

Stormwater Management Plan Procedures

4.1 Overview

The CDPHE states in the “General Permit for Stormwater Discharges Associated with Construction Activity” rationale that under the framework of the NPDES and CDPS stormwater regulations, construction activities must obtain a discharge permit. In the past, this permit has been called a NPDES permit. A Stormwater Management Plan (SWMP) is required by the CDPS program. The SWMP must contain information and BMPs necessary to:

1. Minimize the amount of disturbed soil.
2. Control and minimize erosion and sedimentation during and after the construction phase of a project.
3. Prevent runoff from offsite areas from flowing across the site.
4. Slow down the runoff.
5. Reduce pollutants in stormwater runoff (i.e., stormwater quality management).

All projects involving an earth disturbance require a SWMP. The SWMP is prepared during the design phase of projects and must be part of the project’s bid documents. Projects with 1 acre or more of earth disturbance (Phase II) require a CDPS permit, which involves the completion and submittal of a “General Permit for Stormwater Discharges Associated with Construction Activity” (the application can be obtained from www.cdphe.state.co.us).

The SWMP, in combination with the required Contractor project reviews, project plans, and specifications, must define project limits and area of disturbance, sequence of construction activity, BMPs for stormwater pollution prevention, method of material handling and spill prevention, method of waste disposal, and final stabilization methods. If these requirements are not included in the SWMP, then their location should be referenced in the SWMP title sheet. BMPs should constitute compliance with “Best Available Technology (BAT) and Best Conventional Technology (BCT) as required by the Federal Clean Water Act” (31).

In general, CDOT or CDOT’s representative obtains permit certification for most CDOT projects with the exception of design-build projects. Designers begin the permit application process by providing the required one-page Notice of Intent. The “General Permit for Stormwater Discharges Associated with Construction Activity” is submitted to the CDPHE at least 10 days prior to the start of construction.

Various erosion control and pollution prevention requirements must be addressed when developing a SWMP. The main objective of any SWMP is to prevent sediment from reaching receiving waters. The SWMP accomplishes this by specifying BMPs for stabilizing earth disturbances and by including directions for preventing or minimizing erosion associated

with construction activity. Construction operations must implement the provisions of the SWMP to maintain permit compliance and avoid incurring regulation penalties.

Although the main objective of the SWMP is to focus on temporary BMPs used during construction, the SWMP also should incorporate or reference the permanent water quality measures included in the project. Permanent BMPs are included in the drainage design of the project; the design process involves coordination with CDOT environmental specialists, design, construction, and maintenance personnel. (Refer to Chapter 2 for MS4 permit guidance and CDOT Planning Procedure document for incorporating permanent BMPs into CDOT projects.)

The SWMP must be specific to each project and must consider all measures stated in the CDOT Water Quality Specification 107.25 and Erosion Control Specification 208 (*CDOT Standard Specifications*, Current Edition). The SWMP's length and complexity will vary with the size of the project, severity of site conditions, and proximity to state waters and sensitive environments.

4.2 SWMP Procedures

The following SWMP site information is required for all projects:

1. Location map
2. Discharge locations (applies to projects with drainage plans)
3. Soil classification
4. Presence of fisheries, spawning areas, and wetlands
5. Presence of threatened and endangered species
6. Area of disturbance
7. Stream crossings (names of receiving waters)
8. Unique landscape and cultural values to protect
9. Identification of existing vegetation
10. Compliance with 107.25 CDOT Water Quality Specification

Key design elements required of all SWMPs are as follows:

1. Seeding plan to include seeding, mulching, and fertilizing application and requirements
2. Requirements to protect existing vegetation
3. Tabulation and location of erosion and sedimentation control items
4. Force account erosion control plan to compensate for unforeseen conditions caused by erosion and sedimentation
5. Mapping of existing wetlands and wetland mitigation sites
6. Reference to standard and project specifications pertinent to the SWMP
7. Reference to drainage features not included in the SWMP
8. Notes defining methods of implementation of BMPs and plan

9. Notes defining methods of incremental stabilization (phased seeding and mulching)
10. Design details not included in M&S Standard Plans

The seeding and mulching plan must be prepared or reviewed by a CDOT Landscape Architect. The plan should always be included in the SWMP, and specifications should be included and referenced in the specification document. In addition, all projects must provide requirements to protect existing vegetation, wetlands, and other sensitive environments and cultural sites. On minor projects where erosion control items are determined by the designer to be minimal (i.e., < 0.5 acre), protection BMPs and seeding requirements can be included in the price of the work. However, it is recommended that all items be paid for in accordance with CDOT's specifications.

A CDPS construction activity permit is required for earth disturbances of 1 acre or greater for CDPS Phase II and areas 5 acres or greater for CDPS Phase I. If the project is part of a larger common plan, the sum of all phases is used to determine the total disturbance area. Pavement surface is included in the area measurement if that surface is to be removed to exposed earth.

Projects that require a CDPS permit must include the following **additional information**.

1. Runoff coefficient: pre-construction and post construction
2. Existing soil data: description and quality of discharge, soil type
3. Existing vegetation: general description of plant classifications, e.g., alpine grasses and forests of the higher mountains
4. Reference to other water quality measures not included in the SWMP, e.g., riprap, culvert end sections, or permanent sediment basins

4.3 Creating a Successful Stormwater Management Plan

Analysis of site conditions is essential for proper stormwater management. The author of the SWMP must inspect the future construction site and the construction plans. In addition to the SWMP site information required for all projects, the SWMP should address the following factors:

1. Unstable stream reaches and flood mark
2. Watershed areas
3. Stream crossings
4. Access routes for construction
5. Access for maintenance of temporary and permanent erosion controls
6. Borrow and waste (unclassified excavation) disposal areas
7. Critical natural and constructed slopes, soil types, eroding areas, rock outcroppings, and seepage zones

8. Requirements imposed by adjacent landowners or stewards
9. Construction dewatering methods and locations
10. Detours
11. Concrete washout methods and locations
12. Fuel storage areas
13. Methods of limiting off-site soil tracking

Furthermore, specification 107.25 (*CDOT Standard Specifications*, Current Edition) defines requirements for protecting water. Projects can involve working in highly sensitive environments such as wetlands and threatened and endangered species habitat. During the disposal of construction borrow materials, it is the Contractor's responsibility to not impact the environment and it is CDOT's liability to ensure proper disposal of materials. The CDOT Regional Environmental Representative should review these issues with the designer for inclusion in the SWMP.

The CDOT 107.25 Water Quality Specification defines the factors of concern to the designer; the 208 Erosion Control Specification defines BMPs and the implementation process. Both specifications are good guidelines for the designer and construction personnel when creating and implementing the SWMP. In addition to the specifications, the designer should refer to Permanent Structure BMPs for technical guidance on how to design and construct BMPs for construction projects. The CDOT M&S Standard Plans contain detailed drawings of BMPs, and the *CDOT Item Book* (Current Edition) describes the various pay items used in the SWMP.

4.4 Levels of SWMP Development

There are several phases in the development of a SWMP. These phases are outlined below.

4.4.1 Project Scope

This stage of project development involves addressing the environmental issues. The project team needs to discuss and define how to incorporate the concerns listed in the project's NEPA document or environmental regulations relevant to the project. This process involves communication between the environmental specialists, designers, construction, and maintenance personnel. When working on public lands and sites adjacent to sensitive environments, the inclusion of other State and Federal agencies is beneficial. Including their water quality ideas and the concerns of relevant stakeholders in the SWMP may lessen or eliminate potential project opposition. Proper coordination and assessment will better define the project's drainage requirements and potential impacts on drainage, water quality, or water resources.

Defining who will be completing the SWMP is also critical during the scoping process. Ultimately, the SWMP designer, working with the environmental specialists and project engineer, is responsible for including the objectives of the stakeholders and water quality assessment in the plan. The SWMP must address environmental protection, avoidance, and

minimization; erosion control; stabilization implementation and seeding; and scheduling of the plan.

4.4.2 Field Inspection Review (FIR)

At this stage, the SWMP should include the seeding plan and a list of the BMPs that will be included in the project's pay items. The seed plan includes type and amount of seed, planting method, fertilizer requirements, mulching type, and mulch application. Notes and specifications on when to seed and phased seeding requirements also must be defined in the SWMP. On major projects (i.e., new alignments, major widening, or where deemed necessary), the designer should display the location of BMPs, existing wetlands, and other sensitive environments on project plan sheets. Scaled CAD drawings showing the layout of the project and BMPs are beneficial when outside parties will be reviewing the plan. It is also beneficial to the Contractor reviewing and building the plans to display the BMP locations on the drawings. It is up to the team to decide how they will display the BMP locations of the water quality plan, a decision that is driven by project location, environmental issues, and stakeholder concerns. For example, a bridge replacement project located over a mountain stream and wetlands may require a complex contour drawing showing BMP locations, while a concrete overlay in eastern Colorado will include notes on stabilization and a tabulation of BMP locations. On minor projects such as overlays, minor widenings, or intersection improvements, a seed plan and tabulation of BMP locations maybe be sufficient. If there is an earth disturbance, a seed plan is always required.

During the FIR process or before the Final Office Review (FOR), the SWMP designer must address the following with the Hydraulic Engineer: corridor (roadway ditch) stabilization, embankment protection, channel impacts, temporary stream crossings, dewatering, temporary sediment basins, and other hydraulic issues that will affect water quality. The CDPS regulation does not require the SWMP designer to be a registered engineer, and often the designer may be a Landscape Architect or Hydraulic Engineer. Drainage design is critical, and a successful SWMP must address drainage issues during and after construction.

The engineer should assist the SWMP designer by coordinating the use of permanent water quality features such as riprap placement and sediment basin construction. Proper phasing and scheduling of the SWMP is essential. It is always beneficial to place permanent water quality BMPs at the beginning of a construction project whenever feasible.

To facilitate the implementation of the SWMP, the following items should be listed as salient features in the specification document:

1. Topsoil
2. Seeding and mulching
3. Temporary erosion control items
4. Channel work such as riprap placement or channel stabilization
5. Permanent structural BMPs (i.e., sediment basins)

4.4.3 Final Office Review (FOR)

At this stage of project development, the SWMP should be complete and included in the plan set. The title sheet of the SWMP should include the following:

1. Seeding Plan
 - Plant common name and scientific name
 - Seed rate (pounds of pure live seed per acre/species-itemized and total)
 - Seeding application method
 - Mulching application method
 - Fertilizer requirements
 - Notes defining incremental stabilization and scheduling
2. Additional information defined in permitted projects section
3. Tabulation – pay item description and totals
4. Reference to specifications – standard and project provisions
5. Notes - Define project SWMP requirements and provide references to other environmental designs, e.g., wetlands and threatened and endangered species mitigation plans.

On CDPS permitted projects or major projects involving NEPA documents or environmental issues, the project should include a pay item for an erosion control supervisor. Equipment hours for sediment removal and disposal and erosion control also should be included. Method of payment for sediment removal and disposal is at the discretion of the construction project engineer. The project engineer also should review SWMP pay items and contents prior to the FOR. SWMP pay item quantities such as erosion bales, seeding, mulch tackifier, and mulch (weed free) must be increased to account for replacement, as directed work and incremental installations of seeding and mulching.

After the SWMP is reviewed and finalized, the Regional Environmental Representative or CDOT’s consultant must complete the construction activity permit application and submit the application to the CDPHE. A copy of the SWMP is not required in the submittal. However, the project manager should consult the regional environmental section for additional internal plan documentation.

4.5 Construction

After the project is awarded to the Contractor, implementation of the SWMP begins. The first step is the Pre-Construction Conference. During this project review, or at least 10 days prior to the start of construction, the Contractor is required to identify the locations of potential pollution sources, areas used for storage of materials, dedicated asphalt, or concrete batch plants. A spill contingency plan for pollutants also is required at this time.

Furthermore, at least 10 days prior to the start of construction, the Contractor must submit a schedule outlining the implementation of erosion and sediment control measures (BMPs). The schedule must include erosion and sediment control work for all areas within project boundaries, including haul roads, storage areas, borrow pits, and batch plants. Updates to the schedule must be maintained and submitted to the engineer for approval.

Prior to construction disturbance, baseline vegetation conditions should be determined to quantitatively assess plant density and cover. This information is needed to de-activate the

CDPS stormwater permit. The CDOT Landscape Architect should be contacted if technical support is needed.

When required, an Erosion Control Supervisor (Contractor representative) must be available to manage the project erosion control and water quality plan. This person's responsibilities include, but are not limited to, the oversight of BMP installation, water quality permit compliance, adjustments for unforeseen conditions affecting water quality, and inspection of the SWMP features.

The inspection of the project occurs at 14-day intervals and after each storm event during active construction. The Erosion Control Supervisor must have the ability to make requested modifications to control measures within 7 days after the inspection. During project suspension and until the project is accepted and the vegetative cover is equal to 70 percent of the pre-existing cover, the reports take place every 30 days. When the ground is frozen or covered in snow, inspections are suspended. A report is created from the inspection and becomes part of CDOT's project records.¹

If, during construction, the Contractor proposes changes that would affect the SWMP, the Contractor must obtain approval in writing. Proposed changes to the plan and acceptance by the engineer must be documented and become part of the project records.

In addition to internal project inspections, a CDOT Regional or Headquarter Erosion Control Advisory Team (RECAT) will review a sampling of projects from each region. The purpose of these inspections is to provide support in erosion control and water quality to construction personnel at the regional level, improve consistency in CDOT's erosion control program on a statewide basis, identify any deficiencies in CDOT's erosion control program, and develop strategies to correct the deficiencies. Each project visited will receive a report summarizing the review and rating of the project.²

The CDOT Project Engineer who is responsible for the construction phase of the project will handle implementation of the SWMP or ensure that the plan is implemented during construction.

4.6 Post-Construction Site Evaluation and Report

The Project Engineer and representatives from the Regional Environmental Office, with technical support from the CDOT Landscape Architect, should perform a post-construction site evaluation focusing on the vegetative stabilization of cut and fill slopes and other areas of previous ground disturbance. This evaluation may be performed 6-18 months after project completion depending on the level of plant establishment. The CDPS permit requires: (1) establishment of 70 percent plant density relative to pre-construction conditions; (2) absence of evidence of significant erosion; and (3) removal of temporary BMPs. The Regional Environmental Office representative should evaluate and document the 70 percent plant density requirement using the same methods to determine plant density and cover as were employed prior to construction. (See Section 4.11, Method of Measurement for Vegetative Cover).

¹ Refer to the Appendix of CDOT Form 1176a, *Erosion and Sediment Control Field Inspection Report*.

² RECAT Questionnaire and RECAT Project Rating Form.

Based upon this post-construction site evaluation, additional seeding or other types of BMPs may be required or recommended in order to legally inactivate the permit. A checklist is provided below (See Section 4.8, Record Keeping) to aid in this evaluation. Copies of the checklist should be sent to the Regional Planning and Environmental Manager.

4.7 CDPS Permit Deactivation Notification

Based upon the results of the post-construction site evaluation checklist, the responsible Regional Environmental Representative shall fill out and sign the Inactivation Notice for Construction Stormwater Discharge General Permit Certification and send it to the Water Quality Control Division (WQCD) for inactivation. The person signing off on this notice certifies, under penalty of law, that final stabilization has been attained (70 percent of pre-disturbance vegetative cover as defined in Section 4.11) and measures to control pollutants in stormwater discharges have been completed.

4.8 Record Keeping

Complete files containing all relevant stormwater information through the life of the construction project should be kept by the Regional Environmental Office.

Table 4-1 provides a summary of key documents.

TABLE 4-1
Report/Memorandum Documentation Codes

Report/Memorandum Name	Documentation Code
Watershed Impact Memorandum	WIM-Project Number
NEPA Document or Water Quality Assessment	EA, EIS or Drainage Report
Stormwater Discharge Associated with Construction Activity	SDACA-Permit No. COR-030000
Field Inspection Review (FIR) Meeting Summary	FIR-Project Number
Final Office Review (FOR) Meeting Summary	FOR-Project Number
Contractor Pre-Construction Conference Meeting Summary	PRECON-Project Number
On-Site Review by Regional Environmental (Technical Memorandum)	CONREV-Project Number
RECAT Site Report	RECAT-Project Number
Post Construction Site Evaluation and Report	POST-Project Number
CDPS Permit Deactivation Notification	DEACT-Project Number

4.8.1 Site Evaluation Procedure

The post-construction evaluation checklist consists of the following items:

- Date/Time
- Location/Project

- Reviewer/Region
- Weather Conditions
 - __Coordinate site visit with project manager and landscaping representatives
 - __Visit the construction site (all phases)
 - __Review seeding of cut and fill slopes
 - __Observe existence of rills or gullies due to highway drainage or operations
 - __Review any potential sediment/pollution source areas from CDOT operations
 - __Ensure all temporary BMPs (hay bales, silt fences, sedimentation pond) are removed
 - __Measure/evaluate 70 percent vegetative density of pre-disturbance levels
 - __Provide recommendation: (1) further stabilization/corrective action or (2) deactivation

4.9 SWMP Title Sheet Requirements

Refer to Appendix A for a sample SWMP Title Sheet.

1. Additional Information:
 - a. Pre-Construction and Post-Construction Runoff Coefficient
 - b. Soil Classification - existing soil description
 - c. Description of Existing Vegetation
 - d. Reference to Schedules
 - e. Reference to 100-year flood plan boundaries
 - f. Reference to CDOT project Title Sheet
 - g. Reference to Plan and Profile Sheets and Cross Sections
 - h. Reference to Surface Waters
 - i. Reference to Specification 107.25 - Water Quality
 - j. Inspection and Maintenance procedures 107.25 and 208 specifications
 - k. Reference to other SWMP information not included in the SWMP
2. Seeding Plan: (Refer to Chapter 5 for BMP definitions)
 - a. Area of Disturbance
 - b. Seed Plan displaying common name, botanical name, and pounds of pure live seed per acre
 - c. Seeding Application
 - d. Mulching Application
 - e. Fertilizer Requirements
 - f. Special Requirements - soil preparation
 - g. Stabilization Requirements
3. SWMP Notes: general notes not included in the plan and specifications document
4. SWMP Project Totals:
 - a. Pay item tabulation - unit number, description, unit, quantity and specification reference.

4.10 Resources

The following are helpful resources in creating a SWMP:

- *CDOT Standard Specifications* (Current Edition)
- *National Stormwater Best Management Practices Database* (EPA/ASCE, Version 1.0, 6/99)
- *Urban Drainage and Flood Control District (UDFCD) Drainage Criteria Manual* (V.3)
- Colorado Department of Health and Environment (CDPHE)
Water Quality Control Division (WQCD)
Stormwater Program-www.cdphe.state.co.us
(303) 692-3500
- *CDOT Drainage Manual* (Current Edition)
- *CDOT Item Book* (Current Edition)

4.11 Method of Measurement for Vegetative Cover

This section describes the basis for determining final stabilization as required for terminating coverage under the “General Permit for Stormwater Discharges Associated with Construction Activity.”

4.11.1 Vegetative Cover

The restoration for final stabilization shall form an effective and permanent vegetative cover that prevents soil movements prior to termination under the CDPS permit. The minimum vegetative cover requirement shall be the amount of cover sufficient to prevent accelerated erosion. Accelerated erosion shall be defined as rills of 2 inches deep or more, earth slides, mud flows, sediment deposition, or evidence of concentrated flows of water over bare soils.

The CDOT staff shall take into consideration final stabilization in relation to the level of vegetation cover at the site prior to disturbance.

4.11.2 Documentation

Documentation supporting that the site has been adequately stabilized to 70 percent of pre-disturbance cover and does not show signs of accelerated erosion shall be submitted. The documentation required shall include the following:

1. Pictures of the desirable plant growth (State and County noxious weeds excluded) at the construction project site shall be required prior to construction disturbance and when determining that final stabilization is adequate. Pictures of the location where each transect (see below) was conducted shall be required. Low-level photography shall occur at approximately 90 degrees to the surface in order to properly assess ground cover.
2. A minimum of at least one 50-foot transect of pre-construction and post-construction cover shall be conducted for every 5 acres that is cleared, graded, or excavated. The

environmental specialists shall determine the number of transects required for large construction projects (>20 acres).

Transects shall be located in an area(s) that is representative of the revegetation for the whole construction project. Transects shall be conducted by laying out a 50-foot tape. At every footmark, it must be noted whether vegetation or bare soil is encountered. (Vegetation consists of viable grasses, shrubs, trees, or forbs.) Results are to be expressed as a percent cover.

For example: One transect of 50 points in which 28 points exhibit cover is $(28/50) = 0.56 = 56$ percent cover.

For example: Combined transects of 50 points each in which 28 points exhibit cover in one transect and 41 points exhibit cover in the other transect is $(28+41)/100 = 69/100 = 0.69 = 69$ percent cover.

3. In areas in which final stabilization may be less than satisfactory (less than 70 percent of pre-construction cover) due to poor soil or other natural site conditions, the CDOT representative shall document the percent cover of the indigenous vegetation with pictures and a transect(s).

4.12 Termination of General Permit for Stormwater Discharges Associated with Construction Activity

Termination of coverage under the general permit will be at the discretion of the CDOT representative staff based on an analysis of erosion potential as described above. In some cases, the project may be stable with the exception of certain confined areas. In this instance, the project can be deactivated contingent upon repairing the potential erosion problem. CDOT is responsible for permit coverage and final stabilization. An inactivation form is supplied with the permit certification or can be obtained at the CDPHE Website: www.cdphe.state.co.us.