 projects with direct discharge to receiving water only):

- The contractor must immediately notify the RE and submit results to the RE within 48 hours after a monitoring result is identified that exceeds any applicable Receiving Water Monitoring Trigger per the contract special provisions.

- The receiving waters must be subsequently sampled (upstream and downstream of outfall) for pH, turbidity, and any additional parameters for which monitoring is required by RWQCB.

11.3 Recordkeeping

All field measurements and laboratory analytical data must be kept in the SWPPP file. To manage the various documents required to by the SWPPP and to provide easy access to the documents, the following SWPPP file categories will be used to file SWPPP compliance documents:

File Category 20.01	Stormwater Pollution Prevention Plan (SWPPP)
File Category 20.02	Stormwater Pollution Prevention Plan Amendments
File Category 20.03	Water Pollution Control Schedule Updates
File Category 20.05	Notice of Intent
File Category 20.06	Legally Responsible Person Authorization of Approved Signatory
File Category 20.10	Correspondence
File Category 20.21	Subcontractor Contact Information and Notification Letters
File Category 20.22	Material Supplier Contact Information and Notification Letters
File Category 20.23	Contractor Personnel Training Documentation
File Category 20.31	Contractor Stormwater Site Inspection Reports
File Category 20.32	Caltrans Stormwater Site Inspection Reports
File Category 20.33	Site Visual Monitoring Inspection Reports
File Category 20.34	Best Management Practices Weekly Status Reports
File Category 20.35	Corrective Actions Summary
File Category 20.40	Weather Monitoring Logs
File Category 20.45	Storm/Rain Event Action, Sampling and Analysis Plans
File Category 20.50	Non-Stormwater Discharge Sampling and Test Results
File Category 20.51	Non-Visible Pollutant Sampling and Test Results
File Category 20.52	Turbidity and pH Sampling and Test Results
File Category 20.53	Required Regional Water Board Monitoring Sampling and Test Results
File Category 20.54	ATS Monitoring Sampling and Test Result
File Category 20.55	Field Testing Equipment Maintenance and Calibration Records
File Category 20.61	Notice of Discharge Reports
File Category 20.62	Numeric Action Level Exceedance Reports
File Category 20.63	Numeric Effluent Limitation Violation Reports
File Category 20.80	Stormwater Annual Reports
File Category 20.90	Notice of Termination

The forms listed in Table 11-1 (as applicable) must be completed, maintained at the site with the SWPPP, and submitted to Caltrans per the contract specifications. The Caltrans stormwater forms are available online.[19]

Retain all reports and records (including completed inspection forms) of all visual inspections and water quality monitoring for at least three years from the time Caltrans accepts the project. All records must be retained onsite with the SWPPP while construction is ongoing.

Table 11-1. Caltrans Stormwater Forms

Form Number	Form Title	Description	Submittal Requirements	SWPPP File Category
DOT CEM-2006SW	Legally Responsible Person Authorization of Duly Authorized Representative	Form is used by the Legally Responsible Person (LRP) to authorize a Duly Authorized Representative in accordance with provisions in Section IV of the Construction General Permit (CGP).	Completed by Caltrans, local agency, or private entity LRP. Include a copy of the completed form in the project SWPPP.	20.06
CEM-2006T	Legally Responsible Person Authorization of Approved Signatory – Lake Tahoe Hydrologic Unit	Form is used by the Legally Responsible Person (LRP) to authorize an Approved Signatory in accordance with Order No. R6T-2016-0010, NPDES No. CAG616002.	Completed by Caltrans, local agency, or private entity LRP. Include a copy of the completed form in the project SWPPP.	20.06
DOT CEM-2008SW	SWPPP/WPCP Amendment Certification and Acceptance	Complete form for each SWPPP or WPCP amendment.	Must be used as the cover sheet for each amendment. Submit to the WPC manager and RE for review and approval (signature).	20.02
DOT CEM-2009SW	SWPPP/WPCP Amendments Log	Used to list all amendments to the SWPPP or WPCP.	Attach a completed copy of the form to each approved SWPPP/WPCP amendment and include as Attachment to the SWPPP or WPCP.	20.02
DOT CEM-2020SW	Qualified Stormwater Pollution Prevention Plan Practitioner (QSP) Delegate Training Record	Used this to list all the training received by the QSP Delegate	Attach a completed copy of the form to show training has been completed and QSP Delegate can assists WPC manager in implementing the SWPPP	2023
DOT CEM-2023SW	Stormwater Training Record	Used to list all stormwater training conducted during the project. Use this form to document required weekly informal stormwater training.	Submit to the RE within five days of the date of training.	20.23
DOT CEM-2024SW	Stormwater Training Log	Used to document training for employees responsible for activities associated with CGP compliance and contract specifications.	Submit updated copy to the RE within five days of the date of training.	20.23
DOT CEM-2030SW	Stormwater Site Inspection Report	Used to document visual monitoring including photographs	Submit original to the RE within 24 hours of inspection.	20.31
DOT CEM-2032SW	Permanent Erosion Control Establishment (PECE) Report	Used to document visual monitoring for projects with Plant Establishment line item	Submit updated copy to the RE within five days	20.32

[19] http://www.dot.ca.gov/hq/construc/forms.htm.

Table 11-1. Caltrans Stormwater Forms

Form Number	Form Title	Description	Submittal Requirements	SWPPP File Category
DOT CEM-2033SW	Dewatering Operations Sampling Report	Used to document monitoring of dewatering operations for SWPPP projects subject to CGP Attachment J	Submit updated copy to the RE within 24 hours after completing dewatering and each day of operations	20.33
DOT CEM-2035SW	Stormwater Corrective Actions Summary	Shall be completed for any deficiencies that were identified during visual monitoring (site inspection) and for corrections of deficiencies.	Submit to the RE when corrections are completed but must be submitted within five days of the site inspection.	20.35
DOT CEM-2051SW	Storm Event SWPPP Sampling Log	Form used to document details of all sampling events	Submit to the RE along with form DOT CEM-2052SW	20.50, 20.51, 20.52, 20.53, or 20.54
DOT CEM-2052SW	Storm Event Sampling or Receiving Water Monitoring Report	Required to be completed for each sample or set of samples.	Submit to the RE with form DOT CEM-2051SW within 48 hours of sampling.	20.50, 20.51, 20.52, 20.53, or 20.54
DOT CEM-2061SW	Notice of Discharge Report	To be completed when discharges are causing or contributing to an exceedance of an applicable water quality standard.	Discharges reported to the RE verbally when discovered. Submit original form to the RE within 24 hours of discovery.	20.61
DOT CEM-2062SW	Numeric Action Level Exceedance Report	Complete if the effluent sample analysis results exceed an applicable numeric action level (NAL).	Submit the original form to the RE within 48 hours. The RE will electronically sample results to the SWRCB via Storm Water Multi-Application and Report Tracking System (SMARTS) within 10 after the conclusion of the storm event.	20.62
DOT CEM-2063SW	Numeric Effluent Limitation Violation Report	For CGP projects that have NEL exceedance, whether its TMDL, ATS or effluent sample analysis results exceeds an applicable numeric effluent limitation (NEL).	Immediately report to the RE verbally. Submit the original form to the RE within six hours after violation is identified. The RE will electronically submit an NEL Violation Report to the SWRCB via SMARTS within 24 hours after the NEL exceedance has been identified.	20.63
DOT CEM-2075SW	Project Stormwater Annual Report	Annual report is required to be submitted by the Water Pollution Control Manager to the Resident Engineer by July 15 of each year.	Submit to the RE by July 15.	20.80
DOT CEM-2080SW	Stormwater Change of Information (COI)	CGP requires this form be completed for adding DSA, inactive status and other specific criteria		
DOT CEM-2090SW	Notice of Termination and Final Stormwater Inspection Report	The CGP requires a final inspection for projects that have been completed and will be transferred to Division Of Maintenance. Must include TBMP photos.		20.90

Section 12

References

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Thayumanavan, P., Nelson, P.O., Azizian, M., Williamson, K.J., and Lundy, J.R. 2001. Environmental Impact of Construction and Repair Materials on Surface and Ground Water. *Transportation Research Record.* Vol. 1743, Issue 1. National Cooperative Highway Research Program. https://doi.org/10.3141/1743-04. January.

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United States Environmental Protection Agency (EPA). 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Office of Water (4303T). Document No. EPA-821-R-02-012. 5th Ed. October.

Appendix A

Forms Instructions

A1 Forms Instructions

This section describes how to complete the Caltrans forms required for compliance with the CGP, the Caltrans Stormwater Permit, and contract specifications. These forms (as applicable) must be completed, maintained at the site with the SWPPP or WPCP (if applicable), and submitted to Caltrans per the contract specifications. These forms are available on the Caltrans website at http://www.dot.ca.gov/hq/construc/stormwater/inspection.html.

Instructions on completing the following forms are provided below:

DOT CEM-2020SW	Qualified Stormwater Pollution Prevention Plan Practitioner (QSP) Delegate Training Record
DOT CEM-2023SW	Stormwater Training Record
DOT CEM-2024SW	Stormwater Training Log
DOT CEM-2030SW	Stormwater Site Inspection Report
DOT CEM-2032SW	Permanent Erosion Control Establishment (PECE) Report
DOT CEM-2033SW	Dewatering Operations Sampling Report
DOT CEM-2035 SW	Stormwater Corrective Actions Summary
DOT CEM-2051SW	Storm Event SWPPP Sampling Log
DOT CEM-2052SW	Storm Event Sampling or Receiving Water Monitoring Report
DOT CEM-2061SW	Notice of Discharge Report
DOT CEM-2062SW	Numeric Action Level Exceedance Report
DOT CEM-2063SW	Numeric Effluent Limitation Violation Report

A2 General Project Title Block Form Instructions

Contract Number/Co/Rte/PM

For local agency encroachment permit projects, write the encroachment permit number in the Contract Number field.

Project Identifier Number

Caltrans projects starting on or after July 1, 2010, will have a Project Identifier Number. For projects without a Project Identifier Number, enter “N/A” in the field.

WDID Number

The WDID number is the number that the SWRCB gives each permittee when the permittee applies for an NOI under the CGP. For projects with a Water Pollution Control Program (WPCP), enter “WPCP” in this field.

Project Site Risk Level

The CGP requires construction activity that results in soil disturbance of 1 acre or more to be permitted under the CGP and have a fully developed site SWPPP. Construction projects with a disturbed soil area of less than one acre do not require coverage under the CGP; however, Caltrans requires that a WPCP be prepared. For projects with a WPCP, check “WPCP,” if applicable to the form. For a project in the Lake Tahoe Hydrologic Unit, check “N/A.”

For projects with SWPPPs, check the project's Risk Level. The CGP establishes three levels of possible risk for a construction site (Risk Level 1, 2, or 3). The CGP regulatory requirements vary depending on the risk level of the project. The project's Risk Level is specified in the contract's special provisions.

A3 DOT CEM-2020SW Qualified Stormwater Pollution Prevention Plan Practitioner (QSP) Delegate Training Record

This form is used to document each stormwater training conducted for contractor and subcontractor employees who will function as QSP delegates during the project. Foundational and site-specific training is required before the staff can assist the WPC manager with water pollution compliance work.

A3.1 SUBMITTAL/FILING REQUIREMENTS

Provide this training record to the RE within five days of the date of training. File a copy of the form in SWPPP File Category 20.23. Include the form and required training documentation in the SWPPP.

A3.2 FORM INFORMATION

Title Block

See Section A.1 for information on completing the general project information section.

QSP Delegate Training Record

Complete form as indicated on form. Name, phone number, specific training and its duration, along with the instructor information.

Minimum Required Stormwater Topics

Check one of the following responses:

- **Yes or No** – Foundational and Site-Specific Training for individuals responsible for activities associated with compliance with the CGP must take place and be documented before they can assist the WPC manager.

In addition, other additional training that took place can be selected.

Review and Record Keeping (DOT CEM-2020SW, Page 2)

The Contractor, the WPC manager and the QSP delegate must review, sign, and date the form.

A4 DOT CEM-2023SW Stormwater Training Record

A4.1 GENERAL INFORMATION

This form is used to document each stormwater training (formal and informal) conducted for contractor and subcontractor managers, supervisors, and employees during the project. A new form must be completed for each stormwater training conducted. The form details which individuals have attended the training and topics covered. Stormwater Training Log (DOT

CEM-2024SW) can also be updated when new training is conducted. See Section 4.3 for stormwater training requirements.

Stormwater training includes CGP-required specific training or certifications for key personnel (SWPPP preparers, WPC managers, Alternate WPC managers, QSP delegates, stormwater monitoring samplers, etc.) to ensure their level of knowledge and skills are adequate to capably design and evaluate project specifications in compliance with CGP requirements. Formal stormwater training includes QSD, QSP, Caltrans-approved 8-hour WPC Managers Stormwater Training, and Active Treatment System Operator Training.

This form also documents informal stormwater training. For Caltrans QA/QC purposes, all training project managers, supervisory personnel, subconsultants, and employees involved in WPC work must be trained in stormwater BMP implementation and maintenance standards. This training includes WPC rules and regulations that provide guidelines in sediment and erosion control standards, spill prevention, identifying and handling hazardous substances, proper construction waste management, construction site monitoring, and stormwater quality sampling and analysis. WPC training must be completed prior to working on the job and be conducted weekly thereafter.

A4.2 SUBMITTAL/FILING REQUIREMENTS

Provide this training record and an updated copy of Stormwater Training Log (DOT CEM-2024SW) to the RE within five days of the date of training. File a copy of the form in SWPPP File Category 20.23.

A4.3 FORM INFORMATION

Title Block

See Section A.1 for information on completing general project information section.

Stormwater Training Topics

Check appropriate stormwater topic and attach any handouts provided to the trainees.

Attendee Roster

Enter employee name and employee's company name. Employee must initial.

Review and Record Keeping (DOT CEM-2023SW, Page 2)

The instructor, contractor, and the WPC manager must review and sign the form.

A5 DOT CEM-2024SW Stormwater Training Log

A5.1 GENERAL INFORMATION

This form is used to log all stormwater training conducted for contractor and subcontractor managers, supervisors, and employees. The form provides a summary or running log of all training conducted for the project. See general information for Stormwater Training Record (DOT CEM-2023SW) for types of stormwater training required by the CGP and Caltrans.

A5.2 SUBMITTAL/FILING REQUIREMENTS

Provide an updated copy of this form with attached training documentation to the RE within five days of the training date. File a copy of the form in SWPPP File Category 20.23.

A5.3 FORM INFORMATION

Stormwater Training Log

Complete the training date, topics covered and number of trained staff from DOT CEM-2023SW.

Review and Record Keeping (DOT CEM-2024SW)

The contractor must review and sign the form.

A6 DOT CEM-2030SW Stormwater Site Inspection Report

A6.1 GENERAL INFORMATION

This form documents stormwater inspections conducted to comply with the CGP. Inspections that must be documented on this form are:

- QSD specific inspections
- QSD or QSP specific inspections
- Weekly BMP inspections
- Pre-storm, during storm, and post-qualifying event inspections
- Monthly inactive

See Section 3 for information on what is required for each inspection.

A6.2 SUBMITTAL/FILING REQUIREMENTS

Submit the original from to the RE within 24 hours of inspection. File a copy of the form in SWPPP File Category 20.31.

A6.3 FORM INFORMATION

If the inspection form does not contain enough lines to report all job site locations or issues, use “Add Item” so that all inspected locations are reported.

Title Block

See Section A.1 for information on completing general project information section.

Inspection Type

Check one of the inspection types. See Section 3 for description of each inspection type. Complete Storm Information for the selected inspections type located on the same row.

Weather and Site Conditions Information

Complete the storm information for the selected inspection type. Weather information should be the best estimate.

Construction Phase

Select appropriate phase of the construction: highway construction, plant establishment, or inactive status (inactive requires an approved Change of Information).

Site Information

Complete the acreage of the project site disturbed area (active and inactive).

Precipitation Event Information

Complete the storm information for the selected inspection type. Weather information should be the best estimate of beginning of the storm event, duration of the event, and time elapsed since the last storm. Rainfall amounts should be recorded from the project site rain gauge.

For completing pre-storm information, see Section 4.4.1 for information on weather tracking. Obtain forecasted precipitation information from the National Weather Service Forecast Office website, http://www.weather.gov.

Rainfall amounts should be recorded from the project site rain gauge.

Site Inspection of Best Management Practices (DOT CEM-2030SW, Pages 2-15)

Project BMPs must be inspected daily during some activities (see Section 3.2.3), during weekly BMP inspections, and during pre-storm, during storm, and post-storm inspections. See Section 3.2.3 for additional information on inspecting BMPs.

If BMP failures or shortcomings are identified during the inspection, repairs or design changes to BMPs, as directed by the WPC manager, must be completed within 24 hours of identification, unless a longer period is authorized per Caltrans *Standard Specifications* (Section 13). All corrective actions reported on this form also must be reported on the Stormwater Corrective Actions Summary form (DOT CEM-2035SW). See Section 3.2.3 for additional information on identifying corrective measures.

Answer questions by clicking on box next to either Yes or No. The form is automated and will expand if additional locations are necessary.

Include photographs and their location.

If a specific BMP is not included on pages 2-15, add it as a site-specific BMP.

Water Pollution Control Visual Site Inspection Report General Comments (DOT CEM-2030SW, Page 16)

Review the SWPPP and corrective actions identified during the inspection(s) to answer the questions.

Daily Site Inspections for the Past Week (DOT CEM-2030SW, Page 16)

List daily inspections for previous calendar week, who performed the inspection and whether any deficiencies were identified.

Stormwater Inspection Report Certification (DOT CEM-2030SW, Page 17-18)

The individual conducting the stormwater inspection, the WPC manager, and the contractor must sign and date the form.

Stormwater Inspection Report Acceptance (DOT CEM-2030, Page 18)

The RE must sign and date the form.

A7 DOT CEM-2032SW Permanent Erosion Control Establishment (PECE) Report

A7.1 GENERAL INFORMATION

This form is used to provide inspection when the contract has a bid item for Permanent Erosion Control Establishment (PECE).

Select appropriate phase of the project. For inactive sites, an approved Change of Information must be on file.

A7.2 SUBMITTAL/FILING REQUIREMENTS

The WPC manager must oversee preparation of the report and submit the original from to the RE. File a copy of the form in SWPPP File Category 20.32.

A7.3 FORM INFORMATION

See Section A.2 for information on completing general project information section.

Identify the locations of slides, slip-outs, surface erosion, poor seed germination or plant growth, dead or damaged erosion control plant material, or areas requiring repairs. Include photographs for all locations identified.

Review and Record Keeping (DOT CEM-2032SW)

The Contractor and the WPC manager must review and sign the form.

A8 DOT CEM-2033SW Dewatering Operations Sampling Report

A8.1 GENERAL INFORMATION

This form must be completed when the project is conducting dewatering operations under CGP Attachment J.

A8.2 SUBMITTAL/FILING REQUIREMENTS

A copy must be submitted to the RE within 24 hours for each dewatering day. File the original form in SWPPP File Category 20.33.

A8.3 FORM INFORMATION

Title Block

See Section A.1 for information on completing general project information section.

Dewatering Information

Provide the date when dewatering is planned to start and end. Include name and title of the person responsible for overseeing the operation.

Dewatering Plan

Complete yes or no for each of the questions

Dewatering Operation Source and Discharges

Complete the dewatering source and the yes/no questions regarding pump or siphon operations

Include the latitude and longitude of the discharge location and the type.

Sampling for Discharges to Drainages

Enter all the calibration information for all field meters.

Enter the Dewatering Discharge for pH and Turbidity Sample Analysis results and whether the sample is for the first hour or daily operations.

Sample Results Review

Determine if results are acceptable; less than NAL exceedance and if no, include information requested.

Check one of the inspection Certification and Review (DOT CEM-2033SW, Page 3)

The Stormwater Sampling and Testing Agent, WPC manager, contractor, and RE must review, sign, and date the completed form.

A9 DOT CEM-2035SW Stormwater Corrective Actions Summary

A9.1 GENERAL INFORMATION

This form must be completed for any deficiencies that were identified during visual monitoring (site inspection) and for corrections of deficiencies.

A9.2 SUBMITTAL/FILING REQUIREMENTS

A copy must be attached to the corresponding inspection report (form DOT CEM-2030SW). The form must be submitted to the RE when corrections are completed but must be submitted within five days of the site inspection. File the original form in SWPPP File Category 20.35. File a copy of the form with the corresponding Stormwater Site Inspection Report (DOT CEM-2030SW) in SWPPP File Category.

A9.3 FORM INFORMATION

See Section A.1 for information on completing general project information section.

Insert consecutive numbers for each required corrective action.

If BMP failures or shortcomings are identified during the inspection, any repairs or design changes to BMPs, as directed by the WPC manager, must be completed within 24 hours of identification, unless a longer period is authorized as per Caltrans *Standard Specifications* (Sections 13-3.01C). All corrective actions must be reported on this form. See Section 3.3.2 for additional information on identifying corrective measures. Comments must be provided when the required action is changed from the Stormwater Site Inspection Report (DOT CEM-2030SW).

Certification and Review (DOT CEM-2035SW, Page 2)

The WPC manager, contractor, and RE must review, sign, and date the completed form.

A10 DOT CEM-2051SW Storm Event SWPPP Sampling Log

A10.1 GENERAL INFORMATION

This form is to be used to document details of all sampling events and record results for the samples collected. Complete this form for every storm event that requires sampling and analysis.

A10.2 SUBMITTAL/FILING REQUIREMENTS

Submit to the RE with form DOT CEM-2052SW within 48 hours of sampling for field analyzed samples, and within 30 days of collection for laboratory analyses. File a copy of this form in SWPPP File Categories 20.50, 20.51, 20.52, 20.53, or 20.54, as appropriate.

A10.3 FORM INFORMATION

Title Block (DOT CEM-2051SW, Page 1)

See Section A.2 for information on completing the general project information section.

Storm Event Summary

Complete the details of the storm via the pulldowns to select time of day, whether it is a business day, if there is runoff observed, or sampling was performed.

Include total number of days for the storm event and the total precipitation from the site rain gauge.

Stormwater Sampling and Analysis Log Review (DOT CEM-2051, Page 1)

The WPC manager must review, sign, and date the completed form.

Stormwater Sampling and Analysis Log (DOT CEM-2051, Page 2)

Complete the table for all samples collected on the sample date. Include sample result units with sample result (e.g., 29 NTU for turbidity or 275 mg/L for TSS). See Section 4.2.1 for more information on calculating daily average.

A11 DOT CEM-2052SW Stormwater Sample Field Test Report

A11.1 GENERAL INFORMATION

Complete this form for each sample or set of samples that are tested

A11.2 SUBMITTAL/FILING REQUIREMENTS

Submit to the RE with form DOT CEM-2051SW within 48 hours of sampling. File a copy of this form in SWPPP File Categories 20.50, 20.51, 20.52, 20.53, or 20.54.

A11.3 FORM INFORMATION

Title Block

See Section A.1 for information on completing the general project information section.

General Information

Include the name of the sampler, the date of sampling and type of sampling conducted and analyzed for.

Turbidity Calibration Information

Enter the standard solutions used in the calibration. For the most accurate results, perform a calibration over the smallest range possible; follow the manufacturer's instructions.

Enter the calibration standard solution expiration date that is printed on the calibration standard bottle. Do not use solutions that are expired.

Record the time of calibration. Record each reading of the calibration process, which includes the reading before calibration. If the meter does not calibrate within acceptable limits, recalibrate the meter and record the recalibration readings.

A drift check is used to determine the ability of the meter to retain calibration over extended field use. A drift check shall always be performed at the end of day by measuring the change in reading of each standard solution used to calibrate the meter; this value is to be recorded. The default acceptable performance is 10%.

Record any notes regarding calibration. Any corrective actions to calibrate the meter or maintenance activities must be noted. The person who calibrates the meter must initial the calibration performed for each standard solution.

pH Calibration Record

Utilize the instructions from the manufacturer. All field readings, including calibration readings are to be reported to two decimal places (e.g. 7.92). Enter the date of calibration. Enter the electrode number written on the meter. Record the temperature at the time of calibration (often the pH meter will read temperature also). Enter the calibration slope that the meter will calculate at the end of calibration; if the meter is not capable of reporting the slope (like most pocket meters) enter "N/A"). Check which buffers were used for calibration. At least two buffers must be used for calibration (a two-point calibration). A three-buffer calibration is preferable (a three-point calibration). If a two-buffer calibration is used, then two buffers that bound either the acidic or basic range should be used.

Record the time of calibration. Record each reading of the calibration process, which includes the reading before calibration. If the meter does not calibrate within acceptable limits, recalibrate the meter and record the recalibration readings.

A drift check is used to determine the ability of the meter to retain calibration over extended field use. A drift check shall always be performed at the end of day by measuring the change in the reading of the pH 7.0 buffer solution; this value is to be recorded. The default acceptable performance is 10%.

The person calibrating the meter must initial that the calibration was performed as recorded.

Stormwater Samples Analysis

Enter the sampling location identification number (as identified in the SWPPP SAP and WPCDs), if there is any exception for not conducting sampling. Enter the parameters that the sample should be analyzed for. "Other" field parameters could include those required by RWQCB (see Section 6).

Review and Recordkeeping (DOT CEM-2052SW, Page 3)

Check the corresponding "Yes" or "No" box if test results were entered into the sampling and testing activity log (DOT CEM-2051SW).

Check the corresponding "Yes" or "No" box if the NAL was exceeded.

Check the corresponding "Yes" or "No" box if the NEL was exceeded.

Certification (DOT CEM-2052SW, Page 3)

The Stormwater Sampling and Testing Agent, WPC manager, and contractor must review, sign, and date the completed form.

A12 DOT CEM-2061SW Notice of Discharge Report

A12.1 GENERAL INFORMATION

This form is to be completed when the contractor, Caltrans, SWRCB, or RWQCB staff determines that stormwater discharges, authorized non-stormwater discharges, or non-authorized, non-stormwater discharges are causing or contributing to an exceedance of an applicable water quality standard. Water quality standards are contained in the Statewide Water Quality Control Plan or applicable RWQCBs Basin Plan. See Table 11-1 for RWQCB Basin Plan online resources.

A12.2 SUBMITTAL/FILING REQUIREMENTS

Discharges must be reported to the RE verbally when discovered. Submit the original form to the RE within 24 hours of discovery. File a copy of this form in SWPPP File Category 20.61.

A12.3 FORM INFORMATION

Title Block

See Section A.1 for information on completing general project information section.

Notice of Discharge General Information

Include discharge location description and latitude and longitude, select type of discharge and parameters sampled.

Discharge or Spill Identified by

Specify name, title, and organization, as well as notification date and time.

Notice of Discharge Information (DOT CEM-2061SW, Page 2)

Complete section as indicated on form.

Include photographs for each of the corrective actions taken.

Notice of Discharge Report Certification (DOT CEM-2061, Pages 4-5)

The WPC manager, contractor, and RE must review, sign, and date the completed form.

A13 DOT CEM-2062SW Numeric Action Level Exceedance Report

A13.1 GENERAL INFORMATION

For Risk Level 2 or 3 projects, complete this form if the effluent sample analysis results exceed an applicable NAL.

A13.2 SUBMITTAL/FILING REQUIREMENTS

Submit the original form to the RE within 48 hours. The RE will electronically submit sampling results to the SWRCB via SMARTS within 10 days after the conclusion of the storm event. The RE will submit the Numeric Action Level Exceedance Report (DOT CEM-2062SW), if required by the RWQCB upon review of the sampling results.

File a copy of this form in SWPPP File Category 20.62.

A13.3 FORM INFORMATION

Title Block (DOT CEM-2062SW, Page 1)

See Section A.1 for information on completing general project information section.

Numeric Action Level Exceedance Sampling Summary

Complete the table for sample identification number, latitude and longitude, the exceedance parameter, and the result of sampling conducted.

Numeric Action Level Exceedance Information (DOT CEM-2062SW, Page 2)

Complete section as indicated on form and include photographs.

Numeric Action Level Exceedance Report Certification (DOT CEM-2062, Page 4)

The WPC manager, contractor, and RE must review, sign, and date the completed form.

A14 DOT CEM-2063SW Numeric Effluent Limitation Violation Report

A14.1 GENERAL INFORMATION

Complete this form if the effluent sample analysis results exceed an applicable NEL.

A14.2 SUBMITTAL/FILING REQUIREMENTS

If an NEL is exceeded, immediately report the results to the RE verbally. Submit the original NEL Violation Report form to the RE within six hours after a violation is identified. The RE will electronically submit an NEL Violation Report (DOT CEM-2063SW) to the SWRCB via SMARTS within 24 hours after the NEL exceedance has been identified. File a copy of this form in SWPPP File Category 20.63.

A14.3 FORM INFORMATION

See instructions for DOT CEM-2062SW.

Title Block (DOT CEM-2063SW, Page 1)

See Section A.1 for information on completing the general project information section.

Numeric Effluent Limitation Exceedance Sampling Summary

Complete the table for sample identification number, latitude and longitude, the exceedance parameter, and the result of sampling conducted.

Numeric Effluent Limitation Exceedance Information (DOT CEM-2062SW, Page 3)

Complete section as indicated on form and include photographs.

Numeric Effluent Limitation Exceedance Report Certification (DOT CEM-2062SW, Pages 3-4)

The WPC manager, the Contractor and the RE must review, sign, and date the completed form.

Appendix B

Active Treatment System CGP Monitoring Protocols

B1 Active Treatment System CGP Monitoring Protocols

B1.1 PERMIT REQUIREMENTS

The use of an Active Treatment System (ATS) may be necessary on construction sites where traditional erosion and sediment controls do not effectively control accelerated erosion, or under circumstances where stormwater discharges leaving the site may cause or contribute to an exceedance of a receiving water quality standard. An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to reduce turbidity caused by fine suspended sediment. Additionally, it may be appropriate to use an ATS when site constraints prohibit the construction of a correctly-sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.

An ATS is operated in one of two modes, either batch or flow-through. In batch treatment, water is held in a basin or tank, and is not discharged until treatment is complete. In flow-through treatment, water is pumped into the ATS directly from the runoff collection system or stormwater holding pond, where it is treated and filtered as it flows through the system, and is then continuously discharged.

The CGP requires visual monitoring, operational and (effluent) compliance monitoring, and, for an ATS operating in batch mode, toxicity monitoring. This appendix presents the CGP requirements for ATS monitoring. Additional, Caltrans-required monitoring for ATS installations is described in Section 9, and is designed to provide quality assurance for the ATS instrumentation, which automatically measures and records effluent water quality data.

B1.2 NUMERIC EFFLUENT LIMITS (NEL)

The CGP establishes NELs for discharges from construction sites that utilize an ATS:

- Turbidity of all ATS discharges must be less than 10 NTU for daily flow-weighted average of all samples and 20 NTU for any single sample.
- pH must be within the range of pH NELs (i.e., above 6.0 and below 9.0).
- Residual coagulant/flocculant chemical must be less than 10% of Maximum Allowable Threshold Concentration (MATC) for the most sensitive species of the chemical used. The MATC is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC must be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. The MATC is equal to the geometric mean of the No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC) Acute and Chronic toxicity results for the most sensitive species determined for the specific coagulant. The most sensitive species test must be used to determine the MATC. The contractor should contact the chemical vendor or manufacturer to obtain the chemical's MATC.

Exemption

Discharges of stormwater from an ATS must comply with applicable NELs (above) unless the precipitation event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for ATS discharges is the 10-year, 24-hour storm event, as determined using the following maps, available online.

- Isopluvials of 10-year, 24-hour precipitation for the northern half of California in tenths of an inch (divide number on map by 10 to get inches) available at: http://www.wrcc.dri.edu/pcpnfreq/nca10y24.gif
- Isopluvials of 10-year, 24-hour precipitation for the southern half of California in tenths of an inch (divide number on map by 10 to get inches) available at: http://www.wrcc.dri.edu/pcpnfreq/sca10y24.gif

This exemption is dependent on the submission of rain gauge data verifying that the storm event is equal to or larger than the compliance storm. A rain gauge must be installed onsite as per the contract's special provisions.

If ATS effluent is authorized to discharge into a sanitary sewer system, the operator must comply with any pre-treatment requirements applicable for that system. Any specific criteria required by the municipality or other sanitary sewage agency must be included in the ATS Plan.

If a qualifying residual chemical/additive test does not exist, the ATS must be operated in batch mode. An ATS operating in a batch treatment mode of operation must perform Whole Effluent Toxicity (WET) testing.

The CGP also specifies ATS design and operation requirements (see CGP Attachment F).

B1.3 REQUIRED PLANS

The CGP requires the following plans to be developed:

ATS Plan

An ATS Plan must be prepared combining the site-specific data and treatment system information required to safely and efficiently operate an ATS. The ATS Plan must be electronically submitted to the SWRCB at least 14 days prior to the planned operation of the ATS and a paper copy must be available onsite during ATS operation. At a minimum, the ATS Plan must include:

- ATS O&M Manual for all equipment
- ATS Monitoring, Sampling & Reporting Plan, including QA/QC; if ATS effluent is authorized to discharge into a sanitary sewer system, any pre-treatment requirements applicable for that system must be included in the ATS Plan
- ATS Health and Safety Plan
- ATS Spill Prevention Plan

O&M Manual

A site-specific O&M manual must be prepared covering the procedures required to install, operate and maintain the ATS. The manual is typically in a modular format covering generalized procedures for each component that is utilized in a particular system. The O&M manual must only be used in conjunction with appropriate project-specific design specifications that describe the system configuration and operating parameters. The O&M manual must have operating manuals for specific pumps, generators, control systems, and other equipment.

QA/QC Plan

A project-specific Sampling and Reporting QA/QC Plan must be prepared, and must include at a minimum:

- Calibration – Calibration methods and frequencies for all system and field instruments must be specified. Instrument method detection limit or sensitivity verification, laboratory duplicate procedures, and other pertinent procedures must also be specified.
- Method Detection Limits (MDLs) – The methods for determining MDLs must be specified for each residual coagulant measurement method. Acceptable minimum MDLs for each method, specific to individual coagulants, must be specified.
- Laboratory Duplicates – Requirements for monthly laboratory duplicates for residual coagulant analysis must be specified.
- Manufacturer's recommendations for installation and maintenance of instrumentation (flow meters, probes, valves, streaming current detectors, controlling computers, etc.).

B2 Who Should Monitor

Caltrans requires the WPC manager to perform or supervise the collection and testing of grab samples for pH, turbidity, and residual chemical/additive to verify continuous monitoring measurements.

The ATS must be installed and operated by a qualified person who has either a minimum of five years construction stormwater experience or who is a licensed contractor specifically holding a California Class A Contractors license.

B2.1 TRAINING

In addition, ATS operators must have training specific to using an ATS and liquid coagulants for stormwater discharges in California. The training must be in the form of a formal class with a certificate and requirements for testing and certificate renewal. Training must include a minimum of 8 hours classroom and 32 hours field training. The course must cover the following topics:

- Coagulation Basics – Chemistry and physical processes
- ATS System Design and Operating Principles
- ATS Control Systems
- Coagulant Selection – Jar testing, dose determination, etc.
- Aquatic Safety/Toxicity of Coagulants, proper handling and safety
- Monitoring, Sampling, and Analysis
- Reporting and Recordkeeping
- Emergency Response

B3 What to Monitor

For any project using an ATS, the following monitoring must be conducted:

Visual Monitoring

A qualified ATS operator (per Section D.2) must always be onsite during treatment operations. Daily onsite visual monitoring of the system for proper performance must be conducted and recorded in the project data log. The log must include the name and phone number of the person responsible for system operation and monitoring. The log must include documentation of the responsible person's training.

Operational and Compliance Monitoring

- Flow must be continuously monitored and recorded at not greater than 15-minute intervals for total volume treated and discharged.
- Influent and effluent pH must be continuously monitored and recorded at not greater than 15-minute intervals.
- Influent and effluent turbidity (expressed in NTU) must be continuously monitored and recorded at not greater than 15-minute intervals.
- The type and amount of chemical used for pH adjustment, if any, must be monitored and recorded.
- Dose rate of chemical used in the ATS system (expressed in milligrams per liter) must be monitored and reported 15-minutes after startup and every 8 hours of operation.
- Laboratory duplicates – monthly laboratory duplicates for residual coagulant analysis must be performed and records must be maintained onsite.
- If continuous residual chemical/additive monitoring is possible, residual chemical must be continuously monitored and recorded at not greater than 15-minute intervals. If continuous residual chemical/additive monitoring is not possible, effluent levels of residual chemical/additive must be monitored and recorded within one hour after startup and at least once during every 8 hours of operation thereafter. If a qualifying residual chemical/additive test does not exist, the ATS must be operated in a batch treatment mode of operation and toxicity testing of effluent must be performed as detailed below.
- If an ATS that discharges directly into receiving waters violates an NEL, the receiving waters must be subsequently monitored for pH, turbidity, and/or SSC (as applicable, based on the NEL that was exceeded), and any additional parameters for which monitoring is required by RWQCB, for the duration of coverage under the CGP. See Section 10 for information on receiving water sampling.

Toxicity Monitoring – Batch Mode WET Testing

An ATS operating in a batch treatment mode of operation must perform WET testing. Samples must be collected for acute toxicity testing and the testing must be initiated on effluent samples representing discharge from each batch prior to discharge. Testing results do not need to be obtained prior to discharge. All toxicity testing must be performed by a laboratory certified under the DHS Environmental Laboratory Accreditation Program for WET testing (field testing E113). The toxicity test must follow methods specified for the 96-hour acute test in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA, 2002) for fathead minnow (*Pimephales promelas*), or alternatively for rainbow trout (*Oncorhynchus mykiss*). All toxicity tests must meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

All acute toxicity testing must be electronically reported.

B4 Where to Monitor

Measurements must be made continuously (every 15 minutes or more frequently) for flow rate, pH, and turbidity at influent and effluent points of the ATS.

ATS effluent samples must be collected for residual chemicals from the discharge pipe or another location representative of the nature of the discharge.

Toxicity test samples must be representative of the discharge, and must be collected prior to discharge of the batch treatment system. In practical terms, this means collection of the toxicity test sample near the batch tank outlet.

If an ATS that discharges directly into receiving waters violates an NEL, the receiving waters must be subsequently monitored for the duration of coverage under the CGP, both upstream and downstream from the discharge location. See Section 10 for additional information on receiving water monitoring.

B5 When to Monitor

Table B-1 summarizes the required timing for visual monitoring, continuous operational monitoring, effluent compliance monitoring, and toxicity test sampling.

Table B-1. ATS Monitoring Frequency

Monitoring / Sampling	Frequency
Flow	At least every 15 minutes.
pH (influent and effluent)	At least every 15 minutes.
Turbidity (influent and effluent)	At least every 15 minutes.
Type and amount of chemical used for pH adjustment	Every time chemical is used.
Chemical dose rate	Within 15 minutes after startup and once during every eight hours of operation thereafter.
Laboratory duplicates	Monthly.
Residual Chemical Testing	At least every 15 minutes, or if continuous residual chemical/additive monitoring is not possible, within one hour after startup and once during every eight hours of operation thereafter.
Toxicity Testing	Samples must be collected prior to discharge from the batch treatment system.
Receiving water (if required)	Samples must be collected each day that receiving waters receive ATS discharges.

B6 How to Monitor

B6.1 ATS INSTRUMENTATION

The ATS must be equipped with instrumentation that automatically measures and records effluent water quality data and flow rate. Systems must be equipped with a data recording system, such as a data logger or webserver-based system, which records turbidity, pH, and flow rate measurements at a frequency no less than once every 15 minutes. Cumulative flow volume must be recorded daily. Residual chemical measurements must be tested and recorded at least 15 minutes after startup and every 8 hours of operation. The data recording system must have the capacity to record a minimum of seven days of continuous data. The minimum data recorded must include:

- Influent turbidity
- Effluent turbidity
- Influent pH
- Effluent pH
- Effluent flow rate
- Effluent flow volume

Instrumentation systems must be interfaced with system control to provide auto shutoff or recirculation in the event effluent measurements exceed turbidity or pH. The system must also ensure that, upon system upset, power failure, or other catastrophic event, the ATS will default to a recirculation mode or safe shut down.

Residual treatment chemical also must be monitored, but chemical-specific sensors do not exist for many of these chemicals; therefore, if continuous monitoring is not possible, residual chemical testing must be performed on a discrete (not continuous or automated) basis, as described below.

B6.2 EFFLUENT RESIDUAL CHEMICAL SAMPLES

Samples must be collected from the outlet pipe such that they are representative of the flow and characteristics of the discharge. Sampling techniques are described in detail in Section 4.

Samples must be tested onsite according to the following criteria:

- A residual chemical test method must be utilized that has an MDL of 10% or less than the MATC for the specific coagulant in use and for the most sensitive species of the chemical used.
- The residual chemical test method must be capable of producing a result within one hour of sampling.
- A California state-certified laboratory must validate the selected residual chemical test. Specifically, the lab must review the test protocol, test parameters, and the detection limit for the specific chemical. This documentation must be electronically submitted as part of the ATS Plan.

If a residual chemical test method cannot be utilized that meets the requirements above, the ATS must be operated in batch treatment mode, and toxicity testing is then required, as described below.

B6.3 TOXICITY TEST SAMPLES

Toxicity test samples must be collected prior to discharge of the batch treatment system, and must be representative of the discharge. In practical terms, this means collection of the toxicity test samples near the batch tank outlet.

B6.4 RECEIVING WATER SAMPLES

See Section 10 for information on receiving water sampling.

B7 Recordkeeping

Daily onsite visual monitoring of the system for proper performance must be conducted and recorded in the project data log. The log shall include the name and phone number of the person responsible for system operation and monitoring, as well as documentation of the responsible person's training.

The ATS must be equipped with instrumentation that automatically measures and records effluent water quality data and flow rate. These systems must be equipped with a data recording system, such as a data logger or webserver-based system, which records each measurement on a frequency no less than once every 15 minutes. The data recording system must have the capacity to record a minimum of seven days of continuous data.

At a minimum, every 30 days the RE must access the SWRCB's Storm Water Multi-Application and Report Tracking System (SMARTS) and electronically upload field data from the ATS. Records must be kept for three years after the project is completed.

If any monitoring data exceeds any applicable NEL, a NEL Violation Report must be submitted to the RE within six hours after the violation is identified (NEL Violation Report – ATS Discharges form, DOT CEM-2063) per the contract special provisions. The RE will electronically submit a NEL Violation Report to the SWRCB within 24 hours after the NEL exceedance has been identified. An electronic or paper copy of each NEL Violation Report must be retained for a minimum of three years after the date the annual report is filed. A paper copy of each ATS specification must be maintained onsite.

B8 Data Evaluation, Follow-up, and Reporting

B8.1 DATA EVALUATION

Results of effluent testing for pH, turbidity, and residual coagulant/flocculant chemical levels (for ATS in flow-through mode) are compared to NELs to determine if further action is required.

Discharges of stormwater from an ATS must comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the compliance storm event (expressed in inches of rainfall). The compliance storm event for ATS discharges is the 10-year, 24-hour storm event, as determined using maps found at the following locations:

- Isopluvials of 10-year, 24-hour precipitation for the northern half of California in tenths of an inch (divide number on map by 10 to get inches) available at: http://www.wrcc.dri.edu/pcpnfreq/nca10y24.gif
- Isopluvials of 10-year, 24-hour precipitation for the southern half of California in tenths of an inch (divide number on map by 10 to get inches) available at: http://www.wrcc.dri.edu/pcpnfreq/sca10y24.gif

This exemption is dependent on the submission of rain gauge data verifying the storm event is equal to or larger than the compliance storm event.

B8.2 ASSESSING THE NEED FOR CORRECTIVE MEASURES

All results of pH, turbidity, and residual chemical additives testing must be compared to the NELs shown in Table B-2. Corrective measures are required for NEL exceedances as detailed below.

B8.3 IMPLEMENTING CORRECTIVE MEASURES

Procedures for evaluating appropriate corrective measures for NEL exceedances could include:

- Evaluate the ATS operating procedures and chemicals to determine appropriate operational changes. For example, evaluate if the residence time should be lengthened. Should a different chemical or chemical dose be used? Was there an accidental discharge of settled floc?
- Evaluate if the ATS requires maintenance. For example, evaluate if the differential pressure measurements indicate the filtration unit needs back-flushing or replacement.
- Evaluate if the ATS requires repairs or redesign.
- Corrective actions must be implemented as soon as possible.

Table B-2. ATS Test Methods, Reporting Limits, Reporting Units and Numeric Effluent Limitations

Parameter	Test Method	Method Detection Limit	Reporting Units	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	0.2	pH Units	Lower = 6.0 Upper = 9.0
Turbidity	EPA 0180.1 and/or field test with a calibrated portable instrument	1	NTU	10 NTU for daily flow-weighted average and 20 NTU for any single sample
Residual Chemicals	U.S. EPA-approved test method for the specific pollutant parameter	Less than 10% of MATC for most sensitive species to the chemical used	Dependent on the test method	Less than 10% of MATC for most sensitive species to the chemical used

B8.4 REPORTING

Procedure for Reporting and Correcting NEL Exceedances

If the daily average or maximum ATS effluent measurement exceeds an applicable NEL (ATS projects only):

- If any monitoring result exceeds any applicable NEL, the system operator must immediately notify the RE, and an NEL Violation Report must be submitted to the RE within six hours after the violation is identified (Numeric Effluent Limitation Violation Report – ATS Discharges form, CEM-2063) per the contract special provisions. The RE will electronically submit an NEL Violation Report to SWRCB *within 24 hours after the NEL exceedance has been identified*.
- If stormwater runoff has a direct discharge into receiving waters, the receiving waters must be subsequently sampled (upstream and downstream of outfall) for pH, turbidity, and any additional parameters for which monitoring is required by RWQCB.

- If the turbidity daily average NEL is exceeded, subsequent effluent samples must be analyzed for SSC in addition to pH and turbidity.

NEL Violation Report

The NEL Violation Report must be certified by the RE in accordance with Section IV of the CGP and include:

- The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results less than the method detection limit shall be reported as “less than the method detection limit”).
- The date, time, and place of sampling activities, visual inspections, and/or measurements, including rain gauge readings.
- A description of the current onsite BMPs, and the corrective actions taken to manage NEL exceedance.

Compliance Storm Exemption

If an applicable NEL is exceeded during a storm event equal to or larger than the compliance storm event (10-year, 24-hour storm), report the onsite rain gauge reading and nearby governmental rain gauge readings for verification.

Compliance storm event verification must be done by reporting the onsite rain gauge readings, with verification from nearby governmental rain gauge readings.

Procedure for Reporting Acute Toxicity Test Results

Upon receipt of any toxicity test results indicating acute toxicity to the test organism, the RE must be immediately notified, and the laboratory test results must be submitted to the RE within six hours of receipt. The RE must then submit the results indicating acute toxicity to the RWQCB within 24 hours after receipt of the laboratory test results.

Routine Reporting of Results

All toxicity testing results must be submitted to the RE within 48 hours of receipt of the results from the toxicity testing laboratory. The RE will electronically report the results to the SWRCB within five business days of receipt of laboratory test results.

The contractor must submit all pH, turbidity, and residual chemical monitoring results to the RE weekly (DOT CEM-2052SW).