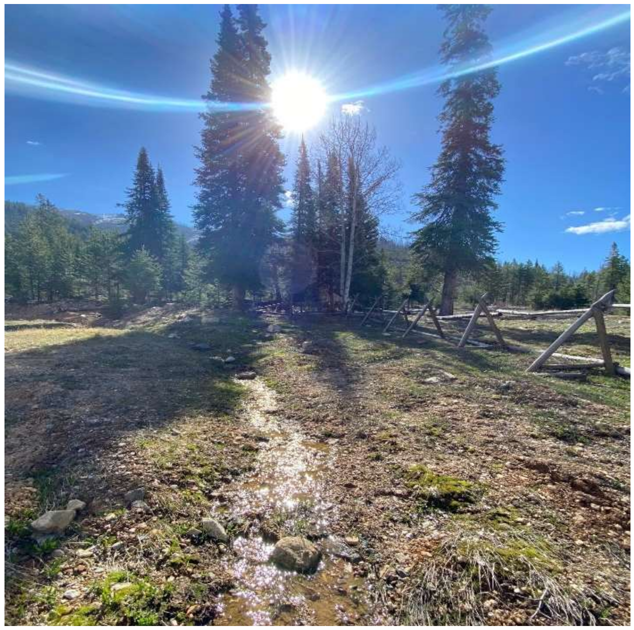


Stormwater Pollution Prevention Plan (SWPPP)

ESOP-029

Perpetua Resources Idaho, Inc.

Stibnite Gold Project

Stibnite, Idaho

Operated by:

Perpetua Resources Idaho, Inc.
405 S. 8th Street, Suite 201
Boise, ID 83702

January 2025

Prepared by:

Aquionix, Inc.
5545 W. 56th Avenue
Arvada, CO 80002

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

[1]CLOSED TCRA documentation can be found in the Environmental files.

INTRODUCTION

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared for the purpose of controlling and reducing pollution from stormwater discharges associated with industrial activity at the Perpetua Resources Idaho, Inc., Stibnite Gold Project (SGP) ("Perpetua") through the use of control measures, implemented in accordance with good engineering practices. This SWPPP describes and provides guideless for the implementation of structural and non-structural control measures; these control measures shall be designed to minimize the likelihood of pollutants being carried off-site.

The US Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity, effective March 21, 2021 and expiring on February 28, 2026 (see Appendix A), authorizes discharges of stormwater associated with industrial activities. Perpetua's SIC Code is 1041, which is a listed industrial activity under the MSGP: Sector G (*Metal Mining)*, Subsector G2 (*Iron Ores; Copper Ores; Lead and Zinc Ores; Gold and Silver Ores; Ferroalloy Ores; except Vanadium; and Miscellaneous Metal Ores (SIC* Codes 1011, 1021, 1031, 1041, 1044, 1061, 1081, 1094, 1099)).

Perpetua has applied for coverage under the MSGP by submitting a Notice of Intent (see Appendix A) to EPA. Pursuant to Part 1.3.5 of the MSGP, Perpetua has posted a sign with required permit coverage information at the access gate to the Office Area (see map in Appendix C). Adjacent to the gate location is a publicly accessed road (NF-412) and the signage can be readily viewed as needed.

SWPPP MODIFICATIONS AND AVAILABILITY [MSGP Parts 6.3 and 6.4]

This SWPPP shall be updated based on any corrective actions and deadlines within the MSGP and all SWPPP modifications shall be signed/dated by the individuals listed in Appendix B of the MSGP. The following table contains a summary of substantive SWPPP modifications:

Table 1: SWPPP Modifications

Date	Description of Modification	Modification Completed By
1/14/2013 *Revision 1*	Update Figures, Text, Appendices – Administrative	Nick Smith
4/30/2013 *Revision 2*	Update Figures, Text, Appendices – Administrative	Nick Smith
11/10/2015 *Revision 3*	Update Document for new requirements in 2015 MSGP	--
2/9/2019 *Revision 4*	Update Figures, Text, Appendices – Administrative	Sam Field/Blaine Serrin
5/2021 *Revision 5*	Updated Plan to reflect 2021 MSGP changes: updated Plan layout, BMP sections, contact information; Updated inspection forms and figures	Kyle Fend / Sam Field / Aquionix, Inc.
6/2022 *Revision 6*	Update plan with final design plans for TCRA's included in Appendix J	Sam Field / Aquionix, Inc.
10/2023 *Revision 7*	Updated plan with 2023 TCRA information in Appendix J	Sam Field / Aquionix, Inc.
03/2024 *Revision 8*	Updated plan with 2023-2024 TCRA information in Appendix J	Blaine Serrin / Aquionix, Inc.
01/2025 *Revision 9*	Added Outfall 004; Updated BMP inspection form; Renumbered BMPs; Updated Figures 1-6 and BMP Figures	Blaine Serrin / Aquionix, Inc.

Refer to Appendix B of this SWPPP for all Delegation of Authority forms for Perpetua personnel.

A copy of this SWPPP is maintained at the Project site pursuant to Section 6.4 of the MSGP and is immediately available. Other applicable required documentation is also maintained with the SWPPP including:

- A copy of the NOI submitted to EPA along with any correspondence exchanged between Perpetua and EPA specific to coverage under the MSGP;
- A copy of the authorization from the EPA assigning a NPDES ID;
- A copy of the MSGP permit (either a hard copy or an electronic copy easily available to SWPPP personnel);
- Documentation of any maintenance and repairs of stormwater control measures, including the date(s) of regular maintenance, date(s) of discovery of areas in need of repair/replacement, and for repairs, date(s) that the control measure(s) returned to full function, and the justification for any extended maintenance/repair schedules;

- All inspection reports, including the Routine Facility Inspection Reports and Visual Assessment Documentation;
- Description of any deviations from the schedule for visual assessments and/or monitoring, and the reason for the deviations (e.g., adverse weather or it was impracticable to collect samples within the first 30 minutes of a measurable storm event);
- Corrective action documentation;
- Documentation of any benchmark threshold exceedances, which AIM Level triggering event the exceedance caused, and AIM response employed (currently not applicable);
- Documentation to support any determination that pollutants of concern are not expected to be present above natural background levels if discharge is directly to impaired waters, and that such pollutants were not detected in the discharge after three years or were solely attributable to natural background sources; and
- Documentation to support any status change from active to inactive and unstaffed with respect to the requirements to conduct routine facility inspections, quarterly visual assessments, benchmark monitoring, and/or impaired waters monitoring.

Part 6.4.1 of the MSGP also requires that Perpetua make this SWPPP publicly available. Perpetua has uploaded the SWPPP to a publicly accessible URL http://midasgoldidaho.com/swppp/# and shall update the documentation at the URL as necessary, but no later than 45 days after conducting the final routine facility inspection for the calendar year. The method of making the SWPPP publicly available may be switched throughout permit coverage; in the event Perpetua changes this method, an appropriate NOI change submittal will be completed.

SWPPP CERTIFICATION [MSGP Appendix B.11.E]

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

Name: Kyle Fend Title: Field Operations Manager

Signature: Date: 2024-01-10

MSGP Appendix B.11's signatory requirements state that NOIs, NOTs and NOEs must be signed as follows:

(1) For a corporation: By a responsible corporate officer. For the purpose of the MSGP, a responsible corporate officer means:

 (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or

 (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

(3) For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of the MSGP, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Changes to this SWPPP, including changes to document any corrective actions, advanced implementation measures or any other compliance documentation (including annual reports, DMRs and inspection reports) must be signed by a person defined in Items 1-3 above or a duly authorized representative of that person (see Appendix B of this SWPPP for Delegations of Authority).

1.0 FACILITY INFORMATION

1.1 Stormwater Pollution Prevention Team [MSGP Part 6.2.1]

Table 1-1 below lists the Stormwater Pollution Prevention Team members at the Perpetua facility. These personnel are responsible for overseeing development of the SWPPP, any modifications to it, and for implementing and maintaining control measures and taking corrective actions and/or Additional Implementation Measures (AIM) responses, when required. All members of the Team have ready access to the most current version of this SWPPP and all other relevant SWPPP documentation.

Table 1-1: Stormwater Pollution Prevention Team

Staff Position	SWPPP Function	SWPPP Individual Responsibilities
Field Operations Manager	Alternate Team Leader	Provide support and backup function to the Team Leader.
Field Operations Supervisor	Member	Taking corrective actions where required; Assisting Maintaining BMP’s
Site Supervising Geologist	Team Leader	Develop and revise the facility SWPPP, complete inspections, prepare reports, develop and assist with deployment of training
Equipment Operator	Member	Taking corrective actions where required; Assisting Maintaining BMP’s
Environmental Geologist	Member	Taking corrective actions where required; Assisting Maintaining BMP’s

1.2 Site Description [MSGP Part 6.2.2]

The Perpetua Stibnite Mine is located in north-central Valley County, Idaho, along the East Fork South Fork Salmon River (EFSFSR), approximately 75 miles northeast of Cascade, Idaho and 14 miles southeast of Yellow Pine, Idaho, as shown on Figure 1 in Appendix C.

Exploration drilling occurs both on private patented property and on public lands that are managed by the U.S. Department of Agriculture (USDA) Forest Service (USFS). The Project area is displayed in Figures 2-5 in Appendix C. The mining district is surrounded by additional public lands administered by USFS. The Krassel Ranger District, Payette National Forest, under an exchange of administration agreement with the Boise National Forest, administers all public lands in the project area.

1.3 Activities at the Facility [MSGP Part 6.2.2.1]

The following sections describe current and planned activities associated with the Standard Gold Project.

1.3.1 Camp Area Activities

The Project camp area is located on private land near the old Stibnite town site. The camp area includes:

- Fuel storage and transfer for operations support;
- Helicopter maintenance and fueling;
- Site administrative offices;

- Living quarters and associated infrastructure, including potable water treatment and municipal wastewater treatment; and
- Vehicle and equipment storage and maintenance.

Refer to Figures 4 and 5 in Appendix C for camp area visual details.

1.3.2 Mine Site Preparation and Construction Activities

As Perpetua transitions to preparing the Project site for future mining operations, several current and future activities may include:

- Construction staging areas to prepare for erecting structures (e.g., personnel housing, mill buildings, etc.);
- Site preparation activities (e.g., tailings impoundments, heap leach pads);
- Access roads (for construction); and
- Cutting new rights of way.

1.3.3 Exploration Drilling Operations

Exploration drilling operations at Perpetua may include the following:

- Drill pad development and operations (track/helicopter core drill pads and reverse core drill pads);
- Access road construction and use (currently only one access road is proposed for construction as part of the exploration activities; all other pads are accessed by helicopter, tracked vehicle, or existing roads; some access roads will include temporarily re-opening old roads); and
- Winter-specific exploration activities.

Figure 3 in Appendix C displays the potential exploration areas within the Project boundary.

1.3.4 Borrow Pit Operations (Inactive)

The borrow pit, located adjacent to and east of the Shop (Figure 4, Appendix C) was used by previous mining operations and federal agencies as a rock resource. Perpetua has used the borrow pit for small quantities of rock borrow and for miscellaneous rock needs (e.g., to address a damaged culvert spillway). The proposed rock body outcrop is estimated to be approximately 75 feet high, 300 feet wide (from north to south), and intermittently exposed approximately 300 feet into the hillside to the east.

Other activities associated with the borrow pit area may include transportation from the borrow site to a rock processing facility (on private land) and a working surface would be required in front of the borrow site for loading and temporary stockpiling.

1.3.5 Time Critical Removal Actions (TCRAs)

Perpetua has prepared drafts of several Time Critical Removal Actions (TCRAs) in accordance with the requirements of an Administrative Settlement Agreement and Order on Consent (ASAOC) for Removal Actions with the U.S. EPA and U.S. Department of Agriculture Forest Service in efforts to reduce any uncontrolled release of metals to surface waters in the Project area (Meadow Creek, EFSFSR) related to historic mining activities. These potential TCRAs include:

- Stream Diversions (to divert upgradient surface water around historical mine features); and
- Relocation of historical (legacy mining) waste rock dumps and tailings storage impoundments (to remove the material from stream channels and banks).

Perpetua has developed a schedule to accomplish all the TCRAs, including collecting data to fill identified gaps during the Summer of 2021, with final design packages targeted for development and approval during the Spring of 2022 and 2023. Refer to Appendix J of this SWPPP for documentation related to the proposed TCRAs. Stormwater control measures, management and inspection activities will be built into the final design packages consistent with this SWPPP. Permanent control measures will be included in this SWPPP as part of future revisions, as required.

1.4 SWPPP Maps [MSGP Parts 6.2.2.2 and 6.2.2.3]

Appendix C contains a Site Location Map (Figure 1) and a Surrounding Waters Overview Map (Figure 2) for the facility showing the site location and surrounding receiving waters for stormwater discharges. Figures 3, 4, 5 and 6 show the following site characteristics (where applicable), as required in the MSGP:

- Boundaries of the property and the size of the property in acres;
- Location and extent of significant structures and impervious surfaces;
- Directions of stormwater flow (use arrows), including flows with a significant potential to cause soil erosion;
- Locations of all stormwater control measures;
- Locations of all receiving waters, including wetlands, in the immediate vicinity of the facility. Indicate which waterbodies are listed as impaired and which are identified by the state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 waters;
- Locations of all stormwater conveyances including ditches, pipes, and swales;
- Locations of potential pollutant sources identified;
- Locations where significant spills or leaks have occurred;
- Locations of all stormwater monitoring points;
- Locations of stormwater inlets and discharge points, with a unique identification code for each discharge point (e.g., 001, 002), indicating if one or more discharge points is considered “substantially identical” and an approximate outline of the areas draining to each discharge point;
- If applicable, municipal separate storm sewer systems (MS4s) and where stormwater discharges to them;

- Areas of Endangered Species Act-designated critical habitat for endangered or threatened species, if applicable; and
- Locations of the following activities where such activities are exposed to precipitation:
  - fueling stations;
  - vehicle and equipment maintenance and/or cleaning areas;
  - loading/unloading areas;
  - locations used for the treatment, storage, or disposal of wastes;
  - liquid storage tanks;
  - processing and storage areas;
  - immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility;
  - transfer areas for substances in bulk;
  - machinery; and
  - locations and sources of run-on to the site from adjacent property that contains significant quantities of pollutants.

2.0 POTENTIAL POLLUTANT SOURCES AND OUTFALLS [MSGP Part 6.2.3]

2.1 Potential Pollutant Sources [MSGP Part 6.2.3]

The following table details the potential stormwater pollutant sources throughout the Perpetua facility. The PPS # listed in the table corresponds to the potential pollutant source located on the figures in Appendix C and the BMPs are shown on the BMP maps in Appendix C.

Table 2-1: Potential Pollutant Source Descriptions

#	Potential Pollutant Source	Location	Associated Outfall	Control Measures
Camp Area Activities				
1	Diesel Fuel	Primary Fuel Storage	Outfall 001	(1) Concrete containment; (2) Double-walled tanks; (3) Area is covered; (4) Spill cleanup materials nearby; (5) Earthen swale to divert flow around area; (6) Materials handling procedures; (7) Routine inspections (SPCC, stormwater); (8) Good housekeeping procedures
2	Gasoline	Secondary Fuel Storage	Outfall 001 Outfall 002	(1) Double-walled tanks; (2) Tertiary containment; (3) Spill cleanup materials nearby; (4) Lined transfer area; (5) Materials handling procedures; (6) Sediment pond down gradient; Earthen swale to divert flow; (7) Routine inspections (SPCC, stormwater); (8) Good housekeeping procedures; (9) Established vegetation adjacent
3	Drinking Water Treatment	Camp Facilities Area	Outfall 001	(1) System located within building itself; (2) Routine inspections
4	Wastewater Treatment and Reuse	Camp Facilities Area	Outfall 001	(1) System located within building itself; (2) Routine inspections

Table 2-1: Potential Pollutant Source Descriptions

#	Potential Pollutant Source	Location	Associated Outfall	Control Measures
5	Used Oil Transfer / Storage	Shop	Outfall 002	(1) Storage located within Shop building itself; (2) Secondary containment at transfer area outside building; (3) Spill cleanup materials nearby; (4) Earthen swale to divert flow around area; (5) Materials handling procedures; (6) Routine inspections (SPCC, stormwater); (7) Good housekeeping procedures
6	Sediment	Various (parking/disturbed areas, dust from vehicle traffic)	Outfall 001 Outfall 002 Outfall 003 Outfall 004	Erosion control varies depending on location, may include: grading, berming, sedimentation ponds, compaction, rip-rap, wattles, and/or diversion utilizing culverts and swales (refer to maps for details)
7	Jet A, Diesel Fuel	Helipad Storage	Outfall 003 Outfall 004	(1) Concrete containment; (2) Berm diverting flow around area; (3) Spill cleanup materials nearby; (4) Materials handling procedures; (5) Routine inspections (SPCC, stormwater); (6) Good housekeeping procedures
8	Oils, Greases, Fuel (Maintenance)	Equipment Parking Area	Outfall 002	(1) Good housekeeping procedures; (2) Area graded towards earthen swale to direct flow; (3) Sedimentation pond; (4) Routine inspections
9	Sanitary Waste	Varies	Varies on location	(1) Porta-pot (self-contained); (2) Earthen swale to direct flow; (3) Routine inspections; (4) Good housekeeping procedures
10	Diesel Fuel	Generator	Varies on location	(1) Containment for fuel tank; (2) Materials handling procedures; (3) Routine inspections (SWPPP and SPCC); (4) Good housekeeping procedures

Table 2-1: Potential Pollutant Source Descriptions				
#	Potential Pollutant Source	Location	Associated Outfall	Control Measures
11	Core Cuttings	Core Shed	Outfall 001	(1) Core cutting water storage tank; (2) Building itself (cutting occurs inside); (3) Routine inspections; (4) Good housekeeping procedures
12	Diesel Fuel	Generator	Outfall 003 Outfall 004	(1) Containment for fuel tank; (2) Materials handling procedures; (3) Routine inspections (SWPPP and SPCC); (4) Good housekeeping procedures
Mine Site Preparation and Construction Activities				
15	Sediment, Dust, Chemicals, Equipment (fuels, oils, greases)	Various (construction staging areas)	Varies on location	(1) Timing of Construction; (2) Preservation of Existing Vegetation; (3) Stabilization of Construction Entrance/Exit; (4) Erosion Prevention of Temporary Roads
16	Sediment, Dust, Chemicals, Equipment (fuels, oils, greases)	Various (access road construction)	Varies on location	(1) Timing of Construction; (2) Preservation of Existing Vegetation; (3) Stabilization of Construction Entrance/Exit; (4) Erosion Prevention of Temporary Roads
Exploration Drilling Operations				
13	Sediment and Gravel	Various (drill pad locations)	Varies on location	(1) Minimization of disturbance (helicopter drilling and access); (2) Preservation of existing vegetation; (3) Earthen berming around pad; (4) Routine inspections; (5) Earthen swale(s) diverting around pad; (6) Temporary use of wattles and haybales; (7) Surface roughing and hydroseeding
14	Drilling Equipment (fuels, oils, greases) and Drilling Fluids	Various (drill pad locations)	Varies on location	(1) Secondary containment for fuels, oils and grease; (2) Infiltration sump for drilling fluids; (3) Routine inspections; (4) Good housekeeping practices
Borrow Pit Operation				

Table 2-1: Potential Pollutant Source Descriptions

#	Potential Pollutant Source	Location	Associated Outfall	Control Measures
17	Sediment	Borrow Pit (inactive)	Outfall 001	(1) Earthen swale in area; (2) Preservation of existing vegetation; (3) Routine inspections
Time Critical Removal Actions (TCRAs)				
N/A	NA – TCRAs 1-8 are complete and no open Actions at the time of this Plan revision			

2.1.1 Spills and Leaks [MSGP Part 6.2.3.3]

Table 2-2 below displays the significant spills and leaks that have occurred at the facility in the three years prior to the date of this SWPPP.

Table 2-2: Significant Spills and Leaks

Date	Material	Location and Outfall Affected
None	-	-

Additionally, Table 2-3 lists the areas where *potential* spills and leaks could occur that may contribute pollutants to stormwater discharges:

Table 2-3: Potential Spills and Leaks

Material	Location and Outfall Potentially Affected
Fuel (gasoline, diesel, Jet A)	Fuel Storage (Exploration Camp) (Outfalls 001 and 002)
Fuel (gasoline, diesel, Jet A)	Helicopter Pads (Outfalls 003 and 004)
Drilling fluids, sediment	Drill pads (locations and outfalls vary throughout)

2.1.2 Covered Stormwater Discharges [MSGP Part 8.G.1.3]

Pursuant to Part 8.G.1.3 of the MSGP (specifically for Sector G facilities), all stormwater discharges from earth-disturbing activities conducted prior to active mining activities are covered by the MSGP. Earth-disturbing activities are defined as either:

- Activities performed for purposes of mine site preparation, including: cutting new rights of way (except when related to access road construction); providing access to the mine site for vehicles and equipment (except when related to access road construction); other earth disturbances associated with site preparation activities on any areas where active mining activities have not yet commenced (e.g., for heap leach pads, waste rock facilities, tailings impoundments, wastewater treatment plants); and
- Construction of staging areas to prepare for erecting structures such as to house project personnel and equipment, mill buildings, etc., and construction of access roads. Earth-disturbing activities associated with the construction of staging areas and the construction of access roads conducted prior to active mining are considered to be “construction” and have additional effluent limits in Part 8.G.4.2 of the MSGP.

2.1.3 Authorized Non-Stormwater Discharges [MSGP Part 1.2.2.1]

The following discharges are the only non-stormwater discharges authorized under the MSGP for all sectors, provided that all discharges comply with MSGP requirements:

- Discharges from emergency/unplanned fire-fighting activities;
- Fire hydrant flushings;
- Potable water, including uncontaminated water line flushings;
- Uncontaminated condensate from air conditioners, coolers/chillers, and other compressors and from the outside storage of refrigerated gases or liquids;
- Irrigation/landscape drainage, provided all pesticides, herbicides, and fertilizers have been applied in accordance with the approved labeling;
- Pavement wash waters, provided that detergents or hazardous cleaning products are not used (e.g., bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonylphenols), and the wash waters do not come into contact with oil and grease deposits, sources of pollutants associated with industrial activities (see Part 6.2.3), or any other toxic or hazardous materials, unless residues are first cleaned up using dry clean-up methods (e.g., applying absorbent materials and sweeping, using hydrophobic mops/rags) and you have implemented appropriate control measures to minimize discharges of mobilized solids and other pollutants (e.g., filtration, detention, settlement);
- External building/structure washdown / power wash water that does not use detergents or hazardous cleaning products (e.g., those containing bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonylphenols) and you have implemented appropriate control measures to minimize discharges of mobilized solids and other pollutants (e.g., filtration, detention, settlement);
- Uncontaminated ground water or spring water;
- Foundation or footing drains where flows are not contaminated with process materials;
- Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but not intentional discharges from the cooling tower (e.g., "piped" cooling tower blowdown; drains); and
- Any authorized non-stormwater discharge listed above in this Part 1.2.2 or any stormwater discharge listed in Part 1.2.1 mixed with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization.

2.1.4 Unauthorized Non-Stormwater Discharge Evaluation [MSGP Part 6.2.3.4]

Pursuant to MSGP Part 6.2.3.4, Perpetua shall inspect and document all discharge points at the facility for the presence of any unauthorized non-stormwater discharge before the end of the first year of permit coverage. Documentation of this evaluation is located in Appendix E of this Plan.

2.1.5 Salt Storage [MSGP Part 6.2.3.5]

There are no storage piles containing salt used for de-icing or other commercial or industrial purposed at the Perpetua facility.

2.1.6 Sampling Data [MSGP Part 6.2.3.6]

Table 2-3 below contains stormwater sampling data that was obtained at the facility during the previous MSGP permit term for Outfall 001. Because of irregular climate and stormwater runoff, discharge events from Outfall 001 did not yield enough volume for analysis; only events in 2018 and 2020 provided enough discharge flow to obtain a sample, as follows:

Table 2-4: Outfall Sampling Data

	2016	2017	2018	2019	2020
Outfall 001					
Arsenic (total as AS)	*No Discharge*	*No Discharge*	*0.188 mg/L*	*No Discharge*	*0.147 mg/L*
Antimony (total as Sb)	*No Discharge*	*No Discharge*	*0.0397 mg/L*	*No Discharge*	*0.0299 mg/L*

2.2 Stormwater Outfalls

The MSGP (2021) defines a "discharge point" as a location where collected and concentrated stormwater flows are discharged from the facility such that the first receiving waterbody into which the discharge flows, either directly or through a separate storm sewer system, into a water of the U.S.

Perpetua has identified three stormwater outfall locations at the facility, as detailed in the following table. Refer to the maps in Appendix C for outfall locations. The BMPs are shown on the BMP maps in Appendix C.

Table 2-5: Stormwater Outfall Inventory

Outfall Number	Receiving Surface Water	Size of Drainage Area Associated	Type of Discharge	Latitude and Longitude	Associated Control Measures
001	East Fork South Fork Salmon River	Approximately 10 acres	Sheet	44.909395 / -115.328996	(1) Earthen drainage swale; (2) Sedimentation pond; (3) Established vegetation; (4) Routine inspections
002	East Fork South Fork Salmon River	Approximately 4 acres	Concentrated	44.906922 / -115.327650	(1) Earthen drainage swale; (2) Rock rip-rap and sedimentation pond prior to entrance; (3) Established vegetation; (4) Routine inspections
003	East Fork South Fork Salmon River	Approximately 4.8 acres	Concentrated	44.903170 / -115.328443	(1) Earthen drainage swale; (2) Established vegetation; (3) Routine inspections
004	East Fork South Fork Salmon River	Approximately 20 acres	Concentrated	44.901855 / -115.329014	(1) Lined/earthen swale; (2) Sedimentation pond; (3) Dual culverts; (4) Established vegetation; (5) Routine inspections

2.2.1 Receiving Waters

The waterways associated with the general area include Meadow Creek, East Fork Meadow Creek (a.k.a. Blowout Creek), Garnet Creek, Fiddle Creek, Midnight Creek, Hennessey Creek, Sugar Creek, West End Creek and EFSFSR (Figure 2, Appendix C). The EFSFSR's 3rd order tributaries are associated with IDEQ's 2022 303(d) impaired waters listing. The EFSFSR is a tributary to the South Fork of the Salmon River (SFSR).

IDEQ has recommended removing EFSFSR from the 303(d) listing for sediment and metals; however, this action has not yet been completed. An addendum to the initial listing indicates that the current management practices associated with the SFSR are consistent with BMPs for sediment.

Perpetua's ongoing wetland delineations have also identified wetlands in the general area, as shown on the maps in Appendix C of this SWPPP.

3.0 STORMWATER CONTROL MEASURES [MSGP Part 6.2.5.1]

Various stormwater control measures (formally known as Best Management Practices (BMPs)) are implemented at Perpetua. Control measures are used to achieve the non-numeric effluent limits in Part 2 of the MSGP and the sector-specific requirements in Part 8.G.5.

This section is organized into three parts: Section 3.1 describes general control measures and practices that are considered by Perpetua when evaluating stormwater management and that may be used at the facility; Section 3.2 describes the control measures described in the Idaho Department of Environmental Quality's (IDEQ's) BMP Catalog that Perpetua may use for technical guidance during design, installation and maintenance; and Section 3.3 discusses the additional control measure requirements under Part 8.G.5 (sector-specific) of the MSGP.

3.1 General Stormwater Control Measures

The following subsections list general control measures described in the MSGP and that may be implemented at Perpetua. Typically, these general control measures are considered for stormwater management and then implemented using the technical guidance provided in Section 3.2 of this SWPPP (IDEQ's BMP Catalog).

3.1.1 Minimize Exposure [MSGP Part 2.1.2.1]

Perpetua has implemented a number of practices to minimize exposure of exploration-related activities, including the following:

- Use helicopter delivery at the remote drill locations rather than constructing access roads.
- Design small drill pad footprints and use small self-contained track drill rigs and small mud pits.

Additionally, to minimize exposure of potential pollutant sources (activities and materials) to stormwater at Perpetua in areas where enclosed/covered storage is not feasible, the facility may also employ one or more of the following:

- Use grading, berming or curbing to prevent discharges of contaminated flows and divert run-on away from these areas;
- Locate materials, equipment, and activities so that potential leaks and spills are contained or able to be contained or diverted before discharge;
- Store leaky vehicles and equipment indoors;
- Perform all vehicle and/or equipment cleaning operations indoors, under cover, or in bermed areas that prevent discharges and run-on and also that capture any overspray; and
- Drain fluids from equipment and vehicles that will be decommissioned, and for any equipment and vehicles that will remain unused for extended periods of time, inspect at least monthly for leaks.

3.1.2 Good Housekeeping [MSGP Part 2.1.2.2]

Good housekeeping practices are a cost-effective way to reduce/eliminate potential pollutant sources from commingling with stormwater runoff. Any of the following good housekeeping measures may be utilized at Perpetua, if appropriate:

- Sweep or vacuum at regular intervals or, alternatively, wash down the area and collect and/or treat, and properly dispose of the washdown water;
- Store materials in appropriate containers;
- Keep all dumpster lids closed when not in use. For dumpsters and roll off boxes that do not have lids and could leak, ensure that discharges have a control (e.g., secondary containment, treatment).
- Minimize the potential for waste, garbage and floatable debris to be discharged by keeping exposed areas free of such materials, or by intercepting them before they are discharged.
- Plastic Materials Requirements: Facilities that handle pre-production plastic must implement control measures to eliminate discharges of plastic in stormwater.9 Examples of plastic material required to be addressed as stormwater pollutants include plastic resin pellets, powders, flakes, additives, regrind, scrap, waste and recycling.

3.1.3 Maintenance [MSGP Part 2.1.2.3]

Maintenance generally is a two-part approach:

- Maintaining on-site equipment, vehicles, and storage containers, to minimize the potential for a release of a pollutant to stormwater (e.g., maintenance of vehicles to avoid oil leaks).
- Maintaining stormwater control measures (e.g., maintaining a silt fence).

Perpetua has an equipment and vehicle maintenance program that includes routine inspection and maintenance of equipment. In general, maintenance of equipment and vehicles is in accordance with manufacturer recommendations, but may also include:

- Performing inspections and preventive maintenance of stormwater drainage, source controls, treatment systems, and plant equipment and systems that could fail and result in discharges of pollutants via stormwater;
- Maintaining non-structural control measures (e.g., keep spill response supplies available, personnel appropriately trained);
- Inspecting and maintaining baghouses at least quarterly to prevent the escape of dust from the system and immediately removing any accumulated dust at the base of the exterior baghouse.
- Cleaning catch basins when the depth of debris reaches two-thirds (2/3) of the sump depth, or in line with manufacturer specifications, whichever is lower, and keeping the debris surface at least six inches below the lowest outlet pipe.

During routine maintenance, if it is found that stormwater control measures need routine maintenance, the necessary maintenance shall be conducted immediately in order to minimize pollutant discharges.

If it is found that the stormwater control measure needs to be repaired or replaced, all reasonable steps shall immediately be taken to prevent or minimize the discharge of pollutants until the final repair or replacement is implemented, including cleaning up any contaminated surfaces. Final repairs/replacement of control measures shall be completed as soon as feasible, but **no later than 14 days**. If 14 days is infeasible, work must be completed with 45 days. Refer to 6.2 of this SWPPP for additional details.

3.1.4 Spill Prevention and Response [MSGP Part 2.1.2.4]

Perpetua may utilize one or more of the following spill prevention and response measures at the facility:

- Clean up spills and leaks promptly using dry methods (e.g., absorbents) to prevent the discharge of pollutants;
- Use drip pans and absorbents if leaky vehicles and/or equipment are stored outdoors;
- Use spill/overflow protection equipment;
- Plainly label containers (e.g., “Used Oil,” “Spent Solvents,” “Fertilizers and Pesticides”) that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur;
- Implement procedures for material storage and handling, including the use of secondary containment and barriers between material storage and traffic areas, or a similarly effective means designed to prevent the discharge of pollutants from these areas;
- Develop training on the procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases. As appropriate, execute such procedures as soon as possible;
- Keep spill kits onsite, located near areas where spills may occur or where a rapid response can be made; and
- Notify appropriate facility personnel when a leak, spill, or other release occurs.

The Perpetua Emergency Response Plan (ref OHS-008) is the primary response procedure at the facility. Additionally, a Spill Prevention, Control and Countermeasures (SPCC) Plan provides additional information for facility personnel, emergency response agencies, and regulatory agencies in the event of a hydrocarbon spill.

3.1.5 Management of Stormwater [MSGP Part 2.1.2.6]

The facility shall divert, infiltrate, reuse, contain or otherwise reduce stormwater to minimize pollutants in discharges.

Perpetua may employ various stormwater diversion ditches, detention basins and vegetated to direct, slow and filter stormwater runoff prior to discharging from the site. Refer to Section 2.1 of this SWPPP for specific control measures associated with potential pollutant sources and the site maps in Appendix C for their location(s).

3.1.6 Salt Storage Piles or Piles Containing Salt [MSGP Part 2.1.2.7]

At the time of this SWPPP revision, there are no outdoor salt storage locations at the Perpetua facility. Minimal amounts of ice melt is stored in bags inside facility buildings.

3.1.7 Employee Training [MSGP Part 2.1.2.8]

Personnel who work in areas where industrial materials or activities are exposed to stormwater, or who are responsible for implementing activities necessary to comply with the MSGP, including all members of the SWPP Team shall be trained on the requirements of the MSGP and their specific responsibilities. Those personnel include:

- Personnel who are responsible for the design, installation, maintenance, and/or repair of controls (including pollution prevention measures);
- Personnel responsible for the storage and handling of chemicals and materials that could become pollutants discharged via stormwater;
- Personnel who are responsible for conducting and documenting monitoring and inspections; and
- Personnel who are responsible for taking and documenting corrective actions.

Personnel shall be trained in at least the following, if related to the scope of their job duties:

- An overview of what is in the SWPPP;
- Spill response procedures, good housekeeping, maintenance requirements, and material management practices;
- The location of all the controls required by this permit, and how they are to be maintained;
- The proper procedures to follow with respect to the permit's pollution prevention requirements; and
- When and how to conduct inspections, record applicable findings, and take corrective actions; and
- The facility's emergency procedures, if applicable.

Perpetua has designated the Camp Supervisor as the training officer. Annual, new hire, and on-the-job training sessions are utilized to deliver the required training content to appropriate personnel. Training attendance records and documentation are maintained by the Environmental and Human Resources departments.

3.1.8 Non-Stormwater Discharges [MSGP Part 2.1.2.9]

Per Section 2.1.3 of this SWPPP, Perpetua shall complete a non-stormwater discharge evaluation at the facility. If any unauthorized non-stormwater discharges are observed during this evaluation, they shall be eliminated.

3.2 IDEQ's BMP Catalog

IDEQ's *Idaho Catalog of Storm Water Best Management Practices* (2020) provides technical guidance for design and selection of stormwater BMPs. The Catalog includes guidance for construction BMPs (temporary in nature and used during construction) and permanent BMPs (those that remain on the landscape after development completion) and each individual BMP 'Fact Sheet' typically describes the BMP purpose, guidelines for handling during construction, installation steps and schematic(s) and maintenance practices.

There are 94 BMPs included in the IDEQ catalog – not all of these are applicable to the Perpetua Project. The following table lists the IDEQ catalog Fact Sheet number and the application the BMP may have at the Project. Appendix D of this SWPPP contains each IDEQ BMP Fact Sheet listed in the table below.

Table 3-1: IDEQ Control Measure List

BMP Fact Sheet #	Description
General Control Measures for Earth Disturbing Activities and Construction	
36	Construction Timing
37	Staging Areas
38	Preserve Topsoil and Vegetation
39	Clearing Limits
40	Vehicle Sediment Control
41	Stabilized Construction Roads and Staging Areas
42	Erosion Prevention on Construction Roads
Good Housekeeping	
43	Dust Control
44	Stockpile Management
46	Spill Prevention and Control
47	Construction Equipment Washing and Maintenance
48	Hazardous Materials Management
49	Concrete Waste Management
50	Sanitary and Septic Waste Management
Slope Protection and Stabilization	
52	Mulching
53	Geotextile
54	Matting
55	Soil Binders
31	Topsoiling
32	Landscaping
58	Slope Roughening
59	Gradient Terracing
Channel Protection	
61	Channel Liners
56	Riprap Slope Protection
74	Inlet Protection

60	Check Dams
62	Temporary Stream Crossing
Sediment Collection and Runoff Diversion	
63	Biofilter Bags
64	Fiber Rolls
65	Silt Fence
11	Vegetative Filter Strip
66	Sedimentation Basins and Traps
67	Portable Sediment Tank
68	Temporary Swale
69	Diversion Dike
70	Temporary Berms

3.3 Sector-Specific Control Measures [MSGP Part 8.G.4]

The MSGP also has sector-specific requirements listed in Part 8.G.4 for Sector G (*Metal Mining)*, Subsector G2 (*Iron Ores; Copper Ores; Lead and Zinc Ores; Gold and Silver Ores; Ferroalloy Ores; except Vanadium; and Miscellaneous Metal Ores (SIC Codes 1011, 1021, 1031, 1041, 1044, 1061, 1081, 1094, 1099)).* These control measures are geared toward the specific activities that may occur during earth-disturbing activities conducted prior to active mining activities.

If applicable, the sector-specific control measures described below shall be implemented using the technical guidance provided in Section 3.2 of this SWPPP (IDEQ's BMP Catalog).

3.3.1 Erosion and Sediment Controls [MSGP Parts 2.1.2.5 and 8.G.4.1]

To minimize pollutant discharges in stormwater, the site's focus shall be on stabilizing exposed soils at the facility and, if appropriate, place velocity dissipation devices at discharge locations to minimize channel and streambank erosion and scour in the immediate vicinity of the discharge locations.

Activities when erosion and sediment runoff could occur may include the following:

- Developing drill pads and during drill pad operations (exposed soil prior to reclamation);
- Constructing access roads;
- Conducting operations at the borrow pit;
- Earth disturbing activities associated with camp site activities; and
- Implementation of TCRAs.

3.3.1.1 Erosion and Sediment Control Installation Requirements [MSGP Part 8.G.4.1.1]

By the time construction activities commence, install and make operational downgradient sediment controls, unless this timeframe is infeasible. If infeasible the facility shall install and make such controls operational as soon as practicable or as soon as site conditions permit. All other stormwater controls described in this SWPPP must be installed and made operational as soon as conditions on each portion of the site allows.

3.3.1.2 Erosion and Sediment Control Maintenance Requirements [MSGP Part 8.G.4.1.2]

Pursuant to Part 8.G of the MSGP, all erosion and sediment controls shall remain in effective operating condition. Whenever it is determined that a stormwater control needs maintenance to control operating effectively, efforts to fix the control shall be initiated immediately after discovery of the problem and work shall be completed by the next day.

When a stormwater control needs to be replaced or significantly repaired, the work shall be completed within 7 days, unless infeasible. If 7 days is infeasible, the installation or repair shall be completed as soon as practicable.

3.3.1.3 Perimeter Controls [MSGP Part 8.G.4.1.3]

Sediment control measures shall be installed along the perimeter area of disturbed areas at the Perpetua facility, except where site conditions prevent the use of such controls or where sediment movement is not likely (i.e., uphill). Sediment shall be removed before it accumulates to one-half of the aboveground height of any perimeter control.

3.3.1.4 Sediment Basins [MSGP Part 8.G.4.1.6]

If sediment basins are installed to treat stormwater from earth-disturbing activities, the following characteristics should be considered:

- Storage capacity shall be for either (1) the 2-year, 24-hour storm or (2) 3,600 cubic feet per acre drained; and
- Erosion of basin embankments shall be prevented by using stabilization controls (e.g., erosion control blankets) and erosion of the inlet and outlet points of the basin shall be prevented using velocity dissipation devices.

3.3.2 Dust Generation and Vehicle Tracking [MSGP Parts 2.1.2.10, 8.G.4.1.4 and 8.G.4.1.7]

Perpetua shall minimize generation and dust of off-site tracking of raw, final or waste materials in order to minimize pollutants discharged in stormwater. For construction vehicles and equipment exiting the site directly onto paved roads, the facility shall:

- Use appropriate stabilization techniques to minimize sediment track-out from vehicles and equipment prior to exit;
- Use additional controls to remove sediment from vehicle and equipment tires prior to exit, where necessary; and
- Remove sediment that is tracked out onto paved roads by the end of the workday.

Minimization of dust through appropriate application of water or other dust suppression techniques shall be utilized to minimize pollutants being discharged into surface waters.

3.3.3 Soil or Sediment Stockpiles [MSGP Part 8.G.4.1.5]

Perpetua shall minimize erosion of stockpiles from stormwater and wind via temporary cover, if feasible. Any upslope stormwater flows shall be diverted around the stockpile to prevent erosion. Sediment that runs off stockpiles from stormwater shall be minimized using sediment controls (e.g., a sediment barrier or downslope sediment control).

3.3.4 Restrictions on Use of Treatment Chemicals [MSGP Part 8.G.4.1.8]

If chemicals are used for sediment treatment at Perpetua, the following minimum requirements shall apply:

- Use conventional erosion and sediment controls prior to and after application of chemicals;
- Select chemicals suited to soil type, and expected turbidity, pH, flow rate;
- Minimize the discharge risk from stored chemicals;
- Comply with state/local requirements;
- Use chemicals in accordance with good engineering practices and specifications of chemical supplier;
- Ensure proper training; and
- Provide proper SWPPP documentation.

Use of cationic treatment chemicals renders facilities ineligible for coverage under the MSGP, unless the EPA Regional Office is notified in advance and use is authorized.

3.3.5 Additional Technology-Based Effluent Limits Applicable Only to the Construction of Staging Areas for Structures and Access Roads [MSGP Part 8.G.4.2]

<u>Erosion and Sediment Control Design Requirements:</u>

Design, install and maintain effective erosion and sediment controls to minimize the discharge of pollutants from construction activities. The following factors shall be accounted for in designing erosion and sediment controls:

- The expected amount, frequency, intensity and duration of precipitation;
- The nature of stormwater discharges and run-on at the site, including factors such as impervious surfaces, slopes and site drainage features;
- The range of soil particle sizes expected to be present on the site.

Direct discharges to stormwater controls in vegetated areas of a site to increase sediment removal and maximize stormwater infiltration, including any natural buffers, unless infeasible. Use velocity dissipation devices if necessary to prevent erosion when directing stormwater to vegetated areas.

If any stormwater flow becomes or will be channelized, design erosion and sediment controls to control both peak flowrates and total stormwater volume to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.

Stormwater conveyance channels shall be designed to avoid unstabilized areas on the site and to reduce erosion, unless infeasible. In addition, minimize erosion of channels and their embankments, outlets, adjacent streambanks, slopes, and downstream waters during discharge conditions through the use of erosion controls and velocity dissipation devices within and along the length of any constructed stormwater conveyance channel, and at any outlet to provide a non-erosive flow velocity.

<u>Natural Buffers:</u>
For any stormwater discharges within 50 feet of a WOUS, one of the following compliance alternatives shall be applied:

(1) Provide a 50-foot undisturbed natural buffer between construction activities and the WOUS; or
(2) Provide an undisturbed natural buffer that is less than 50 feet supplemented by additional erosion and sediment controls, which in combination, achieve a sediment load reduction that is equivalent to a 50-foot undisturbed natural buffer; or
(3) If it is infeasible to provide an undisturbed natural buffer of any size, implement erosion and sediment controls that achieve a sediment load reduction that is equivalent to a 50-foot undisturbed natural buffer.

There are exceptions when buffer requirements do not apply:

- There is no stormwater discharge from construction disturbances to a water of the U.S;
- The natural buffer has already been eliminated by preexisting development disturbances;
- The disturbance is for the construction of a water-dependent structure or construction approved under a CWA section 404 permit;
- For linear construction projects, requirements are not required if there are site constraints provided that, to the extent feasible, disturbances are limited within 50 feet of a water of the U.S. and/or supplemental erosion and sediment controls are provided to treat stormwater discharges from any disturbances within 50 feet of a water of the U.S.

<u>Soil or Sediment Stockpiles:</u>
In addition to the requirements listed in Section 3.3.3 of this SWPPP, any soil or sediment stockpiles associated with the construction of staging areas for structures and access roads shall be located outside of any natural buffers established as detailed in the section above.

<u>Sediment Basins:</u>
In addition to the requirements discussed in Section 3.3.1.4 above, sediment basins associated with the construction of staging areas for structures and access roads shall be located outside of any surface waters and any natural buffers (as established above) and any outlet structure for the sediment basin shall withdraw water from the surface, unless infeasible.

Native Topsoil Preservation:
Native topsoil removed during clearing, grading or excavation, shall be preserved, unless infeasible. Topsoil shall be stored in a manner that maximizes reuse in reclamation or final vegetation stabilization (e.g., by keeping the topsoil stabilized with seed or similar measures).

Steep Slopes:
Disturbance from steep slopes shall be minimized. Depending on site conditions and needs, steep slopes may be necessary (e.g., a road cut in mountainous terrain). Where steep slopes are necessary, disturbances can be minimized through erosion and sediment control practices, such as by phasing disturbances in those areas and using stabilization practices specifically for steep grades.

Soil Compaction:
Where final vegetation will occur or where infiltration practices will be installed, either restrict vehicle / equipment use in these areas to avoid soil compaction or use soil conditioning techniques to support vegetative growth. Minimizing soil compaction is not required when compacted soil is integral to the functionality of the site.

Dewatering Practices:
Discharge groundwater or accumulated stormwater from excavations, trenches, foundations, vaults or similar, is prohibited unless waters are first effectively managed by appropriate controls (e.g., sediment basins or sediment traps, sediment socks, dewater tanks, tube settlers, weir tanks, or filtration systems). Uncontaminated, non-turbid dewatering water can be discharged without being routed to a control (as long as it meets water quality standards). Additionally, the following requirements are for dewatering activities:

- No discharging visible floating solids or foam;
- Remove oil, grease and other pollutants from dewatering water via an oil-water separator or suitable filtration device (such as a cartridge filter);
- Utilize vegetated upland areas of the site, to the extent feasible, to infiltrate dewatering water before discharge. In no case shall waters of the U.S. be considered part of the treatment area;
- Implement velocity dissipation devices at all points where dewatering water is discharged;
- Haul backwash water away for disposal or return it to the beginning of the treatment process; and
- Clean or replace the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.

Pollution Prevention Requirements:
Prohibited discharges, in addition to those listed in Section 2.1.4 of this SWPPP, include:

- Wastewater from washout of concrete;
- Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials;

- Fuels, oils or other pollutants used for operation and maintenance of equipment or vehicles;
- Soaps, solvents or detergents used in vehicle or equipment washing; or
- Toxic or hazardous substances from a spill or other release.

Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters shall be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge.

Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to stormwater. Minimization of exposure is not required in cases where the exposure to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

<u>Site Stabilization Requirements:</u>
Site stabilization requirements for the construction of staging areas for structures and access roads shall include the following, unless the location of disturbed earth is due to the intended function (e.g., the area of construction will become actively mined):

- By no later than the end of the next workday after construction work in an area has stopped permanently or temporarily ("temporarily" means the land will be idle for a period of 14 days or more but earth disturbing activities will resume in the future), immediately initiate stabilization measures;
- If using vegetative measures, by no later than 14 days after initiating stabilization:
  - Seed or plant the area, and provide temporary cover to protect the planted area;
  - Once established, vegetation must be uniform, perennial (if final stabilization), and cover at least 70% of stabilized area based on density of native vegetation.
- If using non-vegetative stabilization, by no later than 14 days after initiating stabilization:
  - Install or apply all non-vegetative measures;
  - Cover all areas of exposed soil.

4.0 STORMWATER INSPECTIONS [MSGP Part 3]

4.1 Routine Visual Stormwater Inspection [MSGP Parts 3.1 and 8.G.4.4]

The MSGP requires all facilities with coverage under the permit to conduct visual stormwater inspections at their facility on a routine basis. There are two types of inspections that are required at the Perpetua facility:

- Inspection of industrial activity areas that **do not** involve earth disturbing activities prior to mining (primarily the camp area, fueling area and stabilized access roads) (driven by MSGP Parts 3.1 and 8.G.7)
- Inspection of earth-disturbing activities conducted prior to mining (drill pads, access road construction and gravel extraction) (driven by MSGP Part 8.G.4.4). These activities are grouped into two classes by Part 8.G.3.2(a) and (b) as:
  - Activities performed for purposes of mine site preparation, including: cutting new rights of way (except when related to access road construction); providing access to the mine site for vehicles and equipment (except when related to access road construction); other earth disturbances associated with site preparation activities on any areas where active mining activities have not yet commenced (e.g., for heap leach pads, waste rock facilities, tailings impoundments, wastewater treatment plants); and
  - Construction of staging areas to prepare for erecting structures such as to house project personnel and equipment, mill buildings, etc., and construction of access roads.

The following subsections describe the visual stormwater inspection characteristics for both types of the inspections listed above.

4.1.1 Visual Inspection Personnel [MSGP Part 3.1.1]

Qualified personnel at Perpetua complete the routine visual stormwater inspections. These qualified personnel may be members of the SWPP Team (see Section 1.1 of this Plan) or a hired third-party. At least one member of the SWPP Team shall participate in each routine stormwater inspection. When planning and conducting these routine inspections, the inspectors shall consider the results of any visual and analytical monitoring that was conducted for the past year (if applicable).

4.1.2 Areas to be Inspected [MSGP Part 3.1.2]

During normal facility operating hours, qualified personnel shall conduct inspections of areas at Perpetua that are covered by requirements in the MSGP, including, but not limited to, the following:

- Areas where industrial materials or activities are exposed to stormwater;
- Areas identified in the SWPPP and those that are potential pollutant sources;
- Areas where spills and leaks have occurred in the past three years;
- Discharge points;
- Control measures used to comply with the effluent limits contained in this permit;
- Disturbed areas;

- Pollution prevention measures;
- Locations where stabilization measures have been implemented; and
- Material, waste, borrow or equipment storage and maintenance areas.

4.1.3 Visual Inspection Focus [MSGP Part 3.1.3]

During the routine stormwater inspections, the qualified personnel shall examine or look out for the following:

- Industrial materials, residue or trash that may have or could come into contact with stormwater;
- Leaks or spills from industrial equipment, drums, tanks and other containers;
- Offsite tracking of industrial or waste materials, or sediment where vehicles enter or exit the site;
- Tracking or blowing of raw, final or waste materials from areas of no exposure to exposed areas;
- Erosion of soils at the facility, channel and streambank erosion and scour in the immediate vicinity of discharge points;
- Non-authorized non-stormwater discharges;
- Control measures needing replacement, maintenance or repair;
- During an inspection occurring during a stormwater event or stormwater discharge, observe control measures implemented to comply with effluent limits to ensure they are functioning correctly; and
- Discharge points (if locations are inaccessible, inspect nearby downstream locations).

4.1.4 Routine Visual Inspection Frequency [MSGP Parts 3 and 8.G.4.4.1]

Table 4-1: Routine Visual Inspection Frequencies

Type	Frequency
Industrial Activity Areas	Once per quarter Note: At least once per year, a routine stormwater inspection shall be conducted during a period with a stormwater discharge is occurring. Perpetua is located in an area with freezing conditions throughout much of the winter and, as such, it is expected that quarterly visual assessments will likely need to be distributed during warmer months, generally from May to early November (see Section 5.11 for further information).
Earth Disturbing Activities (prior to mining)	At least once every 7 calendar days; or Once every 14 calendar days and within 24 hours of a storm event of 0.25 inches or greater Note: ▪ Inspections are only required during working hours; ▪ Inspections are not required during unsafe conditions; and ▪ If you choose to inspection once every 14 days, you must have a method for measuring rainfall amount onsite (rain gauge or weather station).

	Reductions in inspection frequency: Stabilized areas: Reduce the frequency of inspections to once per month in any area of the site where stabilization has occurred pursuant to the MSGP. Arid, semi-arid, and drought-stricken areas: If earth-disturbing activities are occurring during the seasonally dry period or during a period in which drought is predicted to occur, reduce inspections to once per month and within 24 hours of a 0.25-inch storm event. Frozen conditions: Temporarily suspend or reduce inspections to once per month until thawing conditions occur if frozen conditions are continuous and disturbed areas have been stabilized. For extreme conditions in remote areas, e.g., where transit to the site is perilous/restricted or temperatures are routinely below freezing, you may suspend inspections until the conditions are conducive to safe access, and more frequent inspections can resume

The Routine Stormwater Inspection Form is located in Appendix F of this SWPPP. There are a significant number of control measures located at the facility – Appendix F also contains a Control Measure Inspection Form, to be used in conjunction with the Routine Stormwater Inspection Form.

4.1.5 Routine Inspection Documentation [MSGP Part 3.1.6]

Document routine stormwater inspections on the Routine Stormwater Inspection Form, located in Appendix F of this Plan. This form is generally completed while the inspection is being conducted but shall be completed no later than 24 hours after the inspection. Any corrective action as a result of a visual inspection event shall be completed in accordance with the MSGP (see Section 6.0 of this SWPPP). The Forms are retained with this SWPPP and are not required to be submitted to the EPA unless specifically requested. Findings from the routine inspections shall be summarized in the Annual Report (see Section 7.3 for Annual Report details).

4.2 Visual Assessment of Stormwater Discharges [MSGP Part 3.2]

Once per quarter, Perpetua shall collect a stormwater sample from each outfall (see Section 2.2 of this SWPPP) and conduct a visual assessment of each sample. The samples shall be collected in such a manner that they are representative of the stormwater discharge.

Part 3.2.4.5 of the MSGP stipulates that if a facility has two or more discharge points that discharge substantially identical stormwater effluents, quarterly visual assessments can be conducted at just one of the discharge locations and report the results for the other substantially identical discharge points (SIDPs), provided that the assessments occur on a rotating basis of each SIDP. Refer to Section 5.6 below in this SWPPP for details regarding the SIDPs at Perpetua; quarterly visual assessments will rotate numerically through each SIDP (e.g., Outfall 001 first, then Outfall 002 the following quarter, Outfall 003 the quarter after that, etc.).

As discussed below in Section 4.2.3, Perpetua is located in an area with freezing conditions throughout much of the winter and, as such, it is expected that quarterly visual assessments will likely need to be distributed during warmer months, generally from May to early November.

4.2.1 Visual Assessment Procedures [MSGP Part 3.2.2]

The following steps shall be completed during a quarterly visual assessment event:

- Each discharge sample shall be collected in a clean, colorless glass or plastic container, and examined in a well-lit area;
- The visual assessment shall be made on the discharge sample within 30 minutes of an actual discharge from a storm event. If it is not possible to collect the sample within the first 30 minutes of discharge, the sample must be collected as soon as practicable after the first 30 minutes and the reasoning shall be documented. In the case of snowmelt, samples must be taken during a period with a measurable discharge;
- For storm events, the assessment shall be made on discharges that occur at least 72 hours (three days) from the previous discharge. The 72-hour (three-day) storm interval does not apply if it is documented that less than a 72-hour (three-day) interval is representative for local storm events during the sampling period;
- Visually inspect or observe for the following water quality characteristics, which may be evidence of stormwater pollution:
    - Color;
    - Odor;
    - Clarity (diminished);
    - Floating solids;
    - Settled solids;
    - Suspended solids;
    - Foam;
    - Oil sheen; and
    - Other obvious indicators of stormwater pollution.
- Whenever the visual assessment shows evidence of stormwater pollution in the discharge, corrective action procedures shall be implemented.

4.2.2 Visual Assessment Documentation [MSGP Part 3.2.3]

Results of visual assessments are documented on the Visual Assessment Form in Appendix F of this Plan. These Forms shall be retained with this SWPPP. Any corrective action as a result of a visual assessment event shall be completed in accordance with the MSGP (see Section 6.0 of this SWPPP). The visual assessment findings are not required to be submitted to the EPA, unless specifically requested. Findings from visual assessments shall be summarized in the Annual Report (see Section F for Annual Report details).

4.2.3 Exceptions to Quarterly Visual Assessments [MSGP Part 3.2.4]

<u>Adverse Weather Conditions:</u> When adverse weather conditions prevent the collection of stormwater discharge sample(s) during the quarter, a substitute sample shall be taken during the next qualifying storm event. Documentation of the rationale for no visual assessment for the quarter is included on the Visual Assessment Form in Appendix F of this Plan. Adverse conditions are those that are dangerous or create inaccessibility for personnel, such as local flooding, high

winds, electrical storms, or situations that otherwise make sampling impractical, such as extended frozen conditions.

Climates with Irregular Stormwater Discharges: If a facility is located in an area where limited rainfall occurs during many parts of the year (e.g., arid or semi-arid climate) or in an area where freezing conditions exist that prevent discharges from occurring for extended periods, then samples for the quarterly visual assessments may be distributed during seasons when precipitation more regularly occurs. Perpetua is located in an area with freezing conditions throughout much of the winter and, as such, it is expected that quarterly visual assessments will likely need to be distributed during warmer months, generally from May to early November.

Areas that Receive Snow: If a facility is in an area that typically receives snow and the facility receives snow at least once over a period of four quarters, at least one quarterly visual assessment must capture snowmelt discharge, as described above in Section 4.2.1, taking into account the exception described above for climates with irregular stormwater discharges.

5.0 STORMWATER MONITORING [MSGP Part 4]

The Perpetua facility is subject to MSGP Sector G (*Metal Mining)*, Subsector G2 (*Iron Ores; Copper Ores; Lead and Zinc Ores; Gold and Silver Ores; Ferroalloy Ores; except Vanadium; and Miscellaneous Metal Ores (SIC Codes 1011, 1021, 1031, 1041, 1044, 1061, 1081, 1094, 1099)* requirements, including Indicator Monitoring and Effluent Limitations Monitoring.

5.1 Indicator Monitoring [MSGP Parts 4.2.1 and 8.G.8.1]

Table 8.G-1 in the MSGP (and the summarized table below) identifies the indicator monitoring required for Subsector G2 facilities:

Table 8.E-1: G2 Indicator Monitoring

Subsector	Indicator Monitoring Parameter	Indicator Monitoring Threshold
Applies to all Sector G (Subsectors G1 and G2) facilities with stormwater discharges from paved surfaces that will be initially sealed or re-sealed with coal-tar sealcoat where industrial activities are located during coverage under this permit	Polycyclic Aromatic Hydrocarbons (PAHs)	Report Only/ No thresholds or baseline value

At the time of this SWPPP revision, there are no stormwater discharges from paved surfaces that were initially sealed or re-sealed with coal-tar sealcoat where industrial activities are located.

5.2 Benchmark Monitoring [MSGP Parts 4.2.2 and 8.G.8]

Sector G of the MSGP has benchmark monitoring requirements for active metal mining facilities. The Perpetua site is not yet categorized as an active metal mining operation, but rather is conducting earth-disturbing activities prior to active mining activities. Benchmark monitoring will be required once the SGP enters the active mining phase.

5.3 Effluent Limitations Monitoring [MSGP Parts 4.2.3.1 and 8.G.8]

Sector G facilities do not have effluent limitations monitoring under the MSGP.

5.4 State or Tribal Provisions Monitoring [MSGP Parts 4.2.4 and 8.G.8]

NPDES permitting authority in the State of Idaho is under the EPA; at the time of this SWPPP revision, there are no state of tribal provisions monitoring requirements for the Perpetua facility. This SWPPP will be updated July, 1 2021 when Idaho Department of Environmental Quality is granted regulatory authority over the MSGP program.

5.5 Impaired Waters Monitoring [MSGP Part 4.2.5]

As defined in the MSGP, a facility is considered to discharge to an impaired water if the first water of the United States to which it discharges is identified by a state, tribe, or EPA pursuant to section 303(d) of the CWA as not meeting an applicable water quality standard (i.e., without an EPA-approved or -established TMDL) or has been removed from the 303(d) list either because the impairments are addressed by an

EPA-approved or established TMDL or is covered by pollution control requirements that meet the requirements of 40 CFR 130.7(b)(1).

As discussed in Section 2.2 of this SWPPP, Perpetua has identified three stormwater outfalls, all of which may discharge into the EFSFSR. The EFSFSR does not have an EPA-approved or -established TMDL but is on the 303(d) impaired water body listing (2022 Report) for arsenic, antimony and temperature (3rd order of EFSFSR).

Pursuant to Part 4.2.5.1 of the MSGP, discharges to impaired waters without an EPA-approved or -established TMDL are required to be monitored annually in the first year of permit coverage and again in the fourth year of permit coverage as follows (unless a pollutant causing an impairment is detected and then annual monitoring must continue):

- <u>Year 1 of Permit Coverage</u>: the first annual sample must be taken in the first year of permit coverage, which begins in the first full quarter following May 30, 2021. All pollutants causing impairments must be monitored for.
    - If monitoring results indicate the monitored pollutant is not detected in the discharge, or is within the acceptable range for a given parameter for the waterbody to meet its designated use, monitoring for the pollutant(s) may be discontinued for the next two years. Monitoring for the pollutant(s) must resume in year four of permit coverage.
    - If monitoring results indicate that the monitored pollutant(s) is detected in the discharge, or is outside the acceptable range for a given parameter for the waterbody to meet its designated use, monitoring for the pollutant(s) must continue annually until no longer detected, after which it may discontinue until monitoring resumes in year four of permit coverage.
- <u>Year 4 of Permit Coverage:</u> Annual monitoring resumes in the 4th year of permit coverage for a sub-set of parameters monitored for in the first monitoring year. If the 4th year of permit coverage, monitoring must occur for all pollutants causing impairments that are associated with your industrial activity and/or are listed as a benchmark parameter for the facility's subsector in the MSGP (refer to Part 4.2.5.1 of the MSGP for the evaluation of parameters at this step).
    - If monitoring results indicate the monitored pollutant(s) are not detected in the discharge or is within an acceptable range for a given parameter for the waterbody to meet its designated use, monitoring may be discontinued for the remainder of permit coverage.
    - If monitoring results indicate the monitored pollutant(s) are detected in the discharge or are outside the acceptable range for a given parameter for the waterbody to meet its designated use, monitoring must continue annually for the pollutant(s) until no longer detected.

Refer to Appendix G of this SWPPP for the Impaired Water Monitoring Form, to be completed during each monitoring event.

5.6 Substantially Identical Discharge Point (SIDPs) [MSGP 4.1.1]

Perpetua has classified three of the site's four discharge points ("outfalls") as discharging substantially identical stormwater effluents, based on several criteria listed in the MSGP and detailed in the following table:

Table 5-2: Substantially Identical Discharge Point Evaluation

Outfall	Industrial Activities	Control Measures	Potential Exposed Materials	Area Runoff Coefficient[1]
001	Support staging for earth-disturbing activities (fuel storage, materials storage, equipment staging, equipment maintenance, personnel living facilities)	(1) Sedimentation basin; (2) Rock rip-rap; (3) Established vegetation; (4) Upgradient earthen swale; (5) Materials in double-walled tanks and secondary containment; (6) Good housekeeping measures; (7) Routine SWPPP inspections	(1) Sediment; (2) Fuels/oils (associated with equipment staging and maintenance)	0.20 – 0.40
002	Support staging for earth-disturbing activities (fuel storage, materials storage, equipment staging, equipment maintenance)	(1) Sedimentation basin; (2) Rock rip-rap; (3) Established vegetation; (4) Upgradient earthen swale; (5) Materials in double-walled tanks and secondary containment; (6) Good housekeeping measures; (7) Routine SWPPP inspections	(1) Sediment; (2) Fuels/oils (associated with equipment staging and maintenance)	0.20 – 0.40
003	Support staging for earth-disturbing activities (fuel storage, materials storage, equipment staging, equipment maintenance)	(1) Culvert to direct flows; (2) Established vegetation; (3) Upgradient earthen swale; (4) Materials in double-walled tanks and secondary containment; (5) Good housekeeping measures; (6) Routine SWPPP inspections	(1) Sediment; (2) Fuels/oils (associated with equipment staging and maintenance)	0.20 – 0.40

[1] Runoff coefficient value obtained from Table 3-1 in the *U.S.DOT Urban Drainage Design Manual (2001)* for "railroad yard area" (closest area type)

As stated in Part 4.1.1 of the MSGP, Perpetua may monitor the effluent of just one of the above discharge points (003) and report that the results also apply to the other two SIDPs (001 and 002). Perpetua will conduct the impaired waters monitoring that is required at the facility (see Section 5.5 above) at whichever SIDP listed above that is discharging the most volume resulting from a measurable storm event.

The same monitoring that is conducted at a SIDP will also be conducted at Outfall 004 each time it is required. Outfall 004 does not discharge substantially identical effluent like Outfalls 001-003, due to differences in industrial activities and potential pollutants exposed, and therefore is subject to applicable monitoring requirements as an individual outfall.

5.7 Commingled Discharges [MSGP Part 4.1.2]

If any authorized stormwater discharges commingle with discharges not authorized under the MSGP, required sampling of the authorized discharges shall be conducted at a point before they mix with other waste streams, to the extent practicable.

5.8 Measurable Storm Events [MSGP Part 4.1.3]

Required monitoring shall be conducted on a storm event that results in an actual discharge ("measurable storm event") that follows the preceding measurable storm event by at least 72 hours (three days). The 72-hour (3- day) storm interval does not apply if the facility is able to document that less than a 72-hour (3-day) interval is representative for local storm events during the sampling period. In the case of snowmelt, monitoring shall be conducted at a time when a measurable discharge occurs. For each monitoring event, except snowmelt monitoring, the date and duration (in hours) of the rainfall event must be identified, rainfall total (in inches) for that rainfall event, and time (in days) since the previous measurable storm event. The date of the sampling event must be identified for a snowmelt event.

5.9 Sample Type [MSGP Part 4.1.4]

A minimum of one grab sample from a discharge resulting from a measurable storm event is required. Samples shall be collected within 30 minutes of the start of discharge; if it is not possible to collect the sample within the first 30 minutes, the sample shall be taken as soon as possible, and documentation of the timeframe shall be included on the appropriate monitoring form (see Appendix F and G of this SWPPP).

5.10 Adverse Weather Conditions [MSGP Part 4.1.5]

When adverse weather conditions prevent the collection of stormwater discharge samples according to the sampling schedule, a substitute sample shall be taken during the next qualifying storm event.

5.11 Climates with Irregular Stormwater Discharges [MSGP Part 4.1.6]

Facilities located in areas where limited rainfall occurs during parts of the year (e.g., arid or semi-arid climates) or in areas where freezing conditions exist that prevent discharges from occurring for extended periods, the required monitoring events may be distributed during seasons when precipitation occurs, or when snowmelt results in a measurable discharge from the facility, as long as the required number of samples is still obtained.

5.12 Monitoring Periods [MSGP Part 4.1.7]

Monitoring requirements in this SWPPP begin in the first full quarter following either May 30, 2021 or the date of discharge authorization, whichever date comes later.

- January 1 – March 31
- April 1 – June 30
- July 1 – September 30

- October 1 – December 31

For example, if permit coverage is obtained on April 10, 2021, then the first monitoring quarter is July 1, 2021 – September 30, 2021 and the first monitoring year for discharges to impaired waters or discharges subject to an effluent limitation guideline is July 1, 2021 – June 30, 2022. This monitoring schedule may be modified in accordance with Section 5.11 if the revised schedule is documented in the SWPPP. However, Perpetua must indicate in Net-DMR any 3-month interval that a sample was not taken.

5.13 Monitoring Reports [MSGP Part 4.1.8]

Perpetua shall submit any applicable monitoring data using Net-DMR.

6.0 Corrective Actions and Additional Implementation Measures (AIM) [MSGP Part 5]

6.1 Corrective Actions [MSGP Part 5.1]

Corrective actions are the actions taken to ensure that MSGP provisions are met and any pollutant discharges are minimized and corrected. Corrective actions at Perpetua shall be overseen and/or performed by members of the SWPP Team.

6.1.1 Conditions Requiring SWPPP Review and Revision [MSGP Part 5.1.1]

When any of the following conditions occur or are detected during an inspection or monitoring event, the facility shall review and revise the SWPPP (as appropriate):

- An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by this or another NPDES permit to a water of the United States) occurs;
- A discharge violates a numeric effluent limit (see Section 5.2 above);
- Stormwater control measures are not stringent enough for the stormwater discharge to be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards or to meet the non-numeric effluent limits;
- A required control measure was never installed, was installed incorrectly, or not in accordance with the MSGP, or is not being properly operated or maintained; and/or
- Whenever a visual assessment shows evidence of stormwater pollution (e.g., color, odor, floating solids, settled solids, suspended solids, foam).

6.1.2 Conditions Requiring SWPPP Review [MSGP Part 5.1.2]

If construction or a change in design, operation, or maintenance at the facility occurs that significantly changes the nature of pollutants discharged via stormwater, or significantly increases the quantity of pollutants discharged, the facility shall review the SWPPP (e.g., sources of pollution, spill and leak procedures, non-stormwater discharges, selection, design, installation and implementation of stormwater control measures) to determine if modifications are necessary to meet the effluent limits in the MSGP.

6.2 Corrective Action Deadlines [MSGP Part 5.1.3]

<u>Immediate Action:</u> A facility must immediately take all reasonable steps to minimize or prevent the discharge of pollutants until a permanent solution can be implemented, including cleaning up any contaminated surfaces so that the material will not discharge in subsequent storm events. In the MSGP, the term “immediately” means that the day you find a condition requiring corrective action, you must take all reasonable steps to minimize or prevent the discharge of pollutants until you can implement a permanent solution. However, if a problem is identified too late in the workday to initiate corrective action, the corrective action shall be performed the following workday morning.

<u>Subsequent Action:</u> If additional actions are required beyond the immediate actions discussed above, the facility shall complete the subsequent corrective action(s) before the next storm event if possible, and within 14 calendars from the time of discovery of the condition. It if is infeasible to complete the

subsequent corrective action(s) within the 14-day timeframe, the reasons shall be (see the Corrective Action Form in Appendix H of this Plan). The subsequent corrective action work must be completed as soon as practicable after the 14-day timeframe, but no longer than 45 days after discovery of the condition.

Where corrective action(s) result in changes to any of the facilities controls or procedures documented in this SWPPP, the Plan shall be modified accordingly within 14 days of completing the corrective action work.

6.3 Corrective Action Documentation [MSGP Part 5.3]

The existence of any conditions listed in Sections 6.1.1 and 6.1.2 above shall be documented on the Corrective Action Form in Appendix H of this Plan within **24-hours of discovery** of the condition. The 24-hour documentation shall also include a description of the condition, date, any immediate actions taken, and a signed/certified statement.

Within 14 days, any corrective actions taken since the 24-hour documentation shall also be recorded on the Corrective Action Form in Appendix H. Additional documentation at the 14-day mark includes any schedules, rationales, action initiation date and completion date.

Note that correction action documentation is not required to be submitted to EPA, unless specifically requested. A summary of correction actions is required in the Annual Report each year.

6.4 Additional Implementation Measures (AIM) [MSGP Part 5.2]

Part 5.2 of the MSGP contains Additional Implementation Measures (AIM), which are a tiered approach that prescribes sequential and increasingly robust responses when a benchmark monitoring exceedance occurs at the facility. At the time of this SWPPP update, Perpetua does not have any benchmark monitoring requirements and therefore would not be subject to the AIM requirements in the MSGP.

7.0 REPORTING AND RECORDKEEPING REQUIREMENTS [MSGP Part 7]

7.1 NeT-MSGP Tool for Forms [MSGP Parts 7.1 and 7.2]

All required information (NOIs, NOTs, annual reports) shall be submitted via EPA's electronic NPDES eREporting Tool (NeT). Information can be prepared and submitted in NeT-MSGP using specific forms.

7.2 NeT-DMR Tool for Monitoring [MSGP Part 7.3]

Discharge Monitoring Reports (DMRs) must be submitted electronically via EPA's DMR system: NeT-DMR. The facility's monitoring requirements will be pre-populated on DMR forms based on the information reported on the NOI submitted. Any changes to monitoring requirements are completed through submittal of a Change NOI (see Section 7.1 above).

7.3 Annual Report [MSGP Part 7.4]

Each year by January 30th, an annual report must be submitted via the NeT-MSGP tool, containing information generated from the past calendar year, including:

- A summary of the past year of routine visual inspections;
- A summary of the past year of visual assessments;
- A summary of the past year's corrective actions; and
- A certification statement.

7.4 Additional Standard Recordkeeping and Reporting [MSGP Part 7.6]

Table 7-1: Additional Standard Recordkeeping and Reporting

Reporting Type	Description
24-hour verbal reporting	Orally report any noncompliance which may endanger health or the environment
5-day written reporting	A written report of any noncompliance which may endanger health or the environment (follow-up to the oral report above)
Reportable quantity spills	As soon as you have knowledge of a leak, spill or other release containing a hazardous substance or oil in an amount equal to or in excess of an reportable quantity
Planned changes	Give notice to EPA no fewer than 30 days prior to making any planned physical alterations or additions to the permitted facility
Anticipated noncompliance	Give advanced notice to EPA of any planned changes in the permitted facility or activity
Compliance schedules	Reports of compliance or noncompliance with, or any progress reports on, compliance schedules must be submitted within 14 days following each schedule date

7.5 Record Retention Requirements [MSGP Part 7.7]

All copies of the SWPPP, including corrective action, inspection and reporting documentation shall be retained at the facility for at least three years.

7.6 IDEQ Reporting Requirements [MSGP Part 9.10.3]

Part 9.10.3 of the MSGP outlines additional reporting to the State of Idaho including:

- Numeric benchmarks and effluent limitations: at the time of this SWPPP update, Perpetua is not required to complete benchmark monitoring or effluent limitations monitoring. If that applicability changes, additional parameter requirements from the State of Idaho may include pH, Total Arsenic, Total Zinc, Cadmium, Chromium III and Total Recoverable Copper;
- Monitoring of Discharges to Impaired Waters: For water bodies included on the state's 303(d) list as "cause unknown" or "combined biota/habitat assessments", Perpetua must monitor for suspected pollutants listed in the cause comments section of the integrated report. Refer to Section 5.4 of this SWPPP for more information.
- New or Expanding Discharges: If new or existing dischargers wish to expand their discharge to high-quality waters are only eligible for coverage under the MSGP if it is established, to the satisfaction of EPA and IDEQ, that the new or expanded discharge will not result in an increase in the concentrations of pollutants relevant to the use for which the water is considered high-quality;
- Outstanding Resource Waters: Any permittee proposing to discharge to an outstanding resource water shall not be covered under the MSGP and is required to apply for an individual IPDES permit;
- SWPPP Availability: If requested, Perpetua must submit a copy of this SWPPP to IDEQ within 14 days of the request;
- Reporting of Discharges Containing Hazardous Materials or Petroleum Products:
    - Any spill of hazardous materials must be immediately reported to the State Communications Center by calling 1-800-632-8000 or 208-846-7610.
    - Spills must also be reported to the appropriate IDEQ Regional. Spills of petroleum products that exceed 25 gallons or that cause a visible sheen on surface waters should be reported to IDEQ within 24-hours. Petroleum product spills of less than 25 gallons or spills that do not cause sheen on surface waters must only be reported to IDEQ if clean-up cannot be accomplished within 24- hours.
- Other Reporting Requirements: Copies of the following information must be sent to the appropriate DEQ Regional Office:
    - Notices of Intent and Termination (NOIs and NOTs), as required by MSGP Part 7.2.1;
    - Monitoring data collected pursuant to Part 4 of the MSGP, as well as any additional monitoring required by 401 water quality certification;
    - Exceedance Reports, as required by MSGP Part 7.5;
    - Planned Changes Reports, as required by MSGP Parts 7.6.4 and 7.6.5

  Both monitoring data and exceedance reports must be sent to the appropriate DEQ Regional Office within 30 days of receipt of the analytical results.

Alternative Limitations: At the time of this SWPPP revision, Perpetua is not subject to benchmark monitoring requirements; if that applicability changes, the alternative limitations in this part of the MSGP shall be considered.

8.0 ENDANGERED SPECIES PROTECTION AND HISTORIC PROPERTIES PRESERVATION [MSGP Appendices E and F]

8.1 Procedures Relating to Endangered Species Protection [MSGP Part 1.1.4 and Appendix E]

Pursuant to Part 1.1.4 of the MSGP, the facilities shall be able to demonstrate that stormwater discharges, non-stormwater discharges, and stormwater discharge-related activities are not likely to adversely affect any species that are federally listed as endangered or threatened and are not likely to adversely affect habitat that is designated as “critical habitat”, or said discharges and activities were the subject of an Endangered Species Act (ESA) Section 7 consultation or ESA Section 10 permit.

Perpetua has undergone formal consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) under Section 7 of the ESA. Therefore, the Perpetua facility meets Criterion D in Appendix E of the MSGP.

Appendix I of this SWPPP contains Perpetua’s criterion evaluation document and an official concurrence letter from the USFWS and NMFS. Appendix A of this SWPPP contains the facility’s NOI, which supports the eligibility criterion that the facility qualifies under. This documentation supports the assessment that Perpetua’s stormwater discharges, non-stormwater discharges and stormwater discharge-related activities are not likely to adversely affect any species that are federally listed as endangered or threatened and are not likely to adversely affect habitat that is designated as “critical habitat”.

8.2 Procedures Relating to Historic Properties Preservation [MSGP Part 1.1.5 and Appendix F)

Appendix F of the MSGP has up to four steps that facilities must complete in order to demonstrate that stormwater discharges, authorized stormwater discharges, and stormwater discharge-related activities meet one of the eligibility criteria. The steps for Perpetua are as follows:

<u>Step One:</u> ***Are you an existing facility that is resubmitting for certification under the 2021 MSGP?***
<u>Response:</u> Yes. Perpetua is an existing facility that is reapplying for certification under the 2021 MSGP.

The MSGP indicates that if the facility is an existing facility, and will construct or install stormwater control measures that will disturb less than one (1) acre, then proceed to Step Three in MSGP Appendix F.

<u>Step Three:</u> **Have prior earth disturbances determined that historic properties does not exist, or have prior disturbances precluded the existence of historic properties?**
<u>Response</u>: Prior disturbances have not revealed evidence of historic properties. In addition, an extensive cultural resource survey has been conducted as part of Perpetua’s environmental assessment process (2015), including cultural resource surveys at proposed exploration pad locations and other proposed earth disturbing areas. The environmental assessment concluded that impacts to cultural resources is unlikely, but with the stipulation that if cultural resources are encountered during exploration activities, the appropriate authorities shall be notified and mitigation evaluated.

Appendix A: EPA MSGP, Perpetua NOI and Discharge Authorization Form

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA)
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
MULTI-SECTOR GENERAL PERMIT (MSGP)
FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

In compliance with the provisions of the Clean Water Act (CWA), as amended (33 U.S.C. 1251 et seq.), operators of stormwater discharges associated with industrial activity located in an area identified in Appendix C where EPA is the permitting authority are authorized to discharge to waters of the United States in accordance with the eligibility and Notice of Intent (NOI) requirements, effluent limitations, inspection requirements, and other conditions set forth in this permit. This permit is structured as follows:

- **Parts 1-7:** General requirements that apply to all facilities;
- **Part 8:** Industry sector-specific requirements;
- **Part 9:** Specific requirements that apply in individual states and Indian country; and
- **Appendices A through P:** Additional permit conditions that apply to all operators covered under this permit.

This permit becomes effective on **March 1, 2021.** This permit and the authorization to discharge shall expire at 11:59 pm eastern time, **February 28, 2026.**

Signed and issued this 15th day of January 2021
DENNIS DEZIEL
Digitally signed by DENNIS DEZIEL
Date: 2021.01.15 11:27:28 -05'00'
Dennis Deziel,
Regional Administrator, EPA Region 1.

Signed and issued this 15th day of January 2021
JEFFREY GRATZ
Digitally signed by JEFFREY GRATZ
Date: 2021.01.15 09:35:36 -05'00'
Jeffrey Gratz,
Deputy Director, Water Division, EPA Region 2.

Signed and issued this 15th day of January 2021
CARMEN GUERRERO PEREZ
Digitally signed by CARMEN GUERRERO PEREZ
Date: 2021.01.15 11:13:39 -04'00'
Carmen R. Guerrero-Perez,
Director, Caribbean Environmental Protection Division, EPA Region 2.

Signed and issued this 15th day of January 2021
CATHERINE LIBERTZ
Digitally signed by CATHERINE LIBERTZ
Date: 2021.01.15 10:55:42 -05'00'
Catherine A. Libertz,
Director, Water Division, EPA Region 3.

Signed and issued this 15th day of January 2021
JEANEANNE GETTLE
Digitally signed by JEANEANNE GETTLE
Date: 2021.01.15 08:29:14 -05'00'
Jeaneanne Gettle,
Director, Water Division, EPA Region 4.

Signed and issued this 15th day of January 2021
Digitally signed by TERA FONG
Date: 2021.01.15 11:31:25 -06'00'
Tera L. Fong,
Director, Water Division, EPA Region 5.

Signed and issued this 15th day of January 2021
CHARLES MAGUIRE
Digitally signed by CHARLES MAGUIRE
DN: c=US, o=U.S. Government, ou=Environmental Protection Agency, cn=CHARLES MAGUIRE, 0.9.2342.19200300.100.1.1=68001003650036
Date: 2021.01.15 12:41:18 -06'00'
Charles Maguire,
Director, Water Division, EPA Region 6.

Signed and issued this 15th day of January 2021
JEFFERY ROBICHAUD
Digitally signed by JEFFERY ROBICHAUD
Date: 2021.01.15 13:43:45 -06'00'
Jeffery Robichaud,
Director, Water Division, EPA Region 7.

Signed and issued this 15th day of January 2021
DARCY OCONNOR
Digitally signed by DARCY OCONNOR
Date: 2021.01.15 14:22:01 -07'00'
Darcy O'Connor,
Director, Water Division, EPA Region 8.

Signed and issued this 15th day of January 2021
TOMAS TORRES
Digitally signed by TOMAS TORRES
Date: 2021.01.15 15:00:36 -08'00'
Tomás Torres,
Director, Water Division, EPA Region 9.

Signed and issued this 15th day of January 2021
DANIEL OPALSKI
Digitally signed by DANIEL OPALSKI
Date: 2021.01.15 15:30:11 -08'00'
Daniel D. Opalski,
Director, Water Division, EPA Region 10.

Table of Contents

1 How to Obtain Coverage Under the 2021 MSGP

To be covered under this permit, you must meet all of the eligibility conditions and follow the requirements for obtaining permit coverage in Part 1.

1.1 Eligibility Conditions

1.1.1 **Location of Your Facility.** Your facility must be located in an area where EPA is the permitting authority and where coverage under this permit is available (see Appendix C); [1]

1.1.2 **Your Discharges Are Associated with Industrial Activity.** Your facility must have an authorized stormwater discharge or an authorized non-stormwater discharge per Part 1.2 associated with industrial activity from your primary industrial activity (as defined in Appendix A and as listed in Appendix D), or you have been notified by EPA that you are eligible for coverage under Sector AD.

1.1.3 **Limitations on Coverage.** Discharges from your facility are **not**:

1.1.3.1 **Discharges mixed with non-stormwater discharges.** Discharges mixed with non-stormwater discharges other than those mixed with authorized non-stormwater discharges listed in Part 1.2.2, and/or those mixed with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES authorization.

1.1.3.2 **Stormwater discharges associated with construction activity.** Stormwater discharges associated with construction activity disturbing one acre or more, or that are part of a larger common plan of development or sale if the larger common plan will ultimately disturb one acre or more, unless in conjunction with mining activities or certain oil and gas extraction activities as specified in Sectors G, H, I, and J of this permit.

1.1.3.3 **Discharges already covered by another NPDES permit.** Unless you have received written notification from EPA specifically allowing these discharges to be covered under this permit, you are not eligible for coverage under this permit for any of the following:

a. Stormwater discharges associated with industrial activity that are currently covered under an individual NPDES permit or an alternative NPDES general permit;

b. Stormwater discharges covered within five years prior to the effective date of this permit by an individual NPDES permit or alternative NPDES general permit where that permit established site-specific numeric water quality-based effluent limitations developed for the industrial stormwater component of the discharge; or

c. Discharges from facilities where any NPDES permit has been or is in the process of being denied, terminated, or revoked by EPA (this does not apply to the routine expiration and reissuance of NPDES permits every five years).

1.1.3.4 **Stormwater Discharges Subject to Effluent Limitations Guidelines.** Stormwater discharges subject to stormwater effluent limitation guidelines under 40 CFR, Subchapter N, other than those listed in Table 1-1 of this permit.

[1] This condition also applies in the limited circumstances where your facility is located in a jurisdiction where EPA is not the permitting authority, but your discharge point location is to a water of the United States where EPA is the permitting authority.

1.1.4 **Eligibility Related to Endangered Species Act (ESA) Listed Species and Critical Habitat Protection.** You are able to demonstrate that your stormwater discharges, authorized non-stormwater discharges, and stormwater discharge-related activities are not likely to adversely affect any species that are federally listed as endangered or threatened ("ESA-listed") and are not likely to adversely affect habitat that is designated as "critical habitat" under the Endangered Species Act (ESA), or said discharges and activities were the subject of an ESA Section 7 consultation or an ESA Section 10 permit. You must follow the procedures outlined in the Endangered Species Protection section of the NOI in EPA's NPDES eReporting Tool (NeT-MSGP) and meet one of the criteria listed in Appendix E. You must comply with any measures that formed the basis of your criteria eligibility determination to be in compliance with the MSGP. These measures become permit requirements per Part 2.3. Documentation of these measures must be kept as part of your Stormwater Pollution Prevention Plan (SWPPP) (see Part 6.2.6.1).

1.1.5 **Eligibility related to National Historic Preservation Act (NHPA)-Protected Properties.** You must follow the procedures outlined in the Historic Properties section of the NOI in NeT-MSGP to demonstrate that your stormwater discharges, authorized non-stormwater discharges, and stormwater discharge-related activities meet one of the eligibility criteria in Appendix F.

1.1.6 **Eligibility for "New Dischargers" and "New Sources" (as defined in Appendix A)[2] ONLY**

1.1.6.1 **Eligibility for "New Dischargers" and "New Sources" Based on Water Quality Standards.** Your stormwater discharge must be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards. You are ineligible for coverage under this permit if EPA determines prior to your authorization to discharge that your stormwater discharges will not be controlled as necessary such that the receiving water of the United States will not meet an applicable water quality standard. In such case, EPA may notify you that an individual permit application is necessary per Part 1.3.8, or, alternatively, EPA may authorize your coverage under this permit after you implement additional control measures so that your stormwater discharges will be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards.

1.1.6.2 **Eligibility for "New Dischargers" and "New Sources" for Water-Quality Impaired Waters.** If you discharge to an "impaired water" (as defined in Appendix A), you must do one of the following:

a. Prevent all exposure to stormwater of the pollutant(s) for which the waterbody is impaired, and retain documentation of procedures taken to prevent exposure onsite with your SWPPP;

b. When submitting your NOI in NeT-MSGP, provide the technical information or other documentation to support your claim that the pollutant(s) for which the waterbody

[2] "New Discharger" means a facility from which there is or may be a discharge, that did not commence the discharge of pollutants at a particular site prior to August 13, 1979, which is not a new source, and which has never received a finally effective NPDES permit for discharges at that site. See 40 CFR 122.2.

"New Source" means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants," the construction of which commenced: i) after promulgation of standards of performance under section 306 of the CWA which are applicable to such source, or ii) after proposal of standards of performance in accordance with section 306 of the CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal. See 40 CFR 122.2.

is impaired is not present at your facility, and retain such documentation with your SWPPP; or

c. When submitting your NOI in NeT-MSGP, provide either data or other technical documentation, to support a conclusion that the stormwater discharge will be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards and retain such information with your SWPPP. The information you submit must demonstrate:

i. For discharges to waters without an EPA-approved or established total maximum daily load (TMDL), that the discharge of the pollutant for which the water is impaired will be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards at the point of discharge to the waterbody; or

ii. For discharges to waters with an applicable EPA-approved or established TMDL, that there are, in accordance with 40 CFR 122.4(i), sufficient remaining wasteload allocations in the TMDL to allow your discharge and that existing dischargers to the waterbody are subject to compliance schedules designed to bring the waterbody into attainment with water quality standards (e.g., a reserve allocation for future growth).

You are eligible under Part 1.1.6.2.c if you receive a determination from the applicable EPA Regional Office that your stormwater discharge will be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards and you document the Region's determination in your SWPPP. If the applicable EPA Regional Office fails to respond to you within 30 days after submission of data, you are considered eligible for coverage.

1.1.6.3 Eligibility for "New Dischargers" and "New Sources" for Waters with High Water Quality (Tier 2, 2.5, and 3).

a. For new dischargers and new sources to Tier 2 or Tier 2.5 waters, your discharge must not lower the water quality of the applicable water. See a list of Tier 2 and Tier 2.5 waters in Appendix L.

b. For new dischargers and new sources to waters designed by a state or tribe as Tier 3 waters[3] (i.e., outstanding national resource waters) for antidegradation purposes under 40 CFR 131.13(a)(3), you are not eligible under this permit and you must apply for an individual permit. See a list of Tier 3 waters in Appendix L.

1.1.7 Eligibility for Discharges to a Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Site. If you discharge to a federal CERCLA Site listed in Appendix P, you must notify the EPA Region 10 Office when submitting your NOI, and the EPA Region 10 Office must determine that you are eligible for permit coverage. In determining eligibility for coverage under this Part, the EPA Region 10 Office may evaluate whether you are implementing or plan to implement adequate controls and/or procedures to ensure that your discharge will not lead to

[3] For the purposes of this permit, your project is considered to discharge to a Tier 2, Tier 2.5, or Tier 3 water if the first water of the United States to which you discharge is identified by a state, tribe, or EPA as a Tier 2, Tier 2.5, or Tier 3 water. For discharges that enter a separate storm sewer system prior to discharge, the first water of the United States to which you discharge is the waterbody that receives the stormwater discharge from the storm sewer system (separate storm sewer systems (MS4s and non-municipal storm sewers systems) do not include combined sewer systems or separate sanitary sewer systems).

recontamination of aquatic media at the CERCLA Site (i.e., your stormwater discharge will be controlled as necessary such that the receiving water of the United States will meet an applicable water quality standard). If it is determined that your facility discharges to a CERCLA Site listed in Appendix P after you have obtained coverage under this permit, you must contact the EPA Region 10 Office and ensure that you either have implemented or will implement adequate controls and/or procedures to ensure that your discharges will not lead to recontamination of aquatic media at the CERCLA Site such that your stormwater discharge will be controlled as necessary such that the receiving water of the United States will meet an applicable water quality standard.

For the purposes of this permit, a facility discharges to a federal CERCLA Site if the discharge flows directly into the site through its own conveyance, or through a conveyance owned by others, such as a municipal separate storm sewer system (MS4).

1.2 Types of Discharges Authorized Under the MSGP[4]

1.2.1 **Authorized Stormwater Discharges.** If you meet all the eligibility criteria in Part 1.1, then the following discharges from your facility are authorized under this permit:

1.2.1.1 Stormwater discharges associated with industrial activity for any primary industrial activities and co-located industrial activities (as defined in Appendix A) except for any stormwater discharges prohibited in Part 8;

1.2.1.2 Discharges EPA has designated as needing a stormwater permit as provided in Sector AD;

1.2.1.3 Discharges that are not otherwise required to obtain NPDES permit authorization but are mixed with discharges that are authorized under this permit; and

1.2.1.4 Stormwater discharges from facilities subject to any of the national stormwater-specific effluent limitations guidelines listed in Table 1-1.

Table 1-1. Stormwater-Specific Effluent Limitations Guidelines

Regulated Discharge	40 CFR Section	MSGP Sector	New Source Performance Standard (NSPS)	New Source Date
Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas	Part 429, Subpart I	A	Yes	1/26/81
Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products (SIC 2874)	Part 418, Subpart A	C	Yes	4/8/74
Runoff from asphalt emulsion facilities	Part 443, Subpart A	D	Yes	7/28/75
Runoff from material storage piles at cement manufacturing facilities	Part 411, Subpart C	E	Yes	2/20/74

[4] Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under Clean Water Act (CWA) section 402(k) by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including the Notice of Intent (NOI) to be covered by the permit, the Stormwater Pollution Prevention Plan (SWPPP), or during an inspection.

Regulated Discharge	40 CFR Section	MSGP Sector	New Source Performance Standard (NSPS)	New Source Date
Mine dewatering discharges at crushed stone, construction sand and gravel, or industrial sand mining facilities	Part 436, Subparts B, C, and D	J	No	N/A
Runoff from hazardous waste and non-hazardous waste landfills	Part 445, Subparts A and B	K, L	Yes	2/2/00
Runoff from coal storage piles at steam electric generating facilities	Part 423	O	Yes	11/19/82 (10/8/74)[1]
Runoff containing urea from airfield pavement deicing at existing and new primary airports with 1,000 or more annual non-propeller aircraft departures	Part 449	S	Yes	6/15/1

[1] NSPS promulgated in 1974 were not removed via the 1982 regulation; therefore, wastewaters generated by 40 CFR Part 423-applicable sources that were New Sources under the 1974 regulations are subject to the 1974 NSPS.

1.2.2 **Authorized Non-Stormwater Discharges.** Below is the list of non-stormwater discharges authorized under this permit. Unless specifically listed in this Part, this permit does not authorize any other non-stormwater discharges requiring NPDES permit coverage and you must either eliminate those discharges or they must be covered under another NPDES permit; this includes the sector-specific non-stormwater discharges that are listed in Part 8 as prohibited (a non-exclusive list is provided only to raise awareness of contaminants or sources of contaminants generally characteristic of certain sectors).

1.2.2.1 **Authorized Non-Stormwater Discharges for All Sectors.** The following are the only non-stormwater discharges authorized under this permit for all sectors provided that all discharges comply with the effluent limits set forth in Parts 2 and 8.

a. Discharges from emergency/unplanned fire-fighting activities;

b. Fire hydrant flushings;

c. Potable water, including uncontaminated water line flushings;

d. Uncontaminated condensate from air conditioners, coolers/chillers, and other compressors and from the outside storage of refrigerated gases or liquids;

e. Irrigation/landscape drainage, provided all pesticides, herbicides, and fertilizers have been applied in accordance with the approved labeling;

f. Pavement wash waters, provided that detergents or hazardous cleaning products are not used (e.g., bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonylphenols), and the wash waters do not come into contact with oil and grease deposits, sources of pollutants associated with industrial activities (see Part 6.2.3), or any other toxic or hazardous materials, unless residues are first cleaned up using dry clean-up methods (e.g., applying absorbent materials and sweeping, using hydrophobic mops/rags) and you have implemented appropriate control measures to minimize discharges of mobilized solids and other pollutants (e.g., filtration, detention, settlement);

g. External building/structure washdown / power wash water that does not use detergents or hazardous cleaning products (e.g., those containing bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonylphenols) and you have implemented appropriate control measures to minimize discharges of mobilized solids and other pollutants (e.g., filtration, detention, settlement);

h. Uncontaminated ground water or spring water;

i. Foundation or footing drains where flows are not contaminated with process materials;

j. Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of your facility, but not intentional discharges from the cooling tower (e.g., "piped" cooling tower blowdown; drains); and

k. Any authorized non-stormwater discharge listed above in this Part 1.2.2 or any stormwater discharge listed in Part 1.2.1 mixed with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization.

1.2.2.2 **Additional Authorized Non-Stormwater Discharge for Sector A Facilities.** Discharges from the spray down of lumber and wood product storage yards where no chemical additives are used in the spray-down waters and no chemicals are applied to the wood during storage, provided the non-stormwater component of the discharge is in compliance with the non-numeric effluent limits requirements in Part 2.1.2.

1.2.2.3 **Additional Authorized Non-Stormwater Discharges for Earth-Disturbing Activities Conducted Prior to Active Mining Activities for Sectors G, H and J Facilities**. The following non-stormwater discharges are only authorized for earth-disturbing activities conducted prior to active mining activities, as defined in Part 8.G.3.2, 8.H.3.2, and 8.J.3.2, provided that, with the exception of water used to control dust, these discharges are not routed to areas of exposed soil and all discharges comply with the permit's effluent limits. Once the earth-disturbing activities conducted prior to active mining activities have ceased, the only authorized non-stormwater discharges for Sectors G, H, and J are those listed here in Part 1.2.2.3:

a. Water used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;

b. Water used to control dust; and

c. Dewatering water that has been treated by an appropriate control under Parts 8.G.4.2.9, 8.H.4.2.9, or 8.J.4.2.9.

1.3 Obtaining Authorization to Discharge

1.3.1 **Prepare Your Stormwater Pollution Prevention Plan (SWPPP) Prior to Submitting Your Notice of Intent (NOI).** You must develop a SWPPP or update your existing SWPPP per Part 6 prior to submitting your NOI for coverage under this permit, per Part 1.3.2 below. You must make your SWPPP publicly available by either attaching it to your NOI, including a URL in your NOI, or providing additional information from your SWPPP on your NOI, per Part 6.4.

1.3.2 **How to Submit Your NOI to Get Permit Coverage.** To be covered under this permit, you must use EPA's NPDES eReporting Tool for the MSGP (NeT-MSGP) to electronically prepare and submit to EPA a complete and accurate NOI by the deadline applicable to your facility presented in Table 1-2. The NOI certifies to EPA that you are eligible for coverage according to Part 1.1 and provides information on your industrial activities and related discharges. Per Part 7.1, you must submit your NOI electronically via NeT-MSGP, unless the applicable EPA Regional Office grants you a waiver from electronic reporting, in which case you may use the paper NOI form in Appendix G. To access NeT-MSGP, go to https://www.epa.gov/npdes/stormwater-discharges-industrial-activities#accessingmsgp

1.3.3 **Deadlines for Submitting Your NOI and Your Official Date of Permit Coverage.** Table 1-2 provides the deadlines for submitting your NOI and your official start date of permit coverage.

Table 1-2. NOI Submittal Deadlines and Discharge Authorization Dates

Category of Facility/Operator	NOI Submission Deadline	Discharge Authorization Date[1, 2]
Existing MSGP facility. Operators of industrial activities whose stormwater discharges were covered under the 2015 MSGP.	No later than May 30, 2021.	30 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization has been denied or delayed. Note: You must review and update your SWPPP to ensure that this permit's requirements are addressed prior to submitting your NOI. Provided you submit your NOI in accordance with the deadline, your authorization under the 2015 MSGP is automatically continued until you have been granted coverage under this permit or an alternative permit, or coverage is otherwise terminated.
Operator operating consistent with EPA's No Action Assurance and submitted an Intent to Operate (ITO) form. Operators of industrial activities who commenced discharging between June 4, 2020 and March 1, 2021 and have been operating consistent with EPA's June 3, 2020 'No Action Assurance for the NPDES Stormwater Multi-Sector General Permit for Industrial Activities.'	As soon as possible, but see the June 3, 2020 'No Action Assurance for the NPDES Stormwater Multi-Sector General Permit for Industrial Activities' (and any updates to that document) for additional guidance on deadlines.	30 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization has been denied or delayed.
New facility without MSGP coverage. Operators of industrial activities that will commence discharging after March 1, 2021.	At least 30 calendar days prior to commencing discharge.	30 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization has been denied or delayed.
Existing facility covered under an alternative permit. Operators seeking coverage for stormwater discharges previously covered under an individual permit or an alternative general permit.	At least 30 calendar days prior to commencing discharge.	

Category of Facility/Operator	NOI Submission Deadline	Discharge Authorization Date[1, 2]
Existing MSGP facility with a new operator. New operators of existing industrial activities with stormwater discharges previously authorized under the 2021 MSGP.	At least 30 calendar days prior to the date of transfer of control to the new operator.	
Existing facility without MSGP coverage. Operators of industrial activities that commenced discharging prior to March 1, 2021, but whose stormwater discharges were not covered under the 2015 MSGP or another NPDES permit and have not been operating consistent with EPA's No Action Assurance for EPA's NPDES MSGP.	Immediately; your stormwater discharges are currently unpermitted.[1]	

[1] If you have missed the deadline to submit your NOI, any and all discharges from your industrial activities will continue to be unauthorized under the CWA until they are covered by this or a different NPDES permit. EPA may take enforcement action for any unpermitted discharges that occur between the commencement of discharging and discharge authorization.

[2] Discharges are not authorized if your NOI is incomplete or inaccurate or if you are ineligible for permit coverage.

1.3.4 **Modifying your NOI.** If after submitting your NOI, you need to correct or update any fields, you may do so by submitting a "Change NOI" form using NeT-MSGP. Per Part 7.1, you must submit your Change NOI electronically via NeT-MSGP, unless the EPA Regional Office grants you a waiver from electronic reporting, in which case you may use the suggested format for the paper Change NOI form.

1.3.4.1 For an existing operator, if any of the information supplied on the NOI changes, you must submit a Change NOI form within thirty (30) calendar days after the change occurs.

1.3.4.2 At a facility where there is a transfer in operator or a new operator takes over operational control at an existing facility, the new operator must submit a new NOI no later than thirty (30) calendar days after a change in operators. The previous operator must submit a Notice of Termination (NOT) no later than thirty (30) calendar days after MSGP coverage becomes active for the new operator, as specified in Part 1.4.

1.3.5 **Requirement to Post a Sign of your Permit Coverage.** You must post a sign or other notice of your permit coverage at a safe, publicly accessible location in close proximity to your facility. Public signage is not required where other laws or local ordinances prohibit such signage, in which case you must document in your SWPPP a brief explanation for why you cannot post a sign and a reference to the law or ordinance. You must use a font large enough to be readily viewed from a public right-of-way and perform periodic maintenance of the sign to ensure that it remains legible, visible, and factually correct. At minimum, the sign must include:

1.3.5.1 The following statement: "[*Name of facility*] is permitted for industrial stormwater discharges under the U.S. EPA's Multi-Sector General Permit (MSGP)";

1.3.5.2 Your NPDES ID number;

1.3.5.3 A contact phone number for obtaining additional facility information;

1.3.5.4 **One** of the following:

a. The Uniform Resource Locator (URL) for the SWPPP (if available), and the following statement: "To report observed indicators of stormwater pollution, contact [*optional: include facility point of contact and*] EPA at: [*include the applicable MSGP Regional Office contact information found at https://www.epa.gov/npdes/contact-us-stormwater#regional*]; **or**

b. The following statement: "To obtain the Stormwater Pollution Prevention Plan (SWPPP) for this facility or to report observed indicators of stormwater pollution, contact [*optional: include facility point of contact and*] EPA at [*include the applicable MSGP Regional Office contact information found at https://www.epa.gov/npdes/contact-us-stormwater#regional*]."

1.3.6 **Your Official End Date of Permit Coverage.** Once covered under this permit, your coverage will last until the date that:

1.3.6.1 You terminate permit coverage by submitting a Notice of Termination (NOT) per Part 1.4; or

1.3.6.2 You receive coverage under a different NPDES permit or a reissued or replacement version of this permit after it expires on February 28, 2026; or

1.3.6.3 You fail to submit an NOI for coverage under a reissued or replacement version of this permit before the required deadline.

1.3.7 **Continuation of Coverage for Existing Operators After the Permit Expires**

1.3.7.1 Note that if the 2021 MSGP is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with section 558(c) of the Administrative Procedure Act (see 40 CFR 122.6) and remain in force and effect for operators that were covered prior to its expiration. All operators authorized to discharge prior to the expiration date of the 2021 MSGP will automatically remain covered under the 2021 MSGP until the earliest of:

a. The date the operator is authorized for coverage under a new version of the MSGP following the timely submittal of a complete and accurate NOI. Note that if a timely NOI for coverage under the reissued or replacement permit is not submitted, coverage will terminate on the date that the NOI was due; or

b. The date of the submittal of a Notice of Termination; or

c. Issuance of an individual permit for the facility's discharge(s); or

d. A final permit decision by EPA not to reissue the MSGP, at which time EPA will identify a reasonable time period for covered operators to seek coverage under an alternative general permit or an individual permit. Coverage under the 2021 MSGP will terminate at the end of this time period.

1.3.7.2 EPA reserves the right to modify or revoke and reissue the 2021 MSGP under 40 CFR 122.62 and 63, in which case operators will be notified of any relevant changes or procedures to which they may be subject. If EPA fails to issue another general permit prior to the expiration of a previous one, EPA does not have the authority to provide coverage to industrial operators not already covered under that prior general permit. If the five-year expiration date for the 2021 MSGP has passed and a new MSGP has not been reissued, new operators seeking discharge authorization should contact EPA regarding the options available, such as applying for individual permit coverage.

1.3.8 **Coverage Under Alternative Permits.** EPA may require you to apply for and/or obtain authorization to discharge under an alternative permit, i.e., either an individual NPDES permit or an alternative NPDES general permit, in accordance with 40 CFR 122.64 and 124.5. If EPA requires you to apply for an alternative permit, the Agency will notify you in writing that a permit application or NOI is required. This notification will include a brief statement of the reasons for this decision and will contain alternative permit application or NOI requirements, including deadlines for completing your application or NOI.

1.3.8.1 **Denial of Coverage for New or Previously Unpermitted Facilities.** For new or previously unpermitted facilities, following the submittal of your NOI, you may be denied coverage under this permit and must apply for and/or obtain authorization to discharge under an alternative permit.

1.3.8.2 **Loss of Authorization Under the 2021 MSGP for Existing Permitted Facilities.** If your stormwater discharges are covered under this permit, you may receive a written notification that you must either apply for coverage under an individual NPDES permit or submit an NOI for coverage under an alternative general NPDES permit. In addition to the reasons for the decision and alternative permit application or NOI deadlines, the notice will include a statement that on the effective date of your alternative permit coverage, your coverage under the 2021 MSGP will terminate. EPA will terminate your MSGP permit coverage in NeT-MSGP at that time. EPA may grant additional time to submit the application or NOI if you request it. If you fail to submit an alternative permit application or NOI as required by EPA, then your authorization to discharge under the 2021 MSGP is terminated at the end of the day EPA required you to submit your alternative permit application or NOI. EPA may take appropriate enforcement action for any unpermitted discharge.

1.3.8.3 **Operators Requesting Coverage Under an Alternative Permit.** You may request to be covered under an individual permit. In such a case, you must submit an individual permit application in accordance with the requirements of 40 CFR 122.28(b)(3)(iii), with reasons supporting the request, to the applicable EPA Regional Office listed in Part 7.8 of this permit. The request may be granted by issuance of an individual permit if your reasons are adequate to support the request. When you are authorized to discharge under an alternative permit, your authorization to discharge under the 2021 MSGP is terminated on the effective date of the alternative permit.

1.4 Terminating Permit Coverage

1.4.1 **How to Submit your Notice of Termination (NOT) to Terminate Permit Coverage.** To terminate permit coverage, you must use EPA's NPDES eReporting Tool for the MSGP (NeT-MSGP) to electronically prepare and submit to EPA a complete and accurate NOT. Per Part 7.1, you must submit your NOT electronically via NeT-MSGP, unless the EPA Regional Office grants you a waiver from electronic reporting, in which case you may use the paper NOT form in Appendix H. To access NeT-MSGP, go to https://www.epa.gov/npdes/stormwater-discharges-industrial-activities#accessingmsgp

Your authorization to discharge under this permit terminates at midnight of the day that you are notified that your complete NOT has been processed. If you submit a NOT without meeting one or more of the conditions in Part 1.4.2 then your NOT is not valid.

Until you terminate permit coverage, you must comply with all conditions and effluent limitations in the permit.

1.4.2 **When to Submit Your Notice of Termination.** You must submit a NOT within 30 days after one or more of the following conditions have been met:

1.4.2.1 A new owner or operator has received authorization to discharge under this permit; or

1.4.2.2 You have ceased operations at the facility and/or there are not or no longer will be discharges of stormwater associated with industrial activity from the facility, and you have already implemented necessary sediment and erosion controls per Part 2.1.2.5; or

1.4.2.3 You are a Sector G, H, or J facility and you have met the applicable termination requirements; or

1.4.2.4 You obtained coverage under an individual or alternative general permit for all discharges required to be covered by an NPDES permit, unless EPA terminates your coverage for you per Part 1.3.8.

1.5 Conditional Exclusion for No Exposure

If you are covered by this permit and become eligible for a “no exposure” exclusion from permitting under 40 CFR 122.26(g), you may file a No Exposure Certification (NEC). You are no longer required to have a permit upon submission of a complete and accurate NEC to EPA. If you are no longer required to have permit coverage because of a no exposure exclusion and have submitted a NEC form to EPA, you are not required to submit a NOT. You must submit a NEC form to EPA once every five years.

You must use EPA’s NPDES eReporting Tool for the MSGP (NeT-MSGP) to electronically prepare and submit to EPA a complete and accurate NEC. Per Part 7.1, you must submit your NEC electronically via NeT-MSGP, unless the applicable EPA Regional Office grants you a waiver from electronic reporting, in which case you may use the paper NEC form in Appendix K. To access NeT-MSGP, go to https://cdxnodengn.epa.gov/net-msgp/action/login

1.6 Permit Compliance

Any noncompliance with any of the requirements of this permit constitutes a violation of this permit, and thus is a violation of the CWA. As detailed in Part 5, failure to take any required corrective actions constitutes an independent, additional violation of this permit, in addition to any original violation that triggered the need for a corrective action. As such, any actions and time periods specified for remedying noncompliance do not absolve you of the initial underlying noncompliance.

Where an Additional Implementation Measure (AIM) is triggered by an event that does not itself constitute permit noncompliance (i.e., an exceedance of an applicable benchmark), there is no permit violation provided you comply with the required responses within the relevant deadlines established in Part 5.

1.7 Severability

Invalidation of a portion of this permit does not necessarily render the whole permit invalid. EPA’s intent is that the permit is to remain in effect to the extent possible; in the event that any part of this permit is invalidated, EPA will advise the regulated community as to the effect of such invalidation.

2. Control Measures and Effluent Limits

In the technology-based limits included in Parts 2.1 and 8, the term "minimize" means to reduce and/or eliminate to the extent achievable using stormwater control measures (SCMs) (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practice. The term "infeasible" means not technologically possible or not economically practicable and achievable in light of best industry practices. EPA notes that it does not intend for any permit requirement to conflict with state water rights law.

2.1 Stormwater Control Measures

You must select, design, install, and implement stormwater control measures (including best management practices) to minimize pollutant discharges that address the selection and design considerations in Part 2.1.1, meet the non-numeric effluent limits in Part 2.1.2, meet limits contained in applicable effluent limitations guidelines in Part 2.1.3, and meet the water quality-based effluent limitations in Part 2.2.

The selection, design, installation, and implementation of control measures to comply with Part 2 must be in accordance with good engineering practices and manufacturer's specifications. Note that you may deviate from such manufacturer's specifications where you provide justification for such deviation and include documentation of your rationale in the part of your SWPPP that describes your control measures, consistent with Part 6.2.4. You must modify your stormwater control measures per Part 5.1 if you find that your control measures are not achieving their intended effect of minimizing pollutant discharges (i.e., your discharges will be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards or meet any of the other non-numeric effluent limits in this permit). Regulated stormwater discharges from your facility include stormwater run-on that commingles with stormwater discharges associated with industrial activity at your facility.

2.1.1 **Stormwater Control Measure Selection and Design Considerations**. You must consider the following when selecting and designing control measures:

2.1.1.1 Preventing stormwater from coming into contact with polluting materials is generally more effective, and less costly, than trying to remove pollutants from stormwater;

2.1.1.2 Using stormwater control measures in combination may be more effective than using control measures in isolation for minimizing pollutants in your stormwater discharge;

2.1.1.3 Assessing the type and quantity of pollutants, including their potential to impact receiving water quality, is critical to designing effective stormwater control measures that will achieve the limits in this permit;

2.1.1.4 Minimizing impervious areas at your facility and infiltrating stormwater onsite (including bioretention cells, green roofs, and pervious pavement, among other approaches) can reduce the frequency and volume of discharges and improve ground water recharge and stream base flows in local streams, although care must be taken to avoid ground water contamination;

2.1.1.5 Attenuating flow using open vegetated swales and natural depressions can reduce in-stream impacts of erosive flows;

2.1.1.6 Conserving and/or restoring riparian buffers will help protect streams from stormwater discharges and improve water quality;

2.1.1.7 Using treatment interceptors (e.g., swirl separators and sand filters) may be appropriate in some instances to minimize the discharge of pollutants; and

2.1.1.8 Implementing structural improvements, enhanced/resilient pollution prevention measures, and other mitigation measures can help to minimize impacts from stormwater discharges from major storm events such as hurricanes, storm surge, extreme/heavy precipitation,[5] and flood events. If such stormwater control measures are already in place due to existing requirements mandated by other state, local or federal agencies, you should document in your SWPPP a brief description of the controls and a reference to the existing requirement(s). If your facility may be exposed to or has previously experienced such major storm events,[6] additional stormwater control measures that may be considered include, but are not limited to:

- **a.** Reinforce materials storage structures to withstand flooding and additional exertion of force;
- **b.** Prevent floating of semi-stationary structures by elevating to the Base Flood Elevation (BFE)[7] level or securing with non-corrosive device;
- **c.** When a delivery of exposed materials is expected, and a storm is anticipated within 48 hours, delay delivery until after the storm or store materials as appropriate (refer to emergency procedures);
- **d.** Temporarily store materials and waste above the BFE level;
- **e.** Temporarily reduce or eliminate outdoor storage;
- **f.** Temporarily relocate any mobile vehicles and equipment to higher ground;
- **g.** Develop scenario-based emergency procedures for major storms that are complementary to regular stormwater pollution prevention planning and identify emergency contacts for staff and contractors; and

[5] Heavy precipitation refers to instances during which the amount of rain or snow experienced in a location substantially exceeds what is normal. What constitutes a period of heavy precipitation varies according to location and season. Heavy precipitation does not necessarily mean the total amount of precipitation at a location has increased—just that precipitation is occurring in more intense or more frequent events.

[6] To determine if your facility is susceptible to an increased frequency of major storm events that could impact the discharge of pollutants in stormwater, you may reference FEMA, NOAA, or USGS flood map products at https://www.usgs.gov/faqs/where-can-i-find-flood-maps?qt-news_science_products=0#qt-news_science_products.

[7] Base Flood Elevation (BFE) is the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. The BFE is shown on the Flood Insurance Rate Map (FIRM) for zones AE, AH, A1–A30, AR, AR/A, AR/AE, AR/A1– A30, AR/AH, AR/AO, V1–V30 and VE. (Source: https://www.fema.gov/node/404233). The FEMA Flood Map Service Center can be accessed through https://msc.fema.gov/portal/search.

h. Conduct staff training for implementing your emergency procedures at regular intervals.

Note: Part 2.1.1 requires that you must consider Parts 2.1.1.1 through 2.1.1.8 when selecting and designing control measures to minimize pollutant discharges via stormwater. Part 2.1.1 does not require nor prescribe specific control measure to be implemented; however, you must document in your SWPPP per Part 6.2.4 the considerations made to select and design control measures at your facility to minimize pollutants discharged via stormwater.

2.1.2 **Non-Numeric Technology-Based Effluent Limits (BPT/BAT/BCT).**[8] You must comply with the following non-numeric effluent limits as well as any sector-specific non-numeric effluent limits in Part 8, except where otherwise specified.

Effluent limit requirements in Part 2.1.2 that do not involve the site-specific selection of a control measure or are specific activity requirements (e.g., "Cleaning catch basins when the depth of debris reaches two-thirds (2/3) of the sump depth, in line with manufacturer specifications, whichever is lower, and keeping the debris surface at least six inches below the lowest outlet pipe") are marked with an asterisk (*). When documenting in your SWPPP, per Part 6, how you will comply with the requirements marked with an asterisk, you have the option of including additional information or you may just "copy-and-paste" those effluent limits word-for-word from the permit into your SWPPP without providing additional documentation (see Part 6.2.4).

2.1.2.1 **Minimize Exposure.** You must minimize the exposure of manufacturing, processing, and material storage areas (including loading and unloading, storage, disposal, cleaning, maintenance, and fueling operations) to rain, snow, snowmelt, and stormwater in order to minimize pollutant discharges by either locating these industrial materials and activities inside or protecting them with storm resistant coverings. Unless infeasible, you must also:

a. Use grading, berming or curbing to prevent discharges of contaminated flows and divert run-on away from these areas;

b. Locate materials, equipment, and activities so that potential leaks and spills are contained or able to be contained or diverted before discharge;

c. Store leaky vehicles and equipment indoors;

d. Perform all vehicle and/or equipment cleaning operations indoors, under cover, or in bermed areas that prevent discharges and run-on and also that capture any overspray; and

e. Drain fluids from equipment and vehicles that will be decommissioned, and,for any equipment and vehicles that will remain unused for extended periods of time, inspect at least monthly forleaks.

[8] BPT is Best Practicable Control Technology Currently Available, as set forth in CWA section 304(b)(1) and Appendix A; BAT is Best Available Technology Economically Achievable, as set forth in CWA section 304(b)(2) and Appendix A; and BCT is Best Conventional Pollutant Control Technology, as set forth in CWA section 304(b)(4) and Appendix A.

Note: Industrial materials do not need to be enclosed or covered if stormwater from affected areas does not discharge pollutants to waters of the United States or if discharges are authorized under another NPDES permit.

2.1.2.2 **Good Housekeeping.** You must keep clean all exposed areas that are potential sources of pollutants. You must perform good housekeeping measures in order to minimize pollutant discharges, including but not limited to, the following:

- **a.** Sweep or vacuum at regular intervals or, alternatively, wash down the area and collect and/or treat, and properly dispose of the washdown water;
- **b.** Store materials in appropriate containers;
- **c.** Keep all dumpster lids closed when not in use. For dumpsters and roll off boxes that do not have lids and could leak, ensure that discharges have a control (e.g., secondary containment, treatment). Consistent with Part 1.2.2 above, this permit does not authorize dry weather discharges from dumpsters or roll off boxes;*
- **d.** Minimize the potential for waste, garbage and floatable debris to be discharged by keeping exposed areas free of such materials, or by intercepting them before they are discharged.
- **e.** Plastic Materials Requirements: Facilities that handle pre-production plastic must implement control measures to eliminate discharges of plastic in stormwater.[9] Examples of plastic material required to be addressed as stormwater pollutants include plastic resin pellets, powders, flakes, additives, regrind, scrap, waste and recycling.

2.1.2.3 **Maintenance.**

- **a.** **Maintenance Activities.** You must maintain all control measures that are used to achieve the effluent limits in this permit in effective operating condition, as well as all industrial equipment and systems, in order to minimize pollutant discharges. This includes:
  - **ii.** Performing inspections and preventive maintenance of stormwater drainage, source controls, treatment systems, and plant equipment and systems that could fail and result in discharges of pollutants via stormwater.
  - **iii.** Maintaining non-structural control measures (e.g., keep spill response supplies available, personnel appropriately trained).
  - **iv.** Inspecting and maintaining baghouses at least quarterly to prevent the escape of dust from the system and immediately removing any accumulated dust at the base of the exterior baghouse.*

[9] Examples of appropriate control measures include but are not limited to: installing a containment system, or other control, at each on-site storm drain discharge point down gradient of areas containing plastic material, designed to trap all particles retained by a 1 mm mesh screen; using a durable sealed container designed not to rupture under typical loading and unloading activities at all points of plastic transfer and storage; using capture devices as a form of secondary containment during transfers, loading, or unloading plastic materials, such as catch pans, tarps, berms or any other device that collects errant material; having a vacuum or vacuum-type system for quick cleanup of fugitive plastic material available for employees; for facilities that maintain outdoor storage of plastic materials, do so in a durable, permanent structure that prevents exposure to precipitation that could cause the material to be discharged via stormwater.

v. Cleaning catch basins when the depth of debris reaches two-thirds (2/3) of the sump depth, or in line with manufacturer specifications, whichever is lower, and keeping the debris surface at least six inches below the lowest outlet pipe.*

b. **<u>Maintenance Deadlines</u>.**

ii. If you find that your control measures need routine maintenance, you must conduct the necessary maintenance immediately in order to minimize pollutant discharges.

iii. If you find that your control measures need to be repaired or replaced, you must immediately take all reasonable steps to prevent or minimize the discharge of pollutants until the final repair or replacement is implemented, including cleaning up any contaminated surfaces so that the material will not be discharged during subsequent storm events. Final repairs/replacement of stormwater controls should be completed as soon as feasible but must be no later than the timeframe established in Part 5.1.3 for corrective actions, i.e., within 14 days or, if that is infeasible, within 45 days. If the completion of stormwater control repairs/replacement will exceed the 45 day timeframe, you may take the minimum additional time necessary to complete the maintenance, provided that you notify the EPA Regional Office of your intention to exceed 45 days, and document in your SWPPP your rationale for your modified maintenance timeframe. If a control measure was never installed, was installed incorrectly or not in accordance with Parts 2 and/or 8, or is not being properly operated or maintained, you must conduct corrective action as specified in Part 5.1.

Note: In this context, the term "immediately" means the day you identify that a control measure needs to be maintained, repaired, or replaced, you must take all reasonable steps to minimize or prevent the discharge of pollutants until you can implement a permanent solution. However, if you identify a problem too late in the work day to initiate action, you must perform the action the following work day morning. "All reasonable steps" means you must respond to the conditions triggering the action, such as, cleaning up any exposed materials that may be discharged in a storm event (e.g., through sweeping, vacuuming) or making arrangements (i.e., scheduling) for a new SCM to be installed.

2.1.2.4 **<u>Spill Prevention and Response</u>*.*** You must minimize the potential for leaks, spills and other releases that may be exposed to stormwater and develop plans for effective response to such spills if or when they occur in order to minimize pollutant discharges. You must conduct spill prevention and response measures, including but not limited to, the following:

a. Clean up spills and leaks promptly using dry methods (e.g., absorbents) to prevent the discharge of pollutants;

b. Use drip pans and absorbents if leaky vehicles and/or equipment are stored outdoors;

c. Use spill/overflow protection equipment;

d. Plainly label containers (e.g., "Used Oil," "Spent Solvents," "Fertilizers and Pesticides") that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur;*

e. Implement procedures for material storage and handling, including the use of secondary containment and barriers between material storage and traffic areas, or a similarly effective means designed to prevent the discharge of pollutants from these areas;

f. Develop training on the procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases. As appropriate, execute such procedures as soon as possible;

g. Keep spill kits onsite, located near areas where spills may occur or where a rapid response can be made; and

h. Notify appropriate facility personnel when a leak, spill, or other release occurs.

Where a leak, spill or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period, you must notify the National Response Center (NRC) at (800) 424-8802 or, in the Washington, DC, metropolitan area, call (202) 267-2675 in accordance with the requirements of 40 CFR Part 110, 40 CFR Part 117, and 40 CFR Part 302 as soon as you have knowledge of the discharge. State or local requirements may necessitate reporting spills or discharges to local emergency response, public health, or drinking water supply agencies. Contact information must be in locations that are readily accessible and available.

2.1.2.5 **Erosion and Sediment Controls.** To minimize pollutant discharges in stormwater, you must minimize erosion by stabilizing exposed soils at your facility and placing flow velocity dissipation devices at discharge locations to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points. You must also use structural and non-structural control measures to minimize the discharge of sediment. If you use polymers and/or other chemical treatments as part of your controls, you must identify the polymers and/or chemicals used and the purpose in your SWPPP. There are many resources available to help you select appropriate SCMs for erosion and sediment control, including EPA's Stormwater Discharges from Construction Activities website at: https://www.epa.gov/npdes/stormwater-discharges-construction-activities.

2.1.2.6 ***Management of Stormwater.*** You must divert, infiltrate, reuse, contain, or otherwise reduce stormwater to minimize pollutants in your discharges. In selecting, designing, installing, and implementing appropriate control measures, you are encouraged to consult with EPA's resources relating to stormwater management, including the sector-specific *Industrial Stormwater Fact Sheet Series*, (https://www.epa.gov/npdes/stormwater-discharges-industrial-activities#factsheets) and any similar state or tribal resources.

2.1.2.7 **Salt Storage Piles or Piles Containing Salt.** You must enclose or cover storage piles of salt, or piles containing salt, used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces, in order to minimize pollutant discharges. You must implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. Piles do not need to be enclosed or covered pursuant to this permit if stormwater from the piles is not discharged or if discharges from the piles are authorized under another NPDES permit.

2.1.2.8 Employee Training.

a. **Types of Personnel Who Require Training.** You must train all employees who work in areas where industrial materials or activities are exposed to stormwater, or who are responsible for implementing activities necessary to comply with this permit (e.g., inspectors, maintenance personnel), including all members of your stormwater pollution prevention team. You must ensure the following personnel understand the requirements of this permit and their specific responsibilities with respect to those requirements:

i. Personnel who are responsible for the design, installation, maintenance, and/or repair of controls (including pollution prevention measures);

ii. Personnel responsible for the storage and handling of chemicals and materials that could become pollutants discharged via stormwater;

iii. Personnel who are responsible for conducting and documenting monitoring and inspections as required in Parts 3 and 4; and

iv. Personnel who are responsible for taking and documenting corrective actions as required in Part 5.

b. **Areas of Required Training.** Personnel must be trained in at least the following if related to the scope of their job duties (e.g., only personnel responsible for conducting inspections need to understand how to conduct inspections):

i. An overview of what is in the SWPPP;

ii. Spill response procedures, good housekeeping, maintenance requirements, and material management practices;

iii. The location of all the controls required by this permit, and how they are to be maintained;

iv. The proper procedures to follow with respect to the permit’s pollution prevention requirements; and

v. When and how to conduct inspections, record applicable findings, and take corrective actions; and

vi. The facility’s emergency procedures, if applicable per Part 2.1.1.8.

2.1.2.9 Non-Stormwater Discharges. You must evaluate for the presence of non-stormwater discharges. You must eliminate any non-stormwater discharges not explicitly authorized in Part 1.2.2 or covered by another NPDES permit, including vehicle and equipment/tank wash water (except for those authorized in Part 1.2.2.3 for Sectors G, H, and J). If not covered under a separate NPDES permit, wastewater, wash water and any other unauthorized non-stormwater must be discharged to a sanitary sewer in accordance with applicable industrial pretreatment requirements, or otherwise disposed of appropriately.

2.1.2.10 Dust Generation and Vehicle Tracking of Industrial Materials. You must minimize generation of dust and off-site tracking of raw, final, or waste materials in order to minimize pollutants discharged via stormwater.

2.1.3 **Numeric Effluent Limitations Based on Effluent Limitations Guidelines.** If you are in an industrial category subject to one of the effluent limitations guidelines identified in Table 4-3 (see Part 4.2.3.1), you must meet the effluent limits referenced in Table 2-1 below:

Table 2-1. Applicable Effluent Limitations Guidelines

Regulated Activity	40 CFR Part/Subpart	Effluent Limit
Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas	Part 429, Subpart I	See Part 8.A.7
Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products (SIC 2874)	Part 418, Subpart A	See Part 8.C.4
Runoff from asphalt emulsion facilities	Part 443, Subpart A	See Part 8.D.4
Runoff from material storage piles at cement manufacturing facilities	Part 411, Subpart C	See Part 8.E.5
Mine dewatering discharges at crushed stone, construction sand and gravel, or industrial sand mining facilities	Part 436, Subparts B, C, or D	See Part 8.J.9
Runoff from hazardous waste landfills	Part 445, Subpart A	See Part 8.K.6
Runoff from non-hazardous waste landfills	Part 445, Subpart B	See Part 8.L.10
Runoff from coal storage piles at steam electric generating facilities	Part 423	See Part 8.O.8
Runoff containing urea from airfield pavement deicing at existing and new primary airports with 1,000 or more annual non-propeller aircraft departures	Part 449	See Part 8.S.8

2.2 Water Quality-Based Effluent Limitations

2.2.1 **Water Quality Standards.** Your discharge must be controlled as necessary to meet applicable water quality standards of all affected states.

EPA expects that compliance with the conditions in this permit will control discharges as necessary to meet applicable water quality standards. If at any time you become aware, or EPA determines, that your stormwater discharge will not be controlled as necessary such that the receiving water of the United States will not meet an applicable water quality standard, you must take corrective action(s) as required in Part 5.1 and document the corrective actions as required in Part 5.3. You must also comply with any additional requirements that your state or tribe requires in Part 9.

EPA may also require that you undertake additional control measures (to meet the narrative water quality-based effluent limit above) on a site-specific basis, or require you to obtain coverage under an individual permit, if information in your NOI, required reports, or from other sources indicates that your discharges are not controlled as necessary such that the receiving water of the United States will not meet applicable water quality standards. You must implement all measures necessary to be consistent with an available wasteload allocation in an EPA-established or approved TMDL.

2.2.2 **Discharges to Water Quality-Impaired Waters.** You are considered to discharge to an impaired water if the first water of the United States to which your discharge is identified by a state, tribe or EPA as not meeting an applicable water quality standard, and:

- Requires development of a TMDL (pursuant to section 303(d) of the CWA);
- Is addressed by an EPA-approved or established TMDL; or
- Is not in either of the above categories but the waterbody is covered by a pollution control program that meets the requirements of 40 CFR 130.7(b)(1).

Note: For discharges that enter a separate storm sewer system[10] prior to discharge, the first water of the United States to which you discharge is the waterbody that receives the water from the storm sewer system.

2.2.2.1 **Existing Discharge to an Impaired Water with an EPA-Approved or Established TMDL.** If you discharge to an impaired water with an EPA-approved or established TMDL, EPA will inform you whether any additional measures are necessary for your discharge to be consistent with the assumptions and requirements of the applicable TMDL and its wasteload allocation, or if coverage under an individual permit is necessary per Part 1.3.8.

2.2.2.2 **Existing Discharger to an Impaired Water without an EPA-Approved or Established TMDL.** If you discharge to an impaired water without an EPA-approved or established TMDL, you are still required to comply with Part 2.2.1 and the monitoring requirements of Part 4.2.5.1. Note that the impaired waters monitoring requirements of Part 4.2.5.1 also apply where EPA determines that your discharge is not controlled as necessary such that the receiving water of the United States will not meet applicable water quality standards in an impaired downstream water segment, even if your discharge is initially to a receiving water(s) that is not identified as impaired according to Part 2.2.2.

2.2.2.3 **New Discharger or New Source to an Impaired Water.** If your authorization to discharge under this permit relied on Part 1.1.6.2 for a new discharger or a new source to an impaired water, you must implement and maintain any measures that enabled you to become eligible under Part 1.1.6.2, and modify such measures as necessary pursuant to any Part 5 corrective actions. You also must comply with Part 2.2.1 and the monitoring requirements of Parts 4.2.5.1.

2.2.3 **Tier 2 Antidegradation Requirements for New Dischargers, New Sources, or Increased Discharges.** If you are a new discharger or a new source (as defined in Appendix A), or an existing discharger required to notify EPA of an increased discharge consistent with Part 7.6 (i.e., a "planned changes" report), and you discharge directly to waters designated by a state or tribe as Tier 2 or Tier 2.5 for antidegradation purposes under 40 CFR 131.12(a), EPA may require that you undertake additional control measures as necessary to ensure compliance with the applicable antidegradation requirements, or notify you that an individual permit application is necessary in accordance with Part 1.3.8. See list of Tier 2 and 2.5 waters in Appendix L.

2.3 Requirements Relating to Endangered Species, Historic Properties, and CERCLA Sites

If your eligibility under either Part 1.1.4, Part 1.1.5, and/or Part 1.1.7 was made possible through your, or another operator's, agreement to undertake additional measures, you must comply with all such measures to maintain eligibility under the MSGP. Note that if

[10] Separate storm systems include both municipal storm sewer systems (MS4s) and non-municipal separate storm sewers. Separate storm systems do not include combined sewer systems or sanitary sewer systems.

at any time you become aware, or EPA determines, that your discharges and/or discharge-related activities have the potential to adversely affect listed species and/or critical habitat, have an effect on historic properties, or that your facility discharges to a CERCLA Site listed in Appendix P after you have obtained coverage under this permit, EPA may inform you of the need to implement additional measures on a site-specific basis to meet the effluent limits in this permit, or require you to obtain coverage under an individual permit.

3. Inspections

3.1 Routine Facility Inspections

3.1.1 **Inspection Personnel.** Qualified personnel (as defined in Appendix A) must perform the inspections. The qualified personnel may be a member of your stormwater pollution prevention team, or if the qualified personnel is a third-party you hire (i.e., a contractor), at least one member of your stormwater pollution prevention team must participate in the inspection. Inspectors must consider the results of visual and analytical monitoring (if any) for the past year when planning and conducting inspections.

3.1.2 **Areas that You Must Inspect.** During normal facility operating hours, the qualified personnel must conduct inspections of areas of the facility covered by the requirements in this permit, including, but not limited to, the following:

3.1.2.1 Areas where industrial materials or activities are exposed to stormwater;

3.1.2.2 Areas identified in the SWPPP and those that are potential pollutant sources (see Part 6.2.3);

3.1.2.3 Areas where spills and leaks have occurred in the past three years;

3.1.2.4 Discharge points; and

3.1.2.5 Control measures used to comply with the effluent limits contained in this permit.

3.1.3 **What You Must Look for During an Inspection.** During the inspection, the qualified personnel must examine or look out for, including, but not limited to, the following:

3.1.3.1 Industrial materials, residue or trash that may have or could come into contact with stormwater;

3.1.3.2 Leaks or spills from industrial equipment, drums, tanks and other containers;

3.1.3.3 Offsite tracking of industrial or waste materials, or sediment where vehicles enter or exit the site;

3.1.3.4 Tracking or blowing of raw, final or waste materials from areas of no exposure to exposed areas;

3.1.3.5 Erosion of soils at your facility, channel and streambank erosion and scour in the immediate vicinity of discharge points, per Part 2.1.2.5;

3.1.3.6 Non-authorized non-stormwater discharges, per Part 2.1.2.9;

3.1.3.7 Control measures needing replacement, maintenance or repair; and

3.1.3.8 During an inspection occurring during a stormwater event or stormwater discharge, you must observe control measures implemented to comply with effluent limits to ensure they are functioning correctly. You must also observe discharge points, as defined in Appendix A, during this inspection. If such discharge locations are inaccessible, you must inspect nearby downstream locations.

3.1.4 **Inspection Frequency.** The qualified personnel must conduct inspections at least quarterly (i.e., once each calendar quarter), or in some instances more frequently (e.g., monthly). Increased frequency may be appropriate for some types of equipment, processes and stormwater control measures, or areas of the facility with significant activities and materials exposed to stormwater. At least once each calendar year, the routine inspection must be conducted during a period when a stormwater discharge is occurring.

3.1.5 **Exceptions to Routine Facility Inspections for Inactive and Unstaffed Facilities.** The requirement to conduct facility inspections on a routine basis does not apply at a facility that is inactive and unstaffed, as long as there are no industrial materials or activities exposed to stormwater. Such a facility is only required to conduct an annual site inspection in accordance with Part 3.1. To invoke this exception, you must indicate that your facility is inactive and unstaffed on your NOI. If you are already covered under the permit and your facility has changed from active to inactive and unstaffed, you must modify and re-certify your NOI. You must also include a statement in your SWPPP per Part 6.2.5.2 indicating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to stormwater, in accordance with the substantive requirements in 40 CFR 122.26(g)(4)(iii). The statement must be signed and certified in accordance with Appendix B, Subsection 11. If circumstances change and industrial materials or activities become exposed to stormwater or your facility becomes active and/or staffed, this exception no longer applies, and you must immediately resume routine facility inspections. If you are not qualified for this exception at the time you become authorized under this permit, but during the permit term you become qualified because your facility becomes inactive and unstaffed, and there are no industrial materials or activities exposed to stormwater, you must include the same signed and certified statement as above and retain it with your records pursuant to Part 6.5.

Inactive and unstaffed facilities covered under Sectors G (Metal Mining), H (Coal Mines and Coal Mining-Related Facilities), and J (Non-Metallic Mineral Mining and Dressing) are not required to meet the “no industrial materials or activities exposed to stormwater” standard to be eligible for this exception from routine inspections, per Parts 8.G.8.4, 8.H.9.1, and 8.J.9.1.

3.1.6 **Routine Facility Inspection Documentation.** You must document the findings of your facility inspections and maintain this report with your SWPPP as required in Part 6.5. You must conduct any corrective action required as a result of a routine facility inspection consistent with Part 5. If you conducted a discharge visual assessment required in Part 3.2 during your facility inspection, you may include the results of the assessment with the report required in this Part, as long as you include all components of both types of inspections in the report.

Do not submit your routine facility inspection report to EPA, unless specifically requested to do so. However, you must summarize your findings in the Annual Report per Part 7.4. Document all findings, including but not limited to, the following information.

3.1.6.1 The inspection date and time;

3.1.6.2 The name(s) and signature(s) of the inspector(s);

3.1.6.3 Weather information;

3.1.6.4 All observations relating to the implementation of stormwater control measures at the facility, including:

- **a.** A description of any stormwater discharges occurring at the time of the inspection;
- **b.** Any previously unidentified stormwater discharges from and/or pollutants at the facility;
- **c.** Any evidence of, or the potential for, pollutants entering the stormwater drainage system;
- **d.** Observations regarding the physical condition of and around all stormwater discharge points, including any flow dissipation devices, and evidence of pollutants in discharges and/or the receiving water;
- **e.** Any stormwater control measures needing maintenance, repairs, or replacement;

3.1.6.5 Any additional stormwater control measures needed to comply with the permit requirements;

3.1.6.6 Any incidents of noncompliance; and

3.1.6.7 A statement, signed and certified in accordance with Appendix B, Subsection 11.

3.2 Quarterly Visual Assessment of Stormwater Discharges

3.2.1 **Visual Assessment Frequency.** Once each quarter for your entire permit coverage, you must collect a stormwater sample from each discharge point (except as noted in Part 3.2.4) and conduct a visual assessment of each of these samples. These samples are not required to be collected consistent with 40 CFR Part 136 procedures but must be collected in such a manner that the samples are representative of the stormwater discharge. Guidance on monitoring is available at https://www.epa.gov/sites/production/files/2015-11/documents/msgp_monitoring_guide.pdf.

3.2.2 **Visual Assessment Procedures.** You must do the following for the quarterly visual assessment:

3.2.2.1 Make the assessment of a stormwater discharge sample in a clean, colorless glass or plastic container, and examined in a well-lit area;

3.2.2.2 Make the assessment of the sample you collected within the first 30 minutes of an actual discharge from a storm event. If it is not possible to collect the sample within the first 30 minutes of discharge, the sample must be collected as soon as practicable after the first 30 minutes and you must document why it was not possible to take the sample within the first 30 minutes. In the case of snowmelt, samples must be taken during a period with a measurable discharge; and

3.2.2.3 For storm events, make the assessment on discharges that occur at least 72 hours (three days) from the previous discharge. The 72-hour (three-day) storm interval does not apply if you document that less than a 72-hour (three-day) interval is representative for local storm events during the sampling period.

3.2.2.4 Visually inspect or observe for the following water quality characteristics, which may be evidence of stormwater pollution:

- **a.** Color;
- **b.** Odor;
- **c.** Clarity (diminished);
- **d.** Floating solids;
- **e.** Settled solids;
- **f.** Suspended solids;
- **g.** Foam;
- **h.** Oil sheen; and
- **i.** Other obvious indicators of stormwater pollution.

3.2.2.5 Whenever the visual assessment shows evidence of stormwater pollution in the discharge, you must initiate the corrective action procedures in Part 5.1.1.

3.2.3 **Visual Assessment Documentation.** You must document the results of your visual assessments and maintain this documentation onsite with your SWPPP as required in Part 6.5. Any corrective action required as a result of a quarterly visual assessment must be conducted consistent with Part 5 of this permit. You are not required to submit your visual assessment findings to EPA, unless specifically requested to do so. However, you must summarize your findings in the annual report per Part 7.4. Your documentation of the visual assessment must include, but not be limited to:

3.2.3.1 Sample location(s);

3.2.3.2 Sample collection date and time, and visual assessment date and time for each sample;

3.2.3.3 Personnel collecting the sample and conducting visual assessment, and their signatures;

3.2.3.4 Nature of the discharge (i.e., stormwater from rain or snow);

3.2.3.5 Results of observations of the stormwater discharge;

3.2.3.6 Probable sources of any observed stormwater contamination;

3.2.3.7 If applicable, why it was not possible to take samples within the first 30 minutes; and

3.2.3.8 A statement, signed and certified in accordance with Appendix B, Subsection 11.

3.2.4 **Exceptions to Quarterly Visual Assessments**

3.2.4.1 **Adverse Weather Conditions.** When adverse weather conditions prevent the collection of stormwater discharge sample(s) during the quarter, you must take a substitute sample during the next qualifying storm event. Documentation of the rationale for no visual assessment for the quarter must be included with your SWPPP records as described in Part 6.5. Adverse conditions are those that are dangerous or create inaccessibility for personnel, such as local flooding, high winds, electrical storms, or situations that otherwise make sampling impractical, such as extended frozen conditions.

3.2.4.2 **Climates with Irregular Stormwater Discharges.** If your facility is located in an area where limited rainfall occurs during many parts of the year (e.g., arid or semi-arid climate) or in an area where freezing conditions exist that prevent discharges from occurring for extended periods, then your samples for the quarterly visual assessments may be distributed during seasons when precipitation more regularly occurs.

3.2.4.3 **Areas that Receive Snow.** If the facility is in an area that typically receives snow and the facility receives snow at least once over a period of four quarters, at least one quarterly visual assessment must capture snowmelt discharge, as described in Part 4.1.3, taking into account the exception described above for climates with irregular stormwater discharges.

3.2.4.4 **Inactive and Unstaffed Facilities.** The requirement for a quarterly visual assessment does not apply at a facility that is inactive and unstaffed, as long as there are no industrial materials or activities exposed to stormwater. To invoke this exception, you must maintain a statement in your SWPPP per Part 6.2.5.2 indicating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to precipitation, in accordance with the substantive requirements in 40 CFR 122.26(g)(4)(iii). The statement must be signed and certified in accordance with Appendix B, Subsection 11. If circumstances change and industrial materials or activities become exposed to stormwater or your facility becomes active and/or staffed, this exception no longer applies, and you must immediately resume quarterly visual assessments. If you are not qualified for this exception at the time you are authorized under this permit, but during the permit term you become qualified because your facility becomes inactive and unstaffed, and there are no industrial materials or activities that are exposed to stormwater, then you must include the same signed and certified statement as above and retain it with your records pursuant to Part 6.5. Inactive and unstaffed facilities covered under Sectors G (Metal Mining), H (Coal Mines and Coal Mining-Related Facilities), and J (Non-Metallic Mineral Mining and Dressing), are not required to meet the "no industrial materials or activities exposed to stormwater" standard to be eligible for this exception from quarterly visual assessments, consistent with the requirements established in Parts 8.G.8.4, 8.H.9.1, and 8.J.9.1.

3.2.4.5 **Substantially Identical Discharge Points (SIDP).** If your facility has two or more discharge points that discharge substantially identical stormwater effluents, as documented in Part 6.2.5.3, you may conduct quarterly visual assessments of the discharge at just one of the discharge points and report that the results also apply to the SIDPs provided that you conduct visual assessments on a rotating basis of each SIDP throughout the period of your coverage under this permit. If stormwater contamination is identified through visual assessment conducted at a SIDP, you must assess and modify your stormwater control measures as appropriate for each discharge point represented by the monitored discharge point.

4. Monitoring

You must collect and analyze stormwater samples and document monitoring activities consistent with the procedures described in Part 4 and Appendix B, Subsections B.10 – 12, and any additional sector-specific or state/tribal-specific requirements in Parts 8 and 9, respectively. Refer to Part 7 for reporting and recordkeeping requirements.

4.1 Monitoring Procedures

4.1.1 **Monitored Stormwater Discharge Points.** Applicable monitoring requirements apply to each discharge point authorized by this permit, except as otherwise exempt from monitoring as a "substantially identical discharge point" (SIDP). If your facility has two or more discharge points that you believe discharge substantially identical stormwater effluents, based on the similarities of the general industrial activities and control measures, exposed materials that may significantly contribute pollutants to stormwater, and runoff coefficients of their drainage areas, you may monitor the effluent of just one of the discharge points and report that the results also apply to the SIDP(s). As required in Part 6.2.5.3, your SWPPP must identify each discharge point authorized by this permit and describe the rationale for any SIDP determinations. The allowance for monitoring only one of the SIDP is not applicable to any discharge points with numeric effluent limitations. You are required to monitor each discharge point covered by a numeric effluent limit as identified in Part 4.2.2.

4.1.2 **Commingled Discharges.** If any authorized stormwater discharges commingle with discharges not authorized under this permit, you must conduct any required sampling of the authorized discharges at a point before they mix with other waste streams, to the extent practicable.

4.1.3 **Measurable Storm Events.** You must conduct all required monitoring on a storm event that results in an actual discharge ("measurable storm event") that follows the preceding measurable storm event by at least 72 hours (three days). The 72-hour (3-day) storm interval does not apply if you are able to document that less than a 72-hour (3-day) interval is representative for local storm events during the sampling period. In the case of snowmelt, you must conduct monitoring at a time when a measurable discharge occurs.

For each monitoring event, except snowmelt monitoring, you must identify the date and duration (in hours) of the rainfall event, rainfall total (in inches) for that rainfall event, and time (in days) since the previous measurable storm event. For snowmelt monitoring, you must identify the date of the sampling event.

4.1.4 **Sample Type.** You must take a minimum of one grab sample from a discharge resulting from a measurable storm event as described in Part 4.1.3. You must collect samples within the first 30 minutes of a discharge associated with a measurable storm event. If it is not possible to collect the sample within the first 30 minutes of a measurable storm event, you must collect the sample as soon as possible after the first 30 minutes and keep documentation with the SWPPP explaining why it was not possible to take samples within the first 30 minutes. In the case of snowmelt, you must take samples during a period with a measurable discharge.

For indicator monitoring and benchmark monitoring, you may choose to use a composite sampling method instead of taking grab samples. This composite method may be either flow-weighted or time-weighted and performed manually or with the use of automated sampling equipment. For the purposes of this permit, a flow-weighted composite sample means a composite sample consisting of a mixture of aliquots collected at a constant or variable time interval, where the volume of each aliquot included in the composite sample is proportional to the estimated or measured incremental discharge volume at the time of the aliquot collection compared to the total discharge volume estimated or measured over the monitoring event. For the purposes of this permit, a time-weighted composite sample means a composite sample consisting of a mixture of equal volume aliquots collected at a regular defined time interval over a specific period of time. Composite sampling must be initiated during the first 30 minutes of the same storm event. If it is not possible to initiate composite sampling within the first 30 minutes of a measurable storm event, you must initiate composite sampling as soon as possible after the first 30 minutes and keep documentation with the SWPPP explaining why it was not possible to initiate composite sampling within the first 30 minutes. You must submit all monitoring results to EPA per Part 4.1.9. Composite sampling may not be used in situations where hold times for processing or sample preservation requirements cannot be satisfied. For parameters measured in-situ with a probe or meter such as dissolved oxygen, conductivity, pH, or temperature, the composite sampling method shall be modified by calculating an average all individual measurements, weighted by flow volume if applicable.

4.1.5 **Adverse Weather Conditions.** When adverse weather conditions as described in Part 3.2.4.1 prevent the collection of stormwater discharge samples according to the relevant monitoring schedule, you must take a substitute sample during the next qualifying storm event. Adverse weather does not exempt you from having to file a benchmark monitoring report in accordance with your sampling schedule. As specified in Part 7.4, you must indicate in Net-DMR any failure to monitor during the regular reporting period.

4.1.6 **Facilities in Climates with Irregular Stormwater Discharges.** If your facility is located in areas where limited rainfall occurs during parts of the year (e.g., arid or semi-arid climates) or in areas where freezing conditions exist that prevent discharges from occurring for extended periods, you may distribute your required monitoring events during seasons when precipitation occurs, or when snowmelt results in a measurable discharge from your facility. You must still collect the required number of samples. As specified in Part 7.4, you must also indicate in Net-DMR that there was no monitoring for the respective monitoring period.

4.1.7 **Monitoring Periods.** Your monitoring requirements in this permit begin in the first full quarter following either May 30, 2021or your date of discharge authorization, whichever date comes later.

- January 1 – March 31
- April 1 – June 30
- July 1 – September 30
- October 1 – December 31

For example, if you obtain permit coverage on April 10, 2021, then your first monitoring quarter for benchmark monitoring is– July 1, 2021 – September 30, 2021 and your first monitoring year for discharges to impaired waters or discharges subject to an effluent limitation guideline is July 1, 2021 – June 30, 2022. This monitoring schedule may be modified in accordance with Part 4.1.6 if you document the revised schedule in your SWPPP. However, you must indicate in Net-DMR any 3-month interval that you did not take a sample.

4.1.8 **Monitoring for Authorized Non-Stormwater Discharges.** You are only required to monitor authorized non-stormwater discharges (as delineated in Part 1.2.2) when they are commingled with stormwater discharges associated with industrial activity.

4.1.9 **Monitoring Reports.** You must report monitoring data using Net-DMR, EPA's electronic DMR tool, as described in Part 7.3 (unless the applicable EPA Regional Office grants you a waiver from electronic reporting, in which case you may submit a paper DMR form).

4.2 Required Monitoring

This permit includes six types of required analytical monitoring, one or more of which may apply to your stormwater discharge:

- Indicator monitoring (Part 4.2.1);
- Benchmark monitoring (Part 4.2.2);
- Annual effluent limitations guidelines monitoring (Part 4.2.3);
- State- or tribal-specific monitoring (Part 4.2.4);
- Impaired waters monitoring (Part 4.2.5); and
- Other monitoring as required by EPA (Part 4.2.6).

Unless otherwise specified, samples must be analyzed consistent with 40 CFR Part 136 analytical methods that are sufficiently sensitive for the monitored parameter. When more than one type of monitoring for the same pollutant at the same discharge point applies (e.g., total suspended solids once per year for an effluent limitation and once per quarter for benchmark monitoring at a given discharge point), you may use a single sample to satisfy both monitoring requirements (i.e., one sample satisfying both the annual effluent limitation sample and one of the four quarterly benchmark monitoring samples). Similarly, when the same type of monitoring is required for the same pollutant but for different activities, you may use a single sample to satisfy both monitoring requirements (i.e., when you are required to monitor for PAHs in stormwater discharges from paved surfaces that will be sealed or re-sealed with coal-tar sealcoat where industrial activities are located during coverage under this permit and you are also required to monitor for PAHs in stormwater discharges since you manufacture, use, or store creosote or creosote-treated wood in areas that are exposed to precipitation).

When the effluent limitation is lower than the benchmark threshold for the same pollutant, your Additional Implementation Measure (AIM) trigger is based on an exceedance of the effluent limitation threshold, which would subject you to the AIM requirements of Part 5.2. Exceedance of an effluent limitation associated with the results of any analytical monitoring type required by this Part subjects you to the corrective action requirements of Part 5.1. You must conduct all required monitoring in accordance with the procedures described in Appendix B, Subsection B.10.

Per Part 1.3.7, in the event that the permit is administratively continued, monitoring requirements remain in force and effect at their original frequency during any continuance for operators that were covered prior to permit expiration. In the event that monitoring results are unable to be electronically reported in Net-DMR, operators must maintain monitoring results and records within their SWPPP.

Table 4-1. Summary of Each Type of Monitoring

Monitoring Type	Monitoring Type Applies To	Frequency	Duration	Follow-up Action	Permit Part Reference
Indicator – pH, TSS, COD	Subsectors B2, C5, D2, E3, F5, I1, J3, L2, N2, O1, P1, R1, T1, U3, V1, W1, X1, Y2, Z1, AB1, AC1, and AD1	Quarterly	Entirety of permit coverage	None	Part 4.2.1.1.a
Indicator – PAHs*	Operators with stormwater discharges from paved surfaces that will be sealed or re-sealed with coal-tar sealcoat where industrial activities are located during coverage under this permit; sectors; Sector A facilities that manufacture, use, or store creosote or creosote-treated wood in areas that are exposed to precipitation; and Sectors C (SIC 2911), D, F, H, I, M, O, P (SIC 4011, 4013, and 5171), Q (SIC 4491), R, and S	Bi-annually (2 times per year)	First year and fourth year	None	Part 4.2.1.1.b
Benchmark	Subsectors A1, A2, A3, A4, B1, C1, C2, C3, C4, D1, E1, E2, F1, F2, F3, F4, G1, G2, H1, J1, J2, K1, L1, M1, N1, Q1, S1, U1, U2, Y1, AA1, AA2	Quarterly	First year and fourth year	AIM. See Part 5.2.	Part 4.2.2
Effluent limitation guidelines (ELG)	See Part 4.2.3	Annually	Entirety of permit coverage	See Part 5.1	Part 4.2.3
State- or tribal-specific	Depends on the discharge location of your facility. See Part 9				
Impaired Waters	Depends on the receiving waterbody. See Part 4.2.5				
Other as required by EPA	See Part 4.2.6				

* Monitoring is required for the 16 individual PAHs identified at Appendix A to 40 CFR Part 423: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, benzo[g,h,i]perylene, indeno[1,2,3-c,d]pyrene, and dibenz[a,h]anthracene.

4.2.1 **Indicator Monitoring.** This permit requires indicator monitoring of stormwater discharges for three parameters – pH, Total Suspended Solids (TSS), and Chemical Oxygen Demand (COD) – for certain sectors/subsectors (see Part 4.2.1.1.a below) and for polycyclic aromatic hydrocarbons (PAHs) for certain sectors/activities, with additional limitations (see Part 4.2.1.1.b below). Indicator monitoring data will provide you and EPA with a baseline and comparable understanding of industrial stormwater discharge quality and potential water quality problems. The indicator monitoring parameters are "report-only" and do not have thresholds or baseline values for comparison, therefore no follow-up action is triggered or required under this part. The requirement in Part 2.2.1

that your stormwater discharge be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards still applies. You may find it useful to evaluate and compare your indicator monitoring data over time to identify any fluctuating values and why they may be occurring, and to further inform any revisions to your SWPPP/SCMs if necessary.[11] Indicator monitoring is report-only and is neither benchmark monitoring nor an effluent limitation. Instead, it is a permit condition. Thus, failure to conduct indicator monitoring is a permit violation.

4.2.1.1 Applicability and Schedule of Indicator Monitoring

a. pH, Total Suspended Solids (TSS), and Chemical Oxygen Demand (COD).

i. **Applicability.** Operators in the following subsectors must monitor stormwater discharges for pH, TSS, and COD (also specified in the sector-specific requirements in Part 8): B2, C5, D2, E3, F5, I1, J3, L2, N2, O1, P1, R1, T1, U3, V1, W1, X1, Y2, Z1, AB1, AC1, and AD1). Samples must be analyzed consistent with 40 CFR Part 136 analytical methods.

ii. **Schedule.** You must conduct indicator monitoring of stormwater discharges for pH, TSS, and COD each quarter, beginning in your first full quarter of permit coverage as identified in Part 4.1.7.

b. Polycyclic Aromatic Hydrocarbons (PAH).

i. **Applicability.** The following operators must monitor stormwater discharges for the 16 individual priority pollutant PAHs (also specified in the sector-specific requirements in Part 8): operators in all sectors with stormwater discharges from paved surfaces that will be sealed or re-sealed with coal-tar sealcoat where industrial activities are located during coverage under this permit; operators in sectors A (facilities that manufacture, use, or store creosote or creosote-treated wood in areas that are exposed to precipitation), C (SIC Code 2911), D, F, H, I, M, O, P (SIC Codes 4011, 4013, and 5171), Q (SIC Code 4491), R, and S. Monitoring is required for the 16 individual PAHs identified at Appendix A to 40 CFR Part 423: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, benzo[g,h,i]perylene, indeno[1,2,3-c,d]pyrene, and dibenz[a,h]anthracene. Samples must be analyzed using EPA Method 625.1, or EPA Method 610/Standard Method 6440B if preferred by the operator, consistent with 40 CFR Part 136 analytical methods.

ii. **Schedule.** You must conduct indicator monitoring of stormwater discharges for PAHs bi-annually (i.e., sample twice per year) in the first and fourth years of permit coverage. Your first year of permit coverage begins in your first full quarter of permit coverage, identified in Part 4.1.7, commencing no earlier than May 30, 2021, followed by two years of no monitoring. Bi-annual monitoring resumes in your fourth year of permit coverage for another year,

[11] Examples of possible reviews and revisions to the SWPPP/SCMs that could be informed by indicator monitoring values include: reviewing sources of pollution or any changes to performed industrial activities and processes; reviewing spill and leak procedures, and/or non-stormwater discharges; conducting a single comprehensive clean-up, implementing a new control measure, and/or increasing inspections. EPA notes, however, that these actions are not required under the 2021 MSGP in response to indicator monitoring.

after which you may discontinue bi-annual PAH monitoring for the remainder of your permit coverage.

4.2.1.2 **Exception for Facilities in Climates with Irregular Stormwater Discharges**. As described in Part 4.1.6, facilities in climates with irregular stormwater discharges may modify this schedule provided you report this revised schedule directly to EPA by the due date of the first indicator monitoring sample (see EPA Regional contacts in Part 7.8), and you keep this revised schedule with the facility's SWPPP as specified in Part 6.5. As noted in Part 4.1.7, you must indicate in Net-DMR any 3-month interval that you did not take a sample.

4.2.1.3 **Exception for Inactive and Unstaffed Facilities***.* The requirement for indicator monitoring does not apply at a facility that is inactive and unstaffed, provided that there are no industrial materials or activities exposed to stormwater. To invoke this exception, you must do the following:

a. Maintain a statement with your SWPPP stating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to stormwater in accordance with the substantive requirements in 40 CFR 122.26(g) and sign and certify the statement in accordance with Appendix B, Subsection 11.

b. If circumstances change and industrial materials or activities become exposed to stormwater or your facility becomes active and/or staffed, this exception no longer applies and you must immediately begin complying with the applicable indicator monitoring requirements under Part 4.2.1 as if you were in your first year of permit coverage. You must indicate in your NOI that your facility has materials or activities exposed to stormwater or has become active and/or staffed.

c. If you are not qualified for this exception at the time you are authorized under this permit, but during the permit term you become qualified because your facility is inactive and unstaffed, and there are no industrial materials or activities that are exposed to stormwater, then you must notify EPA of this change on your NOI form. You may discontinue indicator monitoring once you have notified EPA, and prepared and signed the certification statement described above concerning your facility's qualification for this special exception.

Note: This exception has different requirements for Sectors G, H, and J (see Part 8).

4.2.2 **Benchmark Monitoring.** This permit requires benchmark monitoring parameters of stormwater discharges for certain sectors/subsectors. Benchmark monitoring data are primarily for your use to determine the overall effectiveness of your stormwater control measures and to assist you in determining when additional action(s) may be necessary to comply with the effluent limitations in Part 2.

The benchmark thresholds are not effluent limitations; a benchmark exceedance, therefore, is not a permit violation. However, if a benchmark exceedance triggers Additional Implementation Measures (AIM) in Part 5.2, failure to conduct any required measures is a permit violation. At your discretion, you may take more than four samples during separate stormwater discharge events to determine the average benchmark parameter value for facility discharges.

4.2.2.1 Applicability of Benchmark Monitoring.

You must monitor stormwater discharges for any benchmark parameters specified for the industrial sector(s), both primary industrial activity and any co-located industrial activities, applicable to your discharge listed in Part 8. If your facility is in one of the industrial sectors subject to benchmark thresholds that are hardness-dependent, you must include in your NOI a hardness value, established consistent with the procedures in Appendix J, that is representative of your receiving water. Hardness is not a specific benchmark and therefore the permit does not include a benchmark threshold with which to compare.

Samples must be analyzed consistent with 40 CFR Part 136 analytical methods and using test procedures with quantitation limits at or below benchmark thresholds for all benchmark parameters for which you are required to sample, i.e. sufficiently sensitive methods. For averaging purposes, you may use a value of zero for any individual sample parameter which is determined to be less than the method detection limit. For sample values that fall between the method detection limit and the quantitation limit (i.e., a confirmed detection but below the level that can be reliably quantified), use a value halfway between zero and the quantitation limit.

4.2.2.2 Summary of the 2021 MSGP Benchmark Thresholds

The Table 4-2 presents the 2021 MSGP's freshwater and saltwater benchmark thresholds. Sector-specific benchmark requirements are detailed in Part 8. Values match the original units found in the source documents, detailed in the corresponding section of the fact sheet.

Table 4-2 2021 MSGP Benchmark Thresholds

Pollutant		2021 MSGP Benchmark Threshold
Total Recoverable Aluminum (T)		1,100 µg/L
Total Recoverable Beryllium		130 µg/L
Biochemical Oxygen Demand (5-day)		30 mg/L
pH		6.0 – 9.0 s.u.
Chemical Oxygen Demand		120 mg/L
Total Phosphorus		2.0 mg/L
Total Suspended Solids (TSS)		100 mg/L
Nitrate and Nitrite Nitrogen		0.68 mg/L
Turbidity		50 NTU
Total Recoverable Antimony		640 µg/L
Ammonia		2.14 mg/L
Total Recoverable Cadmium	Freshwater [a]	1.8 µg/L
	Saltwater	33 µg/L
Total Recoverable Copper	Freshwater	5.19 µg/L
	Saltwater	4.8 µg/L

Pollutant		2021 MSGP Benchmark Threshold
Total Recoverable Cyanide	Freshwater	22 µg/L
	Saltwater	1 µg/L
Total Recoverable Mercury	Freshwater	1.4 µg/L
	Saltwater	1.8 µg/L
Total Recoverable Nickel	Freshwater [a]	470 µg/L
	Saltwater	74 µg/L
Total Recoverable Selenium	Freshwater	1.5 µg/L for still/standing (lentic) waters 3.1 µg/L for flowing (lotic) waters
	Saltwater	290 µg/L
Total Recoverable Silver	Freshwater [a]	3.2 µg/L
	Saltwater	1.9 µg/L
Total Recoverable Zinc	Freshwater [a]	120 µg/L
	Saltwater	90 µg/L
Total Recoverable Arsenic	Freshwater [a]	150 µg/L
	Saltwater	69 µg/L
Total Recoverable Lead	Freshwater [a]	82 µg/L
	Saltwater	210 µg/L

[a] These pollutants are dependent on water hardness where discharged into freshwaters. The freshwater benchmark value listed is based on a hardness of 100 mg/L. When a facility analyzes receiving water samples for hardness, the operator must use the hardness ranges provided in Table 1 in Appendix J of the 2021 MSGP and in the appropriate tables in Part 8 of the 2021 MSGP to determine applicable benchmark values for that facility. Benchmark thresholds for discharges of these pollutants into saline waters are not dependent on receiving water hardness and do not need to be adjusted.

4.2.2.3 **Benchmark Monitoring Schedule.** Benchmark monitoring of stormwater discharges is required quarterly, as identified in Part 4.1.7, in the first and fourth year of permit coverage, as follows:

a. **Year one of permit coverage:** You must conduct benchmark monitoring for all parameters applicable to your subsector(s) for four quarters in your first year of permit coverage, beginning in your first *full* quarter of permit coverage, no earlier than May 30, 2021.

i. If the annual average[12] for a parameter does not exceed the benchmark threshold, you can discontinue benchmark monitoring for that parameter for the next two years (i.e., eight quarters).

[12] For this permit, an annual average exceedance for a parameter can occur if: (a) The four-quarter annual average for a parameter exceeds the benchmark threshold; or (b) Fewer than four quarterly samples are collected, but a single sample or the sum of any sample results within the sampling year exceeds the benchmark threshold by more than four times for a parameter. The result in (b) indicates an exceedance is mathematically certain (i.e., the sum of quarterly sample results to date is already more than four times the benchmark threshold). For pH, an annual average exceedance can only occur if the four-quarter annual average exceeds the benchmark threshold.

ii. If the annual average for a parameter exceeds the benchmark threshold, you must comply with Part 5.2 (Additional Implementation Measures responses and deadlines) and continue quarterly benchmark monitoring for that parameter until results indicate that the annual average is no longer exceeded, after which you can discontinue benchmark monitoring for that parameter until monitoring resumes in year four of permit coverage, per Part 4.2.2.3.b below.

b. **Year four of permit coverage:** You must conduct benchmark monitoring for all parameters applicable to your subsector(s) for four quarters in your fourth year of permit coverage (i.e., your thirteenth through sixteenth quarters), unless the first quarter of your fourth year of permit coverage occurs on or after the date this permit expires.

i. If the annual average[13] for a parameter does not exceed the benchmark threshold, you can discontinue benchmark monitoring for that parameter for the remainder of your permit coverage.

ii. If the annual average for a parameter exceeds the benchmark threshold, you must comply with Part 5.2 (Additional Implementation Measures responses and deadlines) and continue quarterly benchmark monitoring for that parameter until results indicate that the annual average is no longer exceeded, after which you can discontinue benchmark monitoring for that parameter for the remainder of permit coverage.

4.2.2.4 **Exception for Facilities in Climates with Irregular Stormwater Discharges**. As described in Part 4.1.6, facilities in climates with irregular stormwater discharges may modify this quarterly schedule provided you report this revised schedule directly to EPA by the due date of the first benchmark sample (see EPA Regional contacts in Part 7.8), and you keep this revised schedule with the facility's SWPPP as specified in Part 6.5. When conditions prevent you from obtaining four samples in four consecutive quarters, you must continue monitoring until you have the four samples required for calculating your benchmark monitoring average. As noted in Part 4.1.7, you must indicate in Net-DMR any 3-month interval that you did not take a sample.

4.2.2.5 **Exception for Inactive and Unstaffed Facilities.** The requirement for benchmark monitoring does not apply at a facility that is inactive and unstaffed, provided that there are no industrial materials or activities exposed to stormwater. To invoke this exception, you must do the following:

a. Maintain a statement with your SWPPP stating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to stormwater in accordance with the substantive requirements in 40 CFR 122.26(g) and sign and certify the statement in accordance with Appendix B, Subsection 11.

b. If circumstances change and industrial materials or activities become exposed to stormwater or your facility becomes active and/or staffed, this exception no longer applies and you must immediately begin complying with the applicable benchmark monitoring requirements under Part 4.2.2 as if you were in your first year of permit coverage. You must indicate in your NOI that your facility has

[13] *Ibid*.

materials or activities exposed to stormwater or has become active and/or staffed.

c. If you are not qualified for this exception at the time you are authorized under this permit, but during the permit term you become qualified because your facility is inactive and unstaffed, and there are no industrial materials or activities that are exposed to stormwater, then you must notify EPA of this change on your NOI form. You may discontinue benchmark monitoring once you have notified EPA, and prepared and signed the certification statement described above concerning your facility's qualification for this special exception.

Note: This exception has different requirements for Sectors G, H, and J (see Part 8).

4.2.3 Effluent Limitations Monitoring

4.2.3.1 **Monitoring Based on Effluent Limitations Guidelines.** Table 4-3 identifies the stormwater discharges subject to effluent limitation guidelines that are authorized for coverage under this permit. An exceedance of the effluent limitation is a permit violation. Beginning in the first full quarter following May 30, 2021 or your date of discharge authorization, whichever date comes later, you must monitor once per year at each stormwater discharge point containing the discharges identified in Table 4-3 for the parameters specified in the sector-specific section of Part 8.

Table 4-3. Required Monitoring for Effluent Limits Based on Effluent Limitations Guidelines

Regulated Activity	Effluent Limit	Monitoring Frequency	Sample Type
Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas	See Part 8.A.8	1/year	Grab
Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products (SIC 2874)	See Part 8.C.5	1/year	Grab
Runoff from asphalt emulsion facilities	See Part 8.D.5	1/year	Grab
Runoff from material storage piles at cement manufacturing facilities	See Part 8.E.6	1/year	Grab
Mine dewatering discharges at crushed stone, construction sand and gravel, or industrial sand mining facilities	See Part 8.J.10	1/year	Grab
Runoff from hazardous waste landfills	See Part 8.K.7	1/year	Grab
Runoff from non-hazardous waste landfills	See Part 8.L.11	1/year	Grab
Runoff from coal storage piles at steam electric generating facilities	See Part 8.O.8	1/year	Grab
Runoff containing urea from airfield pavement deicing at existing and new primary airports with 1,000 or more annual non- propeller aircraft departures.	See Part 8.S.9	1/year	Grab

4.2.3.2 **Substantially Identical Discharge Points Not Applicable.** You must monitor each discharge point discharging stormwater from any regulated activity identified in Table

4-3. The substantially identical discharge points (SIDP) monitoring provisions are not available for numeric effluent limit monitoring.

4.2.3.3 **Follow-up Actions if Discharge Exceeds Numeric Effluent Limitation.** If any monitoring value exceeds a numeric effluent limitation contained in this permit, you must indicate the exceedance on a "Change NOI" form in the NPDES eReporting Tool (NeT), and you must conduct follow-up monitoring within 30 calendar days (or during the next measurable storm event, should none occur within 30 days) of implementing corrective action(s) taken per Part 5.1. If your follow-up monitoring exceeds the applicable effluent limitation, you must:

- **a.** **Submit an Exceedance Report:** You must submit an Exceedance Report no later than 30 days after you have received your laboratory result consistent with Part 7.5; and
- **b.** **Continue to Monitor:** You must monitor, at least quarterly, until your stormwater discharge is in compliance with the effluent limit or until EPA waives the requirement for additional monitoring. Once your discharge is back in compliance with the effluent limitation you must indicate this on a "Change NOI" form per Part 7.3.

4.2.4 **State or Tribal Required Monitoring**

4.2.4.1 **Sectors Required to Conduct State or Tribal Monitoring.** You must comply with any state or tribal monitoring requirements in Part 9 of the permit applicable to your facility's discharge location.

4.2.4.2 **State or Tribal Monitoring Schedule.** If a monitoring frequency is not specified for an applicable requirement in Part 9, you must monitor once per year for the duration of your permit coverage.

4.2.5 **Impaired Waters Monitoring.** For the purposes of this permit, your facility is considered to discharge to an impaired water if the first water of the United States to which you discharge is identified by a state, tribe, or EPA pursuant to section 303(d) of the CWA as not meeting an applicable water quality standard (i.e., without an EPA-approved or -established TMDL, see Part 4.2.5.1.a below), or has been removed from the 303(d) list either because the impairments are addressed by an EPA-approved or established TMDL or is covered by pollution control requirements that meet the requirements of 40 CFR 130.7(b)(1) (see Part 4.2.5.1.b below). For discharges that enter a separate storm sewer system[14] prior to discharge, the first water of the United States to which you discharge is the waterbody that receives the stormwater discharge from the separate storm sewer system.

4.2.5.1 **Facilities Required to Monitor Stormwater Discharges to Impaired Waters.**

a. **Discharges to impaired waters without an EPA-approved or established TMDL:**

Monitoring is required annually in the first year of permit coverage and again in the fourth year of permit coverage as follows, unless you detect a pollutant causing an impairment, in which case annual monitoring must continue.

[14] Separate storm sewer systems do not include combined sewer systems or sanitary sewer systems. Separate storm sewer systems include both municipal storm sewer systems (MS4s) and non-municipal separate storm sewers.

i. **Year one of permit coverage:** You must take your first annual sample in your first year of permit coverage, which begins in the first full quarter following May 30, 2021 or your date of discharge authorization, whichever date comes later. You must monitor for all pollutants causing impairments using a standard analytical method, provided one exists (see 40 CFR Part 136), once at each discharge point (except substantially identical discharge points) discharging stormwater to impaired waters without an EPA-approved or established TMDL. *Note*: Except where otherwise directed by EPA, if the pollutant of concern for the impaired waterbody is suspended solids, turbidity, or sediment/sedimentation, you must monitor for Total Suspended Solids (TSS). If a pollutant of concern is expressed in the form of an indicator or surrogate pollutant, you must monitor for that indicator or surrogate pollutant. No monitoring is required when a waterbody's biological communities are impaired but no pollutant, including indicator or surrogate pollutants, is specified as causing the impairment, or when a waterbody's impairment is related to hydrologic modifications, impaired hydrology, or other non-pollutant. Operators must consult the applicable EPA Regional Office for any available guidance regarding required monitoring parameters under this part.

1) If monitoring results indicate the monitored pollutant is not detected in your discharge, or is within the acceptable range for a given parameter for the waterbody to meet its designated use (e.g., pH or temperature),[15] you may discontinue monitoring for that pollutant for the next two years. You must resume monitoring for that pollutant in year four of permit coverage, if applicable, per Part 4.2.5.1.a.ii.

2) If monitoring results indicate that the monitored pollutant is detected in your stormwater discharge, or is outside the acceptable range for a given parameter (e.g., pH or temperature) for the waterbody to meet its designated use,[16] you must continue to monitor for the pollutant(s) annually until no longer detected, after which you may discontinue monitoring for that pollutant until monitoring resumes in year four of permit coverage, if applicable, per Part 4.2.5.1.a.ii.

ii. **Year four of permit coverage.** Annual monitoring resumes in your fourth year of permit coverage for another year for a sub-set of parameters monitored for in the first monitoring year. In the fourth year of permit coverage, you must monitor for all pollutants causing impairment(s) that are associated with your industrial activity and/or are listed as a benchmark parameter for your subsector(s) (regardless of whether you have satisfied benchmark monitoring for the parameter per Part 4.2.2). To determine these pollutants, start with the list of pollutants for which the receiving waterbody is impaired and for which a standard analytical method exists (see 40 CFR Part 136), then compare that list to the industrial pollutants you identified in Part 6.2.3.2 and any sector-specific benchmark monitoring pollutants in Part 8 and, if applicable, Part 9. You must monitor for pollutants that appear on both the impairments list and either your industrial pollutants and/or your benchmark parameter list, including "indicator" or "surrogate" pollutants (as described in the "note" in 1 above). You must monitor once at each discharge point (except

[15] Refer to your state's Water Quality Standards or contact the EPA Regional Office for assistance.
[16] *Ibid*.

substantially identical discharge points (SIDPs)) for these pollutants. Consistent with Part 4.2, annual samples may be used to also satisfy any single remaining quarterly benchmark monitoring requirement applicable to your discharge.

1) If monitoring results indicate the monitored pollutant is not detected in your discharge, or is within the acceptable range for a given parameter for the waterbody to meet its designated use (e.g., pH or temperature),[17] you may discontinue monitoring for that pollutant for the remainder of your permit coverage.

2) If the monitoring results indicate that the monitored pollutant is detected in your discharge, or is outside the acceptable range for a given parameter (e.g., pH or temperature) for the waterbody to meet its designated use, you must continue to monitor for the pollutant(s) annually until no longer detected, after which you may discontinue monitoring for that pollutant for the remainder of your permit coverage.

iii. ***Exception****:* If sampling results in either Part 4.2.5.1.a.i or Part 4.2.5.1.a.ii above indicate the monitored pollutant is detected in your discharge, but you have determined that its presence is caused solely by natural background sources, you may discontinue monitoring for that pollutant for the duration of your permit coverage.

To support a determination that the pollutant's presence is caused solely by natural background sources, you must document and maintain with your SWPPP, as required by Part 6.5:

1) An explanation of why you believe that the presence of the pollutant of concern in your discharge is not related to the activities or materials at your facility; and

2) Data and/or studies that tie the presence of the pollutant of concern inyour discharge to natural background sources in the watershed.

Natural background pollutants include those that occur naturally as a result of native soils, and vegetation, wildlife, or ground water. Natural background pollutants do not include legacy pollutants from earlier activity on your site, or pollutants in run-on from neighboring sources that are not naturally occurring. However, you may be eligible to discontinue annual monitoring for pollutants that occur solely from these sources and should consult the applicable EPA Regional Office for related guidance.

b. **Discharges to impaired waters with an EPA-approved or established TMDL:** For stormwater discharges to waters for which there is an EPA-approved or established TMDL, you are not required to monitor for the pollutant(s) for which the TMDL was written unless EPA informs you, upon examination of the applicable TMDL and its wasteload allocation, that you are subject to such a requirement consistent with the assumptions and findings of the applicable TMDL and its wasteload allocation. EPA's notice will include specifications on stormwater discharge monitoring parameters and frequency. If there are questions, you may consult the applicable EPA Regional Office for guidance regarding required monitoring under this Part.

[17] *Ibid*.

4.2.5.2 **Exception for Inactive and Unstaffed Facilities.** The requirement for impaired waters monitoring does not apply at a facility that is inactive and unstaffed, as long as there are no industrial materials or activities exposed to stormwater. To invoke this exception, you must do the following:

a. Maintain a statement with your SWPPP stating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to stormwater in accordance with the substantive requirements in 40 CFR 122.26(g) and sign and certify the statement in accordance with Appendix B, Subsection 11.

b. If circumstances change and industrial materials or activities become exposed to stormwater or your facility becomes active and/or staffed, this exception no longer applies and you must immediately begin complying with the applicable impaired waters monitoring requirements under Part 4.2.5 as if you were in your first year of permit coverage. You must indicate in a "Change NOI" form per Part 7.2 that your facility has materials or activities exposed to stormwater or has become active and/or staffed.

c. If you are not qualified for this exception at the time you are authorized under this permit, but during the permit term you become qualified because your facility is inactive and unstaffed, and there are no industrial materials or activities that are exposed to stormwater, then you must notify EPA of this change on your NOI form. You may discontinue impaired waters monitoring once you have notified EPA, and prepared and signed the certification statement described above concerning your facility's qualification for this special exception.

Note: This exception has different requirements for Sectors G, H, and J (see Part 8).

4.2.6 **Additional Monitoring Required by EPA.** EPA may notify you of additional stormwater discharge monitoring requirements that EPA determines are necessary to meet the permit's effluent limitations. Any such notice will briefly state the reasons for the monitoring, locations, and parameters to be monitored, frequency and period of monitoring, sample types, and reporting requirements.

5. Corrective Actions and Additional Implementation Measures (AIM)

5.1 Corrective Action

5.1.1 **Conditions Requiring SWPPP Review and Revision to Ensure Effluent Limits are Met.** When any of the following conditions occur or are detected during an inspection, monitoring or other means, or EPA or the operator of the MS4 through which you discharge informs you that any of the following conditions have occurred, you must review and revise, as appropriate, your SWPPP (e.g., sources of pollution; spill and leak procedures; non-stormwater discharges; the selection, design, installation and implementation of your stormwater control measures) so that this permit's effluent limits are met and pollutant discharges are minimized:

5.1.1.1 An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by this or another NPDES permit to a water of the United States) occurs at your facility.

5.1.1.2 A discharge violates a numeric effluent limit listed in Table 2-1 and/or in your Part 8 sector-specific requirements.

5.1.1.3 Your stormwater control measures are not stringent enough for your stormwater discharge to be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards or to meet the non-numeric effluent limits in this permit.

5.1.1.4 A required control measure was never installed, was installed incorrectly, or not in accordance with Parts 2 and/or 8, or is not being properly operated or maintained.

5.1.1.5 Whenever a visual assessment shows evidence of stormwater pollution (e.g., color, odor, floating solids, settled solids, suspended solids, foam).

5.1.2 **Conditions Requiring SWPPP Review to Determine if Modifications Are Necessary.** If construction or a change in design, operation, or maintenance at your facility occurs that significantly changes the nature of pollutants discharged via stormwater from your facility, or significantly increases the quantity of pollutants discharged, you must review your SWPPP (e.g., sources of pollution, spill and leak procedures, non-stormwater discharges, selection, design, installation and implementation of your stormwater control measures) to determine if modifications are necessary to meet the effluent limits in this permit.

5.1.3 **Deadlines for Corrective Actions**

5.1.3.1 **Immediate Actions.** You must immediately take all reasonable steps to minimize or prevent the discharge of pollutants until you can implement a permanent solution, including cleaning up any contaminated surfaces so that the material will not discharge in subsequent storm events. In Part 5, the term "immediately" means that the day you find a condition requiring corrective action, you must take all reasonable steps to minimize or prevent the discharge of pollutants until you can implement a permanent solution. However, if you identify a problem too late in the work day to initiate corrective action, you must perform the corrective action the following work day morning. The term "all reasonable steps" means you must respond to the conditions triggering the corrective action, such as cleaning up any exposed materials that may be discharged in a storm event (e.g., through sweeping, vacuuming) or making arrangements (i.e., scheduling) for a new SCM to be installed.

5.1.3.2 **Subsequent Actions.** If additional actions are necessary beyond those implemented pursuant to Part 5.1.3.1, you must complete the corrective actions (e.g., install a new or modified control and make it operational, complete the repair) before the next storm event if possible, and within 14 calendar days from the time of discovery that the condition in Part 5.1.1 is not met. If it is infeasible to complete the corrective action within 14 calendar days, you must document why it is infeasible to complete the corrective action within the 14-day timeframe. You must also identify your schedule for completing the work, which must be done as soon as practicable after the 14-day timeframe but no longer than 45 days after discovery. If the completion of corrective action will exceed the 45-day timeframe, you may take the minimum additional time necessary to complete the corrective action, provided that you notify the appropriate EPA Regional Office of your intention to exceed 45 days, your rationale for an extension, and a completion date, which you must also include in your corrective action documentation (see Part 5.3). Where your corrective actions result in changes to any of the controls or procedures documented in your SWPPP, you must modify your SWPPP accordingly within 14 calendar days of completing corrective action work.

These time intervals are not grace periods, but are schedules considered reasonable for documenting your findings and for making repairs and improvements. They are included in this permit to ensure that the conditions prompting the need for these repairs and improvements do not persist indefinitely.

5.1.4 **Effect of Corrective Action.** If the event triggering the review is a permit violation (e.g., non-compliance with an effluent limit), correcting it does not remove the original violation. Additionally, failing to take corrective action in accordance with this section is an additional permit violation. EPA may consider the appropriateness and promptness of corrective action in determining enforcement responses to permit violations.

5.1.5 **Substantially Identical Discharge Points.** If the event triggering corrective action is associated with a discharge point that had been identified as a "substantially identical discharge point" (SIDP) (see Parts 3.2.4.5 and 4.1.1), your review must assess the need for corrective action for all related SIDPs. Any necessary changes to control measures that affect these other discharge points must also be made before the next storm event if possible, or as soon as practicable following that storm event. Any corrective actions must be conducted within the timeframes set forth in Part 5.1.3.

5.2 Additional Implementation Measures (AIM)

If any of the following AIM triggering events in Parts 5.2.3, 5.2.4, or 5.2.5 occur, you must follow the response procedures described in those parts, called "additional implementation measures" or "AIM." There are three AIM levels: AIM Level 1, Level 2, and Level 3. You must respond as required to different AIM levels which prescribe sequential and increasingly robust responses when a benchmark exceedance occurs. You must follow the corresponding AIM level responses and deadlines described in Parts 5.2.1, 5.2.2, and 5.2.3 unless you qualify for an exception under Part 5.2.6.

5.2.1 Baseline Status

Once you receive discharge authorization under this permit per Part 1.3, you are in a baseline status for all applicable benchmark parameters. If an AIM triggering event occurs and you have proceeded sequentially to AIM Level 1, 2 or 3, you may return directly to baseline status once the corresponding AIM-level response and conditions are met.

5.2.2 **AIM Triggering Events.** If an annual average exceeds an applicable benchmark threshold based on the following events, the AIM requirements have been triggered for that benchmark parameter. You must follow the corresponding AIM-level responses and deadlines described in Parts 5.2.3, 5.2.4, and 5.2.5 unless you qualify for an exception under Part 5.2.6. An annual average exceedance for a parameter can occur if:

5.2.2.1 The four-quarterly annual average for a parameter exceeds the benchmark threshold, or

5.2.2.2 Fewer than four quarterly samples are collected, but a single sample or the sum of any sample results within the sampling year exceeds the benchmark threshold by more than four times for a parameter. This result indicates an exceedance is mathematically certain (i.e., the sum of quarterly sample results to date is already more than four times the benchmark threshold).[18]

5.2.3 AIM Level 1

Your status changes from baseline to AIM Level 1 if quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has occurred, unless you qualify for an exception under Part 5.2.6.

5.2.3.1 **AIM Level 1 Responses.** If any of the triggering events in Part 5.2.2 occur, you must:

a. **Review SWPPP/Stormwater Control Measures.** Immediately review your SWPPP and the selection, design, installation, and implementation of your stormwater control measures to ensure the effectiveness of your existing measures and determine if modifications are necessary to meet the benchmark threshold for the applicable parameter,[19] and

b. **Implement Additional Measures.** After reviewing your SWPPP/stormwater control measures, you must implement additional measures, considering good engineering practices, that would reasonably be expected to bring your exceedances below the parameter's benchmark threshold; or if you determine nothing further needs to be done with your stormwater control measures, you must document per Part 5.3 and include in your annual report why you expect your existing control measures to bring your exceedances below the parameter's benchmark threshold for the next 12-month period.

5.2.3.2 **AIM Level 1 Deadlines.** If any modifications to or additional control measures are necessary in response to AIM Level 1, you must implement those modifications or control measures within 14 days of receipt of laboratory results, unless doing so within 14 days is infeasible. If doing so within 14 days is infeasible, you must document per Part 5.3 why it is infeasible and implement such modifications within 45 days.

5.2.3.3 **Continue Quarterly Benchmark Monitoring**. After compliance with AIM Level 1 responses and deadlines, you must continue quarterly benchmark monitoring for the next four quarters for the parameter(s) that caused the AIM triggering event at all affected stormwater discharge points, beginning no later than the next full quarter after compliance.

5.2.3.4 **AIM Level 1 Status Update.** While in AIM Level 1 status, you may either:

a. **Return to Baseline Status.** Your AIM Level 1 status will return to baseline status if the AIM Level 1 responses have been met and continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has not occurred after four quarters of monitoring (i.e., the benchmark threshold is no longer exceeded for the parameter(s)). You may discontinue benchmark monitoring for that parameter until monitoring resumes in year 4 of permit coverage per Part 4.2.2.3 or if you have fulfilled all benchmark monitoring

---

[18] For pH, an annual average exceedance can only occur if the four-quarter annual average exceeds the benchmark threshold.

[19] Examples may include: review sources of pollution, spill and leak procedures, and/or non-stormwater discharges; conducting a single comprehensive clean-up, making a change in subcontractor, implementing a new control measure, and/or increasing inspections.

requirements per Part 4.2.2.3, then you may discontinue monitoring for that parameter for the remainder of the permit.

b. **Advance to AIM Level 2.** Your AIM Level 1 status advances to AIM Level 2 status if you have completed AIM Level 1 responses and the continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has occurred (i.e., the benchmark threshold continues to be exceeded for the same parameter(s)).

5.2.4 AIM Level 2

Your status changes from AIM Level 1 to AIM Level 2 if your continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has occurred (i.e., the benchmark threshold continues to be exceeded for the parameter(s)), unless you qualify for an exception under Part 5.2.6.

5.2.4.1 **AIM Level 2 Responses.** If any of the events in Part 5.2.2 occur, you must review your SWPPP and implement additional pollution prevention/good housekeeping SCMs, considering good engineering practices, beyond what you did in your AIM Level 1 responses that would reasonably be expected to bring your exceedances below the parameter's benchmark threshold. Refer to the MSGP sector-specific fact sheets for recommended controls found at [https://www.epa.gov/npdes/stormwater-discharges-industrial-activities-fact-sheets-and-guidance].

5.2.4.2 **AIM Level 2 Deadlines.** You must implement additional pollution prevention/good housekeeping SCMs within 14 days of receipt of laboratory results that indicate an AIM triggering event has occurred and document per Part 5.3 how the measures will achieve benchmark thresholds. If it is feasible for you to implement a measure, but not within 14 days, you may take up to 45 days to implement such measure. You must document per Part 5.3 why it was infeasible to implement such measure in 14 days. EPA may also grant you an extension beyond 45 days, based on an appropriate demonstration by you, the operator.

5.2.4.3 **Continue Quarterly Benchmark Monitoring**. After compliance with AIM Level 2 responses and deadlines, you must continue quarterly benchmark monitoring for the next four quarters for the parameter(s) that caused the AIM triggering event at all affected discharge points, beginning no later than the next full quarter after compliance.

5.2.4.4 **AIM Level 2 Status Update**. While in AIM Level 2 status, you may either:

a. **Return to Baseline Status**. Your AIM Level 2 status will return to baseline status if the AIM Level 2 responses have been met and the continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has not occurred after four quarters of monitoring (i.e., the benchmark threshold is no longer exceeded for the parameter(s)). You may discontinue benchmark monitoring for that parameter until monitoring resumes in year 4 of permit coverage per Part 4.2.2.3, or if you have fulfilled all benchmark monitoring requirements per Part 4.2.2.3, then you may discontinue monitoring for that parameter for the remainder of the permit.

b. **Advance to AIM Level 3.** Your AIM Level 2 status advances to AIM Level 3 status if you have completed the AIM Level 2 responses and the continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2

has occurred (i.e., the benchmark threshold continues to be exceeded for the same parameter(s)).

5.2.5 AIM Level 3

Your status changes from AIM Level 2 to AIM Level 3 if your continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has occurred (i.e., the benchmark threshold continues to be exceeded for the parameter(s)), unless you qualify for an exception per Part 5.2.6.

5.2.5.1 **AIM Level 3 Responses.** if any of the triggering events in Part 5.2.2 occur, you must install structural source controls (e.g., permanent controls such as permanent cover, berms, and secondary containment), and/or treatment controls (e.g., sand filters, hydrodynamic separators, oil-water separators, retention ponds, and infiltration structures), except as provided in Part 5.2.6 (AIM Exceptions). The controls or treatment technologies or treatment train you install should be appropriate for the pollutants that triggered AIM Level 3 and should be more rigorous than the pollution prevention/good housekeeping-type stormwater control measures implemented under AIM Tier 2 in Part 5.2.4. You must select controls with pollutant removal efficiencies that are sufficient to bring your exceedances below the benchmark threshold. You must install such stormwater control measures for the discharge point(s) in question and for substantially identical discharge points (SIDPs), unless you individually monitor those SIDPs and demonstrate that AIM Level 3 requirements are not triggered at those discharge points.

5.2.5.2 **AIM Level 3 Deadlines**. You must identify the schedule for installing the appropriate structural source and/or treatment stormwater control measures within 14 days and install such measures within 60 days. If is not feasible within 60 days, you may take up to 90 days to install such measures, documenting in your SWPPP per Part 5.3 why it is infeasible to install the measure within 60 days. EPA may also grant you an extension beyond 90 days, based on an appropriate demonstration by you, the operator.

5.2.5.3 **Continue Quarterly Benchmark Monitoring.** After compliance with AIM Level 3 responses and deadlines, you must continue quarterly benchmark monitoring for the next four quarters for the parameter(s) that caused the AIM triggering event at all affected discharge points, beginning no later than the next full quarter after compliance.

5.2.5.4 **AIM Level 3 Status Update.** While in AIM Level 3 status, you may either:

a. **Return to Baseline Status.** Your AIM Level 3 status will return to baseline status if the AIM Level 3 response(s) have been met and the continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has not occurred after four quarters of monitoring (i.e., the benchmark threshold is no longer exceeded for the parameter(s)). You may discontinue benchmark monitoring for that parameter until monitoring resumes in what would be year 4 of permit coverage per Part 4.2.2.3, or if you have fulfilled all benchmark monitoring requirements per Part 4.2.2.3, then you may discontinue monitoring for that parameter for the remainder of the permit.

b. **Continue in AIM Level 3.** Your AIM Level 3 status will remain at Level 3 if you have completed the AIM Level 3 responses and the continued quarterly benchmark monitoring results indicate that an AIM triggering event per Part 5.2.2 has occurred (i.e., the benchmark threshold continues to be exceeded for the same parameter(s)). You must continue quarterly benchmark monitoring for the next four quarters for the parameter(s) that caused the AIM triggering event at all affected discharge points, beginning no later than the next full quarter after compliance. If you continue to exceed the benchmark threshold for the same parameter even after compliance with AIM Level 3, EPA may require you to apply for an individual permit.

5.2.6 AIM Exceptions

Following the occurrence of an AIM triggering event per Part 5.2.2, at any point or tier level of AIM and following four quarters of benchmark monitoring (or sooner if the exceedance is triggered by less than four quarters of data), you may qualify for an exception below from AIM requirements and continued benchmark monitoring. Regardless if you qualify for and claim an exception, you must still review your SCMs, SWPPP, and other on-site activities to determine if actions or modifications are necessary or appropriate in light of your benchmark exceedance(s). If claiming an AIM exception, you must follow the requirements to demonstrate that you qualify for the exception as provided below. If you qualify for an exception, you are not required to comply with the AIM responses or the continuation of quarterly benchmark monitoring for any parameters for which you can demonstrate that the benchmark exceedance is:

5.2.6.1 **Solely Attributable to Natural Background Pollutant Levels:** You must demonstrate that the benchmark exceedance is solely attributable to the presence of that pollutant in natural background sources, provided that all the following conditions are met and you submit your analysis and documentation to the applicable EPA Regional Office upon request:

a. The four-quarter average concentration of your benchmark monitoring results (or fewer than four-quarters of data that trigger an exceedance) is less than or equal to the concentration of that pollutant in the natural background; and

b. You document and maintain with your SWPPP, as required in Part 6.5.9, your supporting rationale for concluding that benchmark exceedances are in fact attributable solely to natural background pollutant levels. You must include in your supporting rationale any data previously collected by you or others (including literature studies) that describe the levels of natural background pollutants in your stormwater discharge. Natural background pollutants are those substances that are naturally occurring in soils or ground water. Natural background pollutants do not include legacy pollutants from earlier activity on your site, or pollutants in run-on from neighboring sources which are not naturally occurring, such as other industrial facilities or roadways.

5.2.6.2 **Due to Run-On:** You must demonstrate and obtain EPA agreement that run-on from a neighboring source (e.g., a source external to your facility) is the cause of the exceedance, provided that all the following conditions are met and you submit your analysis and documentation to the applicable EPA Regional Office for concurrence:

a. After reviewing and revising your SWPPP, as appropriate, you should notify the other facility or entity contributing run-on to your discharges and request that they abate their pollutant contribution.

b. If the other facility or entity fails to take action to address their discharges or sources of pollutants, you should contact your applicable EPA Regional Office.

5.2.6.3 **Due to an abnormal event:** You must immediately document per Part 5.3 that the AIM triggering event was abnormal, a description explaining what caused the abnormal event, and how any measures taken within 14 days of such event will prevent a reoccurrence of the exceedance. You must also collect a sample during the next measurable storm event to demonstrate that the result is less than the benchmark threshold, in which case you do not trigger any AIM requirements based on the abnormal event. You must report the result of this sample in NeT-DMR in lieu of the result from the sample that caused the AIM triggering event. You may avail yourself of the "abnormal" demonstration opportunity at any AIM Level, one time per parameter, and one time per discharge point, which shall include substantially identical discharge points (SIDP), provided you qualify for the exception.

5.2.6.4 **For Aluminum and Copper benchmark parameters only: Demonstrated to not result in an exceedance of your facility-specific value using the national recommended water quality criteria in-lieu of the applicable MSGP benchmark threshold:**

To be eligible for the exception, you must demonstrate to EPA that your stormwater discharge(s) that exceeded the applicable nationally representative MSGP benchmark threshold would not result in an exceedance of a derived facility-specific value. The demonstration to EPA, which will be made publicly available, must meet the minimum elements below in order to be considered for and approved by the applicable EPA Regional Office. If you exceed the MSGP benchmark threshold for aluminum or copper, you must still comply with any applicable AIM requirements and additional benchmark monitoring until the demonstration is made to and approved by the applicable EPA Regional Office. In this case, EPA suggests that samples collected for any continued benchmark monitoring also be analyzed for the required input parameters for each model for efficiency. If you are an existing operator and you anticipate an exceedance of the MSGP benchmark(s) based on previous monitoring data and expect to utilize this exception(s), EPA recommends you begin the required data collection in your first year of permit coverage.

a. **Aluminum:**

i. Conditions for this exception are:

1) Use of EPA's 2018 National Recommended Aluminum Aquatic Life Criteria: https://www.epa.gov/wqc/aquatic-life-criteria-aluminum;

2) In-stream waterbody sampling for the three water quality input parameters for the recommended criteria model: pH, total hardness, and dissolved organic carbon (DOC); and

3) Completion of sampling events sufficient to capture spatial and temporal variability. Sampling events must adequately represent each applicable season at the facility's location, which would likely be over the course of at least one year. An equal number of ambient waterbody samples must be collected at a single upstream and downstream location from the operator's discharge point(s) to the receiving water of the United States. Where there exists no ambient source water upstream of the operator's discharge point(s) to the receiving water of the United States, samples of the ambient downstream waterbody conditions are sufficient.

ii. The demonstration provided to EPA must include, at minimum:

1) A description of the sampling, analysis, and quality assurance procedures that were followed for data collection, following the guidance in Section

3 of EPA's Industrial Stormwater Monitoring and Sampling Guide. https://www.epa.gov/sites/production/files/2015-11/documents/msgp_monitoring_guide.pdf;

2) The input parameters and export of results from the Aluminum Criteria Calculator, available at: https://www.epa.gov/sites/production/files/2018-12/aluminum-criteria-calculator-v20.xlsm; and,

3) A narrative summary of results.

b. Copper (only for discharges to freshwater):

i. Conditions for this exception are:

1) Use of EPA's 2007 National Recommended Freshwater Copper Aquatic Life Criteria: https://www.epa.gov/wqc/aquatic-life-criteria-copper;

2) In-stream waterbody sampling for the 10 water quality input parameters to the BLM for copper: pH; dissolved organic carbon (DOC); alkalinity; temperature; major cations (calcium, magnesium, sodium, and potassium); and major anions (sulfate, chloride);

3) The water quality input parameters, with the exception of temperature, must fall within the range of conditions recommended for use in the BLM, found in Table 1-1 of the Data Requirements document: https://www.epa.gov/sites/production/files/2015-11/documents/copper-data-requirements-training.pdf; and

4) Completion of sampling events sufficient to capture spatial and temporal variability. Because some of the BLM input parameters are known to vary seasonally, EPA suggests a possible starting point of at least one sampling event per season.[20] Sampling events must adequately represent each applicable season at the facility's location, which would likely be over the course of at least one year. An equal number of ambient waterbody samples must be collected at a single upstream and downstream location from the operator's discharge point(s) to the receiving water of the United States. Where there exists no ambient source water upstream of the operator's discharge point(s) to the receiving water of the United States, samples of the ambient downstream waterbody conditions are sufficient.

ii. The demonstration provided to EPA must include, at minimum:

1) A description of the sampling, analysis, and quality assurance procedures that were followed for data collection, following the guidance in Section 3 of EPA's Industrial Stormwater Monitoring and Sampling Guide.

[20] EPA training materials on Copper BLM for Data Requirements states that spatial variability in the BLM input parameters caused by physical factors such as watershed size or the presence or absence of a point source discharge(s) to a waterbody should also be considered when determining how many sampling events should be collected when using the BLM to develop site-specific copper criteria. Spatial variability in the BLM input parameters should also be considered when determining how many sampling locations should be selected for development of site-specific copper criteria using the BLM. Regardless of the number of sampling events involved, data collection should reflect site-specific characteristics and consider special circumstances that may affect copper toxicity throughout the expected range of receiving water conditions. See https://www.epa.gov/sites/production/files/2015-11/documents/copper-data-requirements-training.pdf.

https://www.epa.gov/sites/production/files/2015-11/documents/msgp_monitoring_guide.pdf;

2) A discussion of how the data collected reflects the site-specific characteristics and how the operator considered special circumstances that may affect copper toxicity throughout the expected range of receiving water conditions;

3) The input file and export of the results from the BLM software, which can be requested at: https://www.epa.gov/wqs-tech/copper-biotic-ligand-model; and

4) A narrative summary of results.

5.2.6.5 **Demonstrated to not result in any exceedance of water quality standards:** You must demonstrate to EPA within 30 days of the AIM triggering event that the triggering event does not result in any exceedance of water quality standards. If it is not feasible to complete this demonstration within 30 days, you may take up to 90 days, documenting in your SWPPP why it is infeasible to complete the demonstration within 30 days. EPA may also grant you an extension beyond 90 days, based on an appropriate demonstration by you, the operator. The demonstration to EPA, which will be made publicly available, must include the following minimum elements in order to be considered for approval by the EPA Regional Office:

a. the water quality standards applicable to the receiving water;

b. the average flow rate of the stormwater discharge;

c. the average instream flow rates of the receiving water immediately upstream and downstream of the discharge point;

d. the ambient concentration of the parameter(s) of concern in the receiving water immediately upstream and downstream of the discharge point demonstrated by full-storm composite sampling;

e. the concentration of the parameter(s) of concern in the stormwater discharge demonstrated by full-storm, flow-weighted composite sampling;

f. any relevant dilution factors applicable to the discharge; and

g. the hardness of the receiving water.

Timeframe of EPA Review of Your Submitted Demonstration: EPA will review and either approve or disapprove of such demonstration within 90 days of receipt (EPA may take up to 180 days upon notice to you before the 90th day that EPA needs additional time).

- **EPA Approval of Your Submitted Demonstration**. If EPA approves such demonstration within this timeframe, you have met the requirements for this exception, and you do not have to comply with the corresponding AIM requirements and continued benchmark monitoring.
- **EPA Disapproval of Your Submitted Demonstration.** If EPA disapproves such demonstration within this timeframe, you must comply with the corresponding AIM requirements and continued benchmark monitoring, as required. Compliance with the AIM requirements would begin from the date EPA notifies you of the disapproval unless you submit a Notice of Dispute to the applicable EPA Regional Office in Part 7 within 30 days of EPA's disapproval.

- **EPA Does Not Provide Response Related to Your Submitted Demonstration**. If EPA does not provide a response on the demonstration within this timeframe, you may submit to the EPA Regional Office in Part 7 a Notice of Dispute.
- **Operator Submittal of Notice of Dispute.** You may submit all relevant materials, including support for your demonstration and all notices and responses to the Water Division Director for the applicable EPA Region to review within 30 days of EPA's disapproval or after 90 days (or 180 days if EPA has provided notice that it needs more time) of not receiving a response from EPA.
- **EPA Review of Notice of Dispute.** EPA will send you a response within 30 days of receipt of the Notice of Dispute. Time for action by you, the operator, upon disapproval shall be tolled during the period from filing of the Notice of Dispute until the decision on the Notice of Dispute is issued by the Water Division Director for the applicable EPA Region.

5.3 **<u>Corrective Action and AIM Documentation</u>**

5.3.1 **<u>Documentation within 24 Hours.</u>** You must document the existence of any of the conditions listed in Parts 5.1.1, 5.2.3, 5.2.4, or 5.2.5 within 24 hours of becoming aware of such condition. You are not required to submit this documentation to EPA, unless specifically required or requested to do so. However, you must summarize your findings in the annual report per Part 7.4. Include the following information in your documentation:

5.3.2 Description of the condition or event triggering the need for corrective action review and/or AIM response. For any spills or leaks, include the following information: a description ofthe incident including material, date/time, amount, location, and reason for spill, and any leaks, spills or other releases that resulted in discharges of pollutants to waters of United States, through stormwater or otherwise;

5.3.2.1 Date the condition/triggering event wasidentified;

5.3.2.2 Description of immediate actions taken pursuant to Part 5.1.3.1 to minimize or prevent the discharge of pollutants. For any spills or leaks, include response actions, the date/time clean-up completed, notifications made, and staff involved. Also include any measures taken to prevent the reoccurrence ofsuch releases (see Part 2.1.2.4); and

5.3.2.3 A statement, signed and certified in accordance with Appendix B,Subsection 11.

5.3.3 **<u>Documentation within 14 Days.</u>** You must also document the corrective actions and/or AIM responses you took or will take as a result of the conditions listed in Part 5.1.1, 5.2.3, 5.2.4, and/or 5.2.5 within 14 days from the time of discovery of any of those conditions/triggering events. Provide the dates when you initiated and completed (or expect to complete) each corrective action and/or AIM response. If infeasible to complete the necessary corrective actions and/or AIM responses within the specified timeframe, per Parts 5.1.1, 5.2.3, 5.2.4, or 5.2.5, you must document your rationale and schedule for installing the controls and making them operational as soon as practicable after the specified timeframe. If you notified EPA regarding an allowed extension of the specified timeframe, you must document your rationale for an extension. Include any additional information and/or rationale that is required and/or applicable to the specified corrective action and/or AIM response in Part 5. You are not required to submit this documentation to EPA, unless specifically required or requested to do so. However, you must summarize your corrective actions and/or AIM responses in the Annual Report per Part 7.4.

6. Stormwater Pollution Prevention Plan (SWPPP)

You must prepare a SWPPP for your facility before submitting your NOI for permit coverage. If you prepared a SWPPP for coverage under a previous version of this permit, you must review and update the SWPPP to implement all provisions of this permit prior to submitting your NOI. The SWPPP does not contain effluent limitations; such limitations are contained in Parts 2, 8, and 9 of the permit. The SWPPP is intended to document the selection, design, and installation of stormwater control measures to meet the permit's effluent limits. The SWPPP is a living document. Facilities must keep their SWPPP up-to-date throughout their permit coverage, such as making revisions and improvements to their stormwater management program based on new information and experiences with major storm events. As distinct from the SWPPP, the additional documentation requirements (see Part 6.5) are so that you document the implementation (including inspection, maintenance, monitoring, and corrective action) of the permit requirements.

Note: Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including the Notice of Intent (NOI) to be covered by the permit, the SWPPP, during an inspection, etc.

6.1 Person(s) Responsible for Preparing the SWPPP

You shall prepare the SWPPP in accordance with good engineering practices and to industry standards. The SWPPP may be developed by either a person on your staff or a third party you hire, but it must be developed by a “qualified person” and must be certified per the signature requirements in Part 6.2.7. If EPA concludes that the SWPPP is not in compliance with Part 6.2 of this permit, EPA may require the SWPPP to be reviewed, amended as necessary, and certified by a Professional Engineer, or for Sector G, H or J, by a Professional Geologist, with the education and experience necessary to prepare an adequate SWPPP.

Note: A “qualified person,” as defined in Appendix A, is a person knowledgeable in the principles and practices of industrial stormwater controls and pollution prevention, and possesses the education and ability to assess conditions at the industrial facility that could impact stormwater quality, and the education and ability to assess the effectiveness of stormwater controls selected and installed to meet the requirements of the permit.

6.2 Required Contents of Your SWPPP

To be covered under this permit, your SWPPP must contain all of the following elements:

- Stormwater pollution prevention team (Part 6.2.1);
- Site description (Part 6.2.2);
- Summary of potential pollutant sources (Part 6.2.3);
- Description of stormwater control measures (Part 6.2.4);
- Schedules and procedures (Part 6.2.5);
- Documentation to support eligibility pertaining to other federal laws (Part 6.2.6); and

- Signature requirements (Part 6.2.7).

Where your SWPPP refers to procedures in other facility documents, such as a Spill Prevention, Control and Countermeasure (SPCC) Plan or an Environmental Management System (EMS), copies of the relevant portions of those documents must be kept with your SWPPP.

6.2.1 **Stormwater Pollution Prevention Team.** You must identify the staff members (by name or title) that comprise the facility's stormwater pollution prevention team as well as their individual responsibilities. Your stormwater pollution prevention team is responsible for overseeing development of the SWPPP, any modifications to it, and for implementing and maintaining control measures and taking corrective actions and/or AIM responses, when required. Each member of the stormwater pollution prevention team must have ready access to either an electronic or paper copy of applicable portions of this permit, the most updated copy of your SWPPP, and other relevant documents or information that must be kept with the SWPPP.

6.2.2 **Site Description.** Your SWPPP must include the following:

6.2.2.1 **Activities at the facility.** Provide a description of the nature of the industrial activities at your facility.

6.2.2.2 **General location map.** Provide a general location map (e.g., U.S. Geological Survey (USGS) quadrangle map) with enough detail to identify the location of your facility and all receiving waters for your stormwater discharges.

6.2.2.3 **Site map.** Provide a map showing:

a. Boundaries of the property and the size of the property in acres;

b. Location and extent of significant structures and impervious surfaces;

c. Directions of stormwater flow (use arrows), including flows with a significant potential to cause soil erosion;

d. Locations of all stormwater control measures;

e. Locations of all receiving waters, including wetlands, in the immediate vicinity of your facility. Indicate which waterbodies are listed as impaired and which are identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 waters;

f. Locations of all stormwater conveyances including ditches, pipes, and swales;

g. Locations of potential pollutant sources identified under Part 6.2.3.2;

h. Locations where significant spills or leaks identified under Part 6.2.3.3 have occurred;

i. Locations of all stormwater monitoring points;

j. Locations of stormwater inlets and discharge points, with a unique identification code for each discharge point (e.g., 001, 002), indicating if you are treating one or more discharge points as "substantially identical" under Parts 3.2.4.5, 6.2.5.3, and 4.1.1, and an approximate outline of the areas draining to each discharge point;

k. If applicable, municipal separate storm sewer systems (MS4s) and where your stormwater discharges to them;

l. Areas of Endangered Species Act-designated critical habitat for endangered or threatened species, if applicable.

m. Locations of the following activities where such activities are exposed to precipitation:

ii. fueling stations;

iii. vehicle and equipment maintenance and/or cleaning areas;

iv. loading/unloading areas;

v. locations used for the treatment, storage, or disposal of wastes;

vi. liquid storage tanks;

vii. processing and storage areas;

viii. immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility;

ix. transfer areas for substances in bulk;

x. machinery;

xi. locations and sources of run-on to your site from adjacent property that contains significant quantities of pollutants.

6.2.3 **Summary of Potential Pollutant Sources.** You must describe in the SWPPP areas at your facility where industrial materials or activities are exposed to stormwater or from which authorized non-stormwater discharges originate. Industrial materials or activities include but are not limited to: material handling equipment or activities; industrial machinery; raw materials; industrial production and processes; and intermediate products, by-products, final products, and waste products. Material handling activities include, but are not limited to: the storage, loading and unloading, transportation, disposal, or conveyance of any raw material, intermediate product, final product or waste product. For structures located in areas of industrial activity, you must be aware that the structures themselves are potential sources of pollutants. This could occur, for example, when metals such as aluminum or copper are leached from the structures as a result of acid rain.

For each area identified, the description must include:

6.2.3.1 **Activities in the Area.** A list of the industrial activities exposed to stormwater (e.g., material storage; equipment fueling, maintenance, and cleaning; cutting steel beams).

6.2.3.2 **Pollutants.** A list of the pollutant(s) or pollutant constituents (e.g., crankcase oil, zinc, sulfuric acid, cleaning solvents) associated with each identified activity, which could be exposed to rainfall or snowmelt and could be discharged from your facility. The pollutant list must include all significant materials that have been handled, treated, stored or disposed, and that have been exposed to stormwater in the three years prior to the date you prepare or amend your SWPPP.

6.2.3.3 **Spills and Leaks.** You must document where potential spills and leaks could occur that could contribute pollutants to stormwater discharges, and the corresponding discharge point(s) that would be affected by such spills and leaks. You must document all significant spills and leaks of oil or toxic or hazardous substances that actually occurred at exposed areas, or that drained to a stormwater conveyance, in the three years prior to the date you prepare or amend your SWPPP.

Note: Significant spills and leaks include, but are not limited to, releases of oil or hazardous substances in excess of quantities that are reportable under CWA section 311 (see 40 CFR 110.6 and 40 CFR 117.21) or section 102 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 USC § 9602. This permit does not relieve you of the reporting requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302 relating to spills or other releases of oils or hazardous substances.

6.2.3.4 **Unauthorized Non-Stormwater Discharges Evaluation.** By the end of the first year of your permit coverage under this permit, you must inspect and document all discharge points at your facility as part of the SWPPP. If it is infeasible to complete the evaluation within the first year of permit coverage, you must document in your SWPPP why this is the case and identify the schedule by which you expect to complete the evaluation. Documentation of your evaluation must include:

a. The date of the evaluation;

b. A description of the evaluation criteria used;

c. A list of the discharge points or onsite drainage points that were directly observed during the evaluation; and

d. If there are any unauthorized non-stormwater discharges (see Part 1.2.2 for the exclusive list of authorized non-stormwater discharges under this permit) you must immediately take action(s), such as implementing control measures, to eliminate those discharges or seek an individual NPDES wastewater permit and document that you obtained the permit (for example, a floor drain was sealed, a sink drain was re-routed to sanitary, or an NPDES permit application was submitted for an unauthorized cooling water discharge).

e. An explanation of everything you did to immediately eliminate the unauthorized discharge per Part 5 Corrective Actions.

6.2.3.5 **Salt Storage.** You must document the location of any storage piles containing salt used for deicing or other commercial or industrial purposes.

6.2.3.6 **Sampling Data.** Existing permitted facilities must summarize all stormwater discharge sampling data collected at the facility during the previous permit term. The summary shall include a narrative description (and may include data tables/figures) that adequately summarizes the collected sampling data tosupport identification of potential pollution sources at your facility. New dischargers and new sources must provide a summary of any available stormwater data they may have.

6.2.4 **Description of Stormwater Control Measures to Meet Technology-Based and Water Quality-Based Effluent Limits.** You must document the location and type of stormwater control measures you have specifically chosen and/or designed to comply with:

6.2.4.1 Part 2.1.2: Non-numeric technology-based effluent limits;

6.2.4.2 Parts 2.1.3 and 8: Applicable numeric effluent limitations guidelines-based limits;

6.2.4.3 Part 2.2: Water quality-based effluent limits;

6.2.4.4 Part 2.3: Any additional measures that formed the basis of eligibility regarding Endangered Species Act-listed threatened and endangered species or their critical habitat, National Historic Preservation Act historic properties, and/orfederal CERCLA Site requirements;

6.2.4.5 Parts 8 and 9: Applicable effluent limits;

6.2.4.6 Regarding your control measures, you must also document, as appropriate:

a. How you addressed the selection and design considerations in Part 2.1.1;

b. How they address the pollutant sources identified in Part 6.2.3.

Effluent limit requirements in Part 2.1.2 that do not involve the site-specific selection of a stormwater control measure or are specific activity requirements (e.g., "cleaning catch basins when the depth of debris reaches two-thirds (2/3) of the sump depth, or in line with manufacturer specifications, whichever is lower, and keeping the debris surface at least six inches below the lowest outlet pipe") are marked with an asterisk (*). For the requirements marked with an asterisk, you may include extra information, or you may just "copy-and-paste" these effluent limits word-for-word into your SWPPP without providing additional documentation.

6.2.5 **Schedules and Procedures**

6.2.5.1 **Pertaining to Stormwater Control Measures Used to Comply with the Effluent Limits in Part 2**. You must document the following in your SWPPP:

a. **Good Housekeeping (see Part 2.1.2.2)** – A schedule or the convention used for determining when pickup and disposal of waste materials occurs. Also provide a schedule for routine inspections for leaks and conditions of drums, tanks and containers.

b. **Maintenance (see Part 2.1.2.3)** – Preventative maintenance procedures, including regular inspections, testing, maintenance and repair of all stormwater control measures to avoid situations that may result in leaks, spills, and other releases, and any back-up practices in place should a storm event resulting in a stormwater discharge occur while a control measure is off-line. The SWPPP shall include the schedule or frequency for maintaining all control measures used to comply with the effluent limits in Part 2;

c. **Spill Prevention and Response Procedures (see Part 2.1.2.4**) – Procedures for preventing and responding to spills and leaks, including notification procedures. For preventing spills, include in your SWPPP the stormwater control measures for material handling and storage, and the procedures for preventing spills that can contaminate stormwater. Also specify cleanup equipment, procedures and spill logs, as appropriate, in the event of spills. You may reference the existence of other plans for Spill Prevention, Control and Countermeasure (SPCC) developed for the facility under section 311 of the CWA or BMP programs otherwise required by an NPDES permit for the facility, provided that you keep a copy of that other plan onsite and make it available for review consistent with Part 6.4;

d. **Erosion and Sediment Controls (see Part 2.1.2.5)** – If you use polymers and/or other chemical treatments as part of your erosion and sediment controls, you must identify the polymers and/or chemicals used and the purpose;

e. **Employee Training (see Part 2.1.2.8)** – The elements of your employee training plan shall include all, but not necessarily limited to, the requirements set forth in Part 2.1.2.8, and also the following:

ii. The content of the training;

iii. The frequency/schedule of training for employees who work in areas where industrial materials or activities are exposed to stormwater, or who are responsible for implementing activities necessary to meet the conditions of this permit;

iv. A log of the dates on which specific employees received training.

6.2.5.2 **Pertaining to Inspections and Assessments.** You must document in your SWPPP your procedures for performing, as appropriate, the types of inspections specified by this permit, including:

a. Routine facility inspections (see Part 3.1) and;

b. Quarterly visual assessment of stormwater discharges (see Part 3.2).

For each type of inspection performed, your SWPPP must identify:

a. Person(s) or positions of person(s) responsible for the inspection;

b. Schedules for conducting inspections, including tentative schedule for facilities in climates with irregular stormwater discharges (see Part 3.2.4);

c. Specific items to be covered by the inspection, including schedules for specific discharge points.

If you are invoking the exception for inactive and unstaffed facilities relating to routine facility inspections and quarterly visual assessments, you must include in your SWPPP the information to support this claim as required by Parts 3.1.5 and 3.2.4.

6.2.5.3 **Pertaining to Monitoring**

a. **Procedures for Each Type of Monitoring.** You must document in your SWPPP procedures for conducting the six types of analytical stormwater discharge monitoring specified by this permit, where applicable to your facility, including:

i. Indicator monitoring (Part 4.2.1);

ii. Benchmark monitoring (Part 4.2.2);

iii. Effluent limitations guidelines monitoring (Part 4.2.3);

iv. State- or tribal-specific monitoring (Part 4.2.4);

v. Impaired waters monitoring (Part 4.2.5);

vi. Other monitoring as required by EPA (Part 4.2.6).

b. **Documentation for Each Type of Monitoring.** For each type of stormwater discharge monitoring, you must document in your SWPPP:

i. Locations where samples are collected, including any determination that two or more discharge points are substantially identical;

ii. Parameters for sampling and the frequency of sampling for each parameter;

iii. Schedules for monitoring at your facility, including schedule for alternate monitoring periods for climates with irregular stormwater discharges (see Part 4.1.6);

iv. Any numeric control values (benchmark thresholds, effluent limitations guidelines, TMDL-related requirements, or other requirements) applicable to stormwater discharges from each discharge point;

v. Procedures (e.g., responsible staff, logistics, laboratory to be used) for gathering storm event data, as specified in Part 4.1.

c. **Exception for Inactive and Unstaffed Facilities**. If you are invoking the exception for inactive and unstaffed facilities for indicator monitoring, benchmark monitoring or impaired waters monitoring, you must include in your SWPPP the information to support this claim as required by Part 4.2.2.5 and 4.2.5.2.

d. **Exception for Substantially Identical Discharge Points (SIDP).** You must document the following in your SWPPP if you plan to use the SIDP exception for your quarterly visual assessment requirements in Part 3.2.4 or your indicator, benchmark, or impaired waters monitoring requirements in Parts 4.2.1, 4.2.2, and 4.2.5, respectively (see also Part 4.1.1):

i. Location of each SIDP;

ii. Description of the general industrial activities conducted in the drainage area of each discharge point;

iii. Description of the control measures implemented in the drainage area of each discharge point;

iv. Description of the exposed materials located in the drainage area of each discharge point that are likely to be significant contributors of pollutants via stormwater discharges;

v. An estimate of the runoff coefficient of the drainage areas (low = under 40%; medium = 40 to 65%; high = above 65%);

vi. Why the discharge points are expected to discharge substantially identical effluents.

6.2.6 **Documentation to Support Eligibility Pertaining to Other Federal Laws**

6.2.6.1 **Documentation Regarding Endangered Species Act-Listed Threatened and Endangered Species and Critical Habitat Protection.** You must keep with your SWPPP the documentation supporting your determination with regard to Part 1.1.4.

6.2.6.2 **Documentation Regarding National Historic Preservation Act Historic Properties.** You must keep with your SWPPP the documentation supporting your determination with regard to Part 1.1.5.

6.2.7 **Signature Requirements.** You must sign and date your SWPPP in accordance with Appendix B, Subsection 11.

6.3 Required SWPPP Modifications

You must modify your SWPPP based on any corrective actions and deadlines required under Part 5. You must sign and date any SWPPP modifications in accordance with Appendix B, Subsection 11.

6.4 SWPPP Availability

You must retain a complete copy of your current SWPPP required by this permit at the facility in any accessible format. A complete SWPPP includes any documents incorporated by reference and all documentation supporting your permit eligibility pursuant to Part 1.1 of this permit, as well as your signed and dated certification page. Regardless of the format, the SWPPP must be immediately available to facility employees, EPA, a state or tribe, the operator of an MS4 into which you discharge, and representatives of the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) at the time of an on-site inspection.

Your current SWPPP or certain information from your current SWPPP described below must also be made available to the public (except any confidential business information (CBI) or restricted information [as defined in Appendix A]), but you must clearly identify those portions of the SWPPP that are being withheld from public access; to do so, you must comply with one of the following two options:

6.4.1 Making Your SWPPP Publicly Available

You have three options to comply with the public availability requirements for the SWPPP: attaching your SWPPP to your NOI; providing a URL of your SWPPP in your NOI; or providing SWPPP information in your NOI. To remain current for all three options, you must update your SWPPP (by updating the attachment per Part 6.4.1.1 via a Change NOI, updating your webpage per Part 6.4.1.2, or updating the SWPPP information in the NOI per Part 6.4.1.3 via a Change NOI no later than 45 days after conducting the final routine facility inspection for the year required in Part 3.1. You may switch your preferred option throughout your permit coverage, but you must update your NOI as necessary to indicate your change in option. You are not required to post any CBI or restricted information (as defined in Appendix A) (such information may be redacted), but you must clearly identify those portions of the SWPPP that are being withheld from public access. CBI may not be withheld from those staff cleared for CBI review within EPA, USFWS or NMFS.

6.4.1.1 Attaching Your SWPPP to your NOI: You may attach a copy of your SWPP, and any SWPPP modifications, records, and other reporting elements that must be kept with your SWPPP, to your NOI in NeT-MSGP.

6.4.1.2 Providing a URL of your SWPPP in your NOI: You may provide a URL in your NOI in NeT-MSGP where your SWPPP can be found, and maintain your current SWPPP at this URL. You must post any SWPPP modifications, records, and other reporting elements that must be kept with your SWPPP required for the previous year at the same URL as the main body of the SWPPP.

6.4.1.3 Providing SWPPP Information in your NOI. You may include the following information in your NOI in NeT-MSGP. Irrespective of this requirement, EPA may provide access to portions of your SWPPP to a member of the public upon request (except any CBI or restricted information (as defined in Appendix A)).

a. Onsite industrial activities exposed to stormwater, including potential spill and leak areas (see Parts 6.2.3.1, 6.2.3.3 and 6.2.3.5);

b. Pollutants or pollutant constituents associated with each industrial activity exposed to stormwater that could be discharged in stormwater and/or any authorized non-stormwater discharges listed in Part 1.2.2 (see Part 6.2.3.2);

c. Stormwater control measures you employ to comply with the non-numeric technology-based effluent limits required in Part 2.1.2 and Part 8, and any other measures taken to comply with the requirements in Part 2.2 Water Quality-Based Effluent Limitations (see Part 6.2.4). If you use polymers and/or other chemical treatments as part of your erosion and sediment controls, you must identify the polymers and/or chemicals used and the purpose; and

d. Schedule for good housekeeping and maintenance (see Part 6.2.5.1) and schedule for all inspections required in Part 3 (see Part 6.2.5.2).

6.5 Additional Documentation Requirements

You are required to keep the following inspection, monitoring, and certification records with your SWPPP that together keep your records complete and up-to-date, and demonstrate your full compliance with the conditions of this permit:

6.5.1 A copy of the NOI submitted to EPA along with any correspondence exchanged between you and EPA specific to coverage under this permit;

6.5.2 A copy of the authorization email you receive from the EPA assigning your NPDES ID;

6.5.3 A copy of this permit (either a hard copy or an electronic copy easily available to SWPPP personnel);

6.5.4 Documentation of any maintenance and repairs of stormwater control measures, including the date(s) of regular maintenance, date(s) of discovery of areas in need of repair/replacement, and for repairs, date(s) that the control measure(s) returned to full function, and the justification for any extended maintenance/repair schedules (see Part 2.1.2.3);

6.5.5 All inspection reports, including the Routine Facility Inspection Reports (see Part 3.1.6) and Visual Assessment Documentation (see Part 3.2.3);

6.5.6 Description of any deviations from the schedule for visual assessments and/or monitoring, and the reason for the deviations (e.g., adverse weather or it was impracticable to collect samples within the first 30 minutes of a measurable storm event) (see Parts 3.2.4 and 4.1.5);

6.5.7 Corrective action documentation required per Part 5.1;

6.5.8 Documentation of any benchmark threshold exceedances, which AIM Level triggering event the exceedance caused, and AIM response you employed per Part 5.2, including:

6.5.8.1 The AIM triggering event;

6.5.8.2 The AIM response taken;

6.5.8.3 Any rationale that SWPPP/SCM changes were unnecessary;

6.5.8.4 Any documentation required to meet any AIM exception per Part 5.2.6.

6.5.9 Documentation to support any determination that pollutants of concern are not expected to be present above natural background levels if you discharge directly to impaired waters, and that such pollutants were not detected in your discharge after three years or were solely attributable to natural background sources (see Part 4.2.5.1); and

6.5.10 Documentation to support your claim that your facility has changed its status from active to inactive and unstaffed with respect to the requirements to conduct routine facility inspections (see Part 3.1.5), quarterly visual assessments (see Part 3.2.4.4), benchmark monitoring (see Part 4.2.2.4), and/or impaired waters monitoring (see Part 4.2.5.2).

7. Reporting and Recordkeeping

7.1 Electronic Reporting Requirement

You must submit all NOIs, NOTs, NECs, Annual Reports, Discharge Monitoring Reports (DMRs), and other reporting information as appropriate electronically, unless the EPA Regional Office grants you a waiver based on one of the following conditions:

- If your headquarters is physically located in a geographic area (i.e., zip code or census tract) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission; or
- If you have limitations regarding available computer access or computer capability.

Waivers are only granted for a one-time use for a single information submittal, e.g., an initial waiver for an NOI does not apply for the entire term of the permit for other forms. If you need to submit information on paper after your first waiver, you must apply for a new waiver. The EPA Regional Office may extend a wavier on a case-by-case basis.

If you wish to obtain a waiver from submitting a report electronically, you must submit a request to the applicable EPA Regional Office, found in Part 7.9. In that request you must document which exemption you meet, provide evidence supporting any claims, and a copy of your completed paper form. A waiver may only be considered granted once you receive written confirmation from EPA or its authorized representative.

7.2 Submitting Information to EPA

7.2.1 **Submitting Forms via NeT-MSGP.** You must submit all required information via EPA's electronic NPDES eReporting tool (NeT), unless the permit states otherwise or unless you have been granted a waiver per Part 7.1. You can both prepare and submit required information in NeT-MSGP using specific forms, also found in the permit's appendices. To access NeT-MSGP, go to https://cdxnodengn.epa.gov/net-msgp/action/login.

Information you must submit to EPA via NeT-MSGP:

- Notice of Intent (NOI) (Part 1.3);
- Change Notice of Intent (NOI) (Part 1.3.4);

- No Exposure Certification (NEC) (Part 1.5);
- Notice of Termination (NOT) (Part 1.4); and
- Annual Report (AR) (Part 7.4).

Note: You must submit Discharge Monitoring Reports (see Part 7.3) electronically using Net-DMR.

If the applicable EPA Regional Office grants you a waiver from electronic reporting, you must use the required forms found in the Appendices.

7.2.2 **Other Information Required to be Submitted.** Information required to be submitted to the applicable EPA Regional Office at the address in Part 7.8:

- New Dischargers and New Sources to Water Quality-Impaired Waters (Part 1.1.6.2);
- Exceedance Report for Numeric Effluent Limitations (Part 7.5); and
- Additional Reporting (Part 7.6)

7.3 **Reporting Monitoring Data to EPA**

7.3.1 **Submitting Monitoring Data via NeT-DMR.** You must submit all stormwater discharge monitoring data collected pursuant to Part 4 to EPA using Net-DMR, EPA's electronic DMR system (for more information visit: https://www.epa.gov/compliance/npdes-ereporting (unless the applicable EPA Regional Office grants you a waiver from electronic reporting, in which case you may submit a paper DMR form) no later than 30 days after you have received your complete laboratory results for all monitoring discharge points for the reporting period. Your monitoring requirements (i.e., parameters required to be monitored and sample frequency) will be prepopulated on your electronic Discharge Monitoring Report (DMR) form based on the information you reported on your NOI form through the NeT-MSGP. Accordingly, you must certify the following changes to your monitoring frequency to EPA by submitting a Change NOI in NeT-MSGP, unless EPA has completed the development of planned features in the electronic systems to process submitted monitoring results to automatically turn monitoring on/off as applicable, which will trigger changes to your monitoring requirements in Net-DMR:

7.3.1.1 All benchmark monitoring requirements have been fulfilled for the permit term;

7.3.1.2 All impaired waters monitoring requirements have been fulfilled for the permit term;

7.3.1.3 Benchmark monitoring requirements no longer apply because the EPA Regional Office has concurred with your assessment that run-on from a neighboring source is the cause of the exceedance;

7.3.1.4 Benchmark and/or impaired monitoring requirements no longer apply because your facility is inactive and unstaffed;

7.3.1.5 Benchmark and/or impaired monitoring requirements now apply because your facility has changed from inactive and unstaffed to active and staffed;

7.3.1.6 For Sector G2 only: Discharges from waste rock and overburden piles have exceeded benchmark thresholds;

7.3.1.7 A numeric effluent limitation guideline has been exceeded;

7.3.1.8 A numeric effluent limitation guideline exceedance is back in compliance.

7.3.2 **When You Can Discontinue Submission of Monitoring Data.** Once you have completely fulfilled applicable monitoring requirements, you are no longer required to report monitoring results using Net-DMR. If you have only partially fulfilled your benchmark monitoring and/or impaired waters monitoring requirements (e.g., your four quarterly average is below the benchmark for some, but not all, parameters; you did not detect some, but not all, impairment pollutants), you must continue to report your results in Net-DMR for the remaining monitoring requirements. If the EPA Regional Office grants you a waiver per Part 7.1, you must submit paper reporting forms by the same deadline.

7.3.3 **State or Tribal Required Monitoring Data.** See Part 9 for specific reporting requirements applicable to individual states or tribes.

7.3.4 **Submission Deadline for Indicator and Benchmark Monitoring Data.** For both indicator and benchmark monitoring, you are required to submit sampling results to EPA no later than 30 days after receiving your complete laboratory results for all monitored discharge points for each monitoring period that you are required to collect samples, per Part 4.2.1. and Part 4.2.2. If you collect samples during multiple storm events in a single quarter (e.g., due to adverse weather conditions, climates with irregular stormwater discharges, or areas subject to snow), you are required to submit all sampling results for each storm event to EPA within 30 days of receiving all laboratory results for the event. Or, for any of your monitored discharge points that did not have a discharge within the reporting period, using Net-DMR, you must report that no discharges occurred for that discharge point no later than 30 days after the end of the reporting period.

7.4 Annual Report

You must submit an Annual Report to EPA via NeT-MSGP, per Part 7.2, by January 30th for each year of permit coverage containing information generated from the past calendar year. You must include the following information in the Annual Report:

7.4.1 A summary of your past year's routine facility inspection documentation required (Part 3.1.6). In addition, if you are an operator of an airport facility (Sector S) that is subject to the airport effluent limitations guidelines and are complying with the Part 8.S.8.1 effluent limitation through the use of non-urea-containing deicers, provide a statement certifying that you do not use pavement deicers containing urea. (Note: Operators of airport facilities that are complying with Part 8.S.8.1 by meeting the numeric effluent limitation for ammonia do not need to include thisstatement.)

7.4.2 A summary of your past year's visual assessment documentation (see Part 3.2.3);

7.4.3 A summary of your past year's corrective action and any required AIM documentation (see Part 5.3). If you have not completed required corrective action or AIM responses at the time you submit your annual report, you must describe the status of any outstanding corrective action(s) or AIM responses. Also describe any incidents of noncompliance in the past year or currently ongoing, or if none, provide a statement that you are in compliance with the permit.

Your Annual Report must also include a statement, signed and certified in accordance with Appendix B, Subsection 11.

7.5 Numeric Effluent Limitations Exceedance Report

If follow-up monitoring per Part 4.2.3.3 exceeds a numeric effluent limit, you must submit an Exceedance Report to EPA no later than 30 days after you have received your laboratory results. Send the Exceedance Report to the applicable EPA Regional Office listed in Part 7.8, and report the monitoring data through Net-DMR. Your report must include the following:

7.5.1 NPDES ID;

7.5.2 Facility name, physical address and location;

7.5.3 Name of receiving water;

7.5.4 Monitoring data from this and the preceding monitoring event(s);

7.5.5 An explanation of the situation, including what you have done and intend to do (should your corrective actions not yet be complete) to correct the violation;

7.5.6 An appropriate contact name and phone number.

7.6 Additional Standard Recordkeeping and Reporting Requirements

In addition to the reporting requirements stipulated in Part 7, you are also subject to the standard permit reporting provisions of Appendix B, Subsection 12. You must submit the following reports to the applicable EPA Regional Office listed in Part 7.8, as applicable. If you discharge through an MS4, you must also submit these reports to the MS4 operator (identified pursuant to Part 6.2.2).

7.6.1 24-hour reporting (see Appendix B, Subsection 12.F) – You must report any noncompliance which may endanger health or the environment. Any information must be provided orally within 24 hours from the time you become aware of the circumstances;

7.6.2 5-day follow-up reporting to the 24-hour reporting (see Appendix B, Subsection 12.F) – A written submission must also be provided within five days of the time you become aware of the circumstances;

7.6.3 Reportable quantity spills (see Part 2.1.2.4) – You must provide notification, as required under Part 2.1.2.4, as soon as you have knowledge of a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity;

7.6.4 Planned changes (see Appendix B, Subsection 12.A) – You must give notice to EPA promptly, no fewer than 30 days prior to making any planned physical alterations or additions to the permitted facility that qualify the facility as a new source or that could significantly change the nature or significantly increase the quantity of pollutants discharged;

7.6.5 Anticipated noncompliance (see Appendix B, Subsection 12.B) – You must give advance notice to EPA of any planned changes in the permitted facility or activity which you anticipate will result in noncompliance with permit requirements;

7.6.6 Compliance schedules (see Appendix B, Subsection 12.F) – Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date;

7.6.7 Other noncompliance (see Appendix B, Subsection 12.G) – You must report all instances of noncompliance not reported in your Annual Report, compliance schedule report, or 24-hour report at the time monitoring reports are submitted; and

7.6.8 Other information (see Appendix B, Subsection 12.H) – You must promptly submit facts or information if you become aware that you failed to submit relevant facts in your NOI, or that you submitted incorrect information in your NOI or in any report.

7.7 Record Retention Requirements

You must retain copies of your SWPPP (including any modifications made during the term of this permit), additional documentation requirements pursuant to Part 6.5 (including documentation related to any corrective actions or AIM responses taken pursuant to Part 5), all reports and certifications required by this permit, monitoring data, and records of all data used to complete the NOI to be covered by this permit, for a period of at least three years from the date that your coverage under this permit expires or is terminated.

7.8 Addresses for Reports

Permit Part	EPA Region	Areas Covered	Address
7.8.1	1	Connecticut Massachusetts New Hampshire Rhode Island Vermont	U.S. EPA Region 1 Water Division Stormwater and Construction Permits Section 5 Post Office Square, Ste. 100 (06-1) Boston, MA 02109-3912
7.8.2	2	New Jersey New York	U.S. EPA Region 2 NPDES Stormwater Program 290 Broadway, 24th Floor New York, NY 10007-1866
		Puerto Rico Virgin Islands	U.S. EPA Region 2 Caribbean Environmental Protection Division NPDES Stormwater Program City View Plaza II – Suite 7000 48 Rd. 165 Km 1.2 Guaynabo, PR 00968-8069
7.8.3	3	Delaware District of Columbia Maryland Pennsylvania Virginia West Virginia	U.S. EPA Region 3 NPDES Permits Section, MC 3WD41 1650 Arch Street Philadelphia, PA 19103
7.8.4	4	Alabama Florida Georgia Kentucky Mississippi North Carolina	U.S. EPA Region 4 Water Division NPDES Stormwater Program Atlanta Federal Center 61 Forsyth Street SW Atlanta, GA 30303-3104

Permit Part	EPA Region	Areas Covered	Address
		South Carolina Tennessee	
7.8.5	5	Illinois Indiana Michigan Minnesota Ohio Wisconsin	U.S. EPA Region 5 NPDES Program Branch 77 W. Jackson Blvd. MC WP16J Chicago, IL 60604-3507
7.8.6	6	Arkansas Louisiana Oklahoma Texas New Mexico (except see Region 9 for Navajo lands, and see Region 8 for Ute Mountain Reservation lands)	U.S. EPA Region 6 Permitting Section (WD-PE) 1201 Elm Street, Suite 500 Dallas, TX 75270
7.8.7	7	Iowa Kansas Missouri Nebraska	U.S. EPA Region 7 NPDES Stormwater Program 11201 Renner Blvd Lenexa, KS 66219
7.8.8	8	Colorado Montana North Dakota South Dakota Wyoming Utah (except see Region 9 for Goshute Reservation and Navajo Reservation lands) The Ute Mountain Reservation in New Mexico The Pine Ridge Reservation in Nebraska	EPA Region 8 Storm Water Program MC: 8P-W-WW 1595 Wynkoop Street Denver, CO 80202-1129

Permit Part	EPA Region	Areas Covered	Address
7.8.9	9	Arizona California Hawaii Nevada Guam American Samoa The Commonwealth of the Northern Mariana Islands The Goshute Reservation in Utah and Nevada The Navajo Reservation in Utah New Mexico, and Arizona The Duck Valley Reservation in Idaho Fort McDermitt Reservation in Oregon	U.S. EPA Region 9 Water Division NPDES Stormwater Program (WTR-2-3) 75 Hawthorne Street San Francisco, CA 94105-3901
7.8.10	10	Alaska Idaho Oregon (except see Region 9 for Fort McDermitt Reservation) Washington	U.S. EPA Region 10 Water Division NPDES Stormwater Program (19-C04) 1200 6th Avenue, Suite 155 Seattle, WA 98101-3188
7.8.11	State and Tribal Addresses		See Part 9 (states and tribes) for the addresses of applicable states or tribes that require submission of information to their agencies.

Part 8 – Sector-Specific Requirements for Industrial Activity

Subpart G – Sector G – Metal Mining

You must comply with Part 8 sector-specific requirements associated with your primary industrial activity and any co-located industrial activities, as defined in Appendix A. The sector- specific requirements apply to those areas of your facility where those sector-specific activities occur. These sector-specific requirements are in addition to any requirements specified elsewhere in this permit.

Note: Where compliance with a requirement in a separate exploration permit, mining permit, reclamation plan, Surface Mining Control and Reclamation Act (SMCRA) requirements, etc. will result in you fully meeting any requirement in this Subpart, you are considered to have complied with the relevant requirement in this Subpart. You must include documentation in your SWPPP describing your rationale for concluding that any particular action on your part is sufficient to comply with the corresponding requirement in this Subpart.

8.G.1 Covered Stormwater Discharges

The requirements in Subpart G apply to stormwater discharges associated with industrial activity from Metal Mining facilities, including mines abandoned on Federal lands, as identified by the SIC Codes specified under Sector G in Table D-1 of Appendix D. Coverage is required for metal mining facilities that discharge stormwater contaminated by contact with, or that has come into contact with, any overburden, raw material, intermediate product, finished product, byproduct, or waste product located on the site of the operation.

8.G.1.1 ***Covered Discharges from Inactive Facilities.*** All stormwater discharges.

8.G.1.2 ***Covered Discharges from Active and Temporarily Inactive Facilities.*** Only the stormwater discharges from the following areas are covered:

- Waste rock and overburden piles if composed entirely of stormwater and not combined with mine drainage;
- Topsoil piles;
- Offsite haul and access roads;
- Onsite haul and access roads constructed of waste rock, overburden or spent ore if composed entirely of stormwater and not combining with mine drainage;
- Onsite haul and access roads not constructed of waste rock, overburden or spent ore except if mine drainage is used for dust control;
- Discharges from tailings dams or dikes when not constructed of waste rock or tailings and no process fluids are present;
- Discharges from tailings dams or dikes when constructed of waste rock or tailings and no process fluids are present, if composed entirely of stormwater and not combining with mine drainage;
- Concentration building if no contact with material piles;
- Mill site if no contact with material piles;
- Office or administrative building and housing if mixed with stormwater from industrial area;
- Chemical storage area;

- Docking facility if no excessive contact with waste product that would otherwise constitute mine drainage;
- Explosive storage;
- Fuel storage;
- Vehicle and equipment maintenance area and building;
- Parking areas (if necessary);
- Power plant;
- Truck wash areas if no excessive contact with waste product that would otherwise constitute mine drainage;
- Unreclaimed, disturbed areas outside of active mining area;
- Reclaimed areas released from reclamation requirements prior to December 17, 1990;
- Partially or inadequately reclaimed areas or areas not released from reclamation requirements.

8.G.1.3 ***Covered Discharges from Earth-Disturbing Activities Conducted Prior to Active Mining Activities.*** All stormwater discharges.

8.G.1.4 ***Covered Discharges from Facilities Undergoing Reclamation.*** All stormwater discharges.

8.G.2 **Limitations on Coverage**

8.G.2.1 ***Prohibition of Stormwater Discharges.*** Stormwater discharges not authorized by this permit: discharges from active metal mining facilities that are subject to effluent limitation guidelines for the Ore Mining and Dressing Point Source Category (40 CFR Part 440).

Note: Stormwater discharges from these sources are subject to 40 CFR Part 440 if they are mixed with other discharges subject to Part 440. In this case, they are not eligible for coverage under this permit. Discharges from overburden/waste rock and overburden/waste rock-related areas are not subject to 40 CFR Part 440 unless they: drain naturally (or are intentionally diverted) to a point source; and (2) combine with "mine drainage" that is otherwise regulated under the Part 440 regulations. For such sources, coverage under this permit would be available if the discharge composed entirely of stormwater does not combine with other sources of mine drainage that are not subject to 40 CFR Part 440, and meets the other eligibility criteria contained in Part 1.1 of the permit. Operators bear the initial responsibility for determining if they are eligible for coverage under this permit, or must seek coverage under another NPDES permit. EPA recommends that operators contact the relevant NPDES permit issuance authority for assistance to determine the nature and scope of the "active mining area" on a mine-by-mine basis, as well as to determine the appropriate permitting mechanism for authorizing such discharges.

8.G.2.2 ***Prohibition of Non-Stormwater Discharges.*** Not authorized by this permit: adit drainage, and contaminated springs or seeps discharging from waste rock dumps that do not directly result from precipitation events (see also the standard Limitations on Coverage in Part 1.1.3). (EPA includes these prohibited non-stormwater discharges here solely as a helpful reminder to the operator that the only non-stormwater discharges authorized by this permit are at Part 1.2.2)

8.G.3 Definitions

The following definitions are not intended to supersede the definitions of active and inactive mining facilities established by 40 CFR 122.26(b)(14)(iii).

8.G.3.1 ***Mining operations.*** For this permit, mining operations are grouped into two distinct categories, with distinct effluent limits and requirements applicable to each: a) earth-disturbing activities conducted prior to active mining activities); and b) active mining activities, which includes reclamation. "Mining operations" can occur at both inactive mining facilities and temporarily inactive mining facilities.

8.G.3.2 ***Earth-disturbing activities conducted prior to active mining activities.*** Consists of two classes of earth-disturbing (i.e., clearing, grading and excavation) activities:

- **a.** activities performed for purposes of mine site preparation, including: cutting new rights of way (except when related to access road construction); providing access to a mine site for vehicles and equipment (except when related to access road construction); other earth disturbances associated with site preparation activities on any areas where active mining activities have not yet commenced (e.g., for heap leach pads, waste rock facilities, tailings impoundments, wastewater treatment plants); and
- **b.** construction of staging areas to prepare for erecting structures such as to house project personnel and equipment, mill buildings, etc., and construction of access roads. Earth-disturbing activities associated with the construction of staging areas and the construction of access roads conducted prior to active mining are considered to be "construction" and have additional effluent limits in Part 8.G.4.2.

8.G.3.3 ***Active mining activities.*** Activities related to the extraction, removal or recovery, and benefication of metal ore from the earth; removal of overburden and waste rock to expose mineable minerals; and site reclamation and closure activities. All such activities occur within the "active mining area." Reclamation involves activities undertaken, in compliance with applicable mined land reclamation requirements, to return the land to an appropriate post-mining contour and land use in order to meet applicable federal and state reclamation requirements. In addition, once earth-disturbing activities conducted prior to active mining activities have ceased and all related requirements in Part 8.G.4 have been met, and a well-delineated "active mining area" has been established, all activities (including any clearing, grading, and excavation) that occur within the active mining area are "active mining activities."

8.G.3.4 ***Active mining area.*** A place where work or other activity related to the extraction, removal or recovery of metal ore is being conducted, except, with respect to surface mines, any area of land on or in which grading has been completed to return the earth to desired contour and reclamation work has begun.

Note: Earth-disturbing activities described in the definition in Part 8.G.3.2 that occur on areas outside the active mining area (e.g., for expansion of the mine into undeveloped territory) are considered "earth-disturbing conducted prior to active mining activities", and must comply with the requirements in Part 8.G.4.

8.G.3.5 ***Inactive metal mining facility.*** A site or portion of a site where metal mining and/or milling occurred in the past but there are no active mining activities occurring as defined above, and where the inactive portion is not covered by an active mining permit issued by the applicable state or federal agency. An inactive metal mining facility has an identifiable owner / operator. Sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined materials and sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim are not considered either active or inactive mining facilities and do not require an NPDES industrial stormwater permit.

8.G.3.6 ***Temporarily inactive metal mining facility.*** A site or portion of a site where metal mining and/or milling occurred in the past but currently are not being actively undertaken, and the facility is covered by an active mining permit issued by the applicable state or federal agency.

8.G.4 Requirements Applicable to Earth-Disturbing Activities Conducted Prior to Active Mining Activities

Stormwater discharges from earth-disturbing activities conducted prior to active mining activities (defined in Part 8.G.3.2) are covered under this permit. For such earth-disturbing activities, you must comply with all applicable requirements in Parts 1-9 of the MSGP except for the technology-based effluent limits in Part 8.G.5 and Part 2.1.2, the inspection requirements in Part 8.G.7 and Part 3, and the monitoring requirements in Part 8.G.8 and Part 4.

Authorized discharges from areas where earth-disturbing activities have ceased and stabilization as specified in Part 8.G.4.1.9 or 8.G.4.2.11, where appropriate, has been completed (stabilization is not required for areas where active mining activities will occur), are no longer subject to the Part 8.G.4 requirements. At such time, authorized discharges become subject to all other applicable requirements in the MSGP, including the effluent limits in Parts 2.1.2 and 8.G.5, the inspection requirements in Parts 3 and 8.G.7, and the monitoring requirements in Parts 4 and 8.G.8.

8.G.4.1 ***Technology-Based Effluent Limits Applicable to All Earth-Disturbing Activities Conducted Prior to Active Mining Activities.*** The following technology-based effluent limits apply to authorized discharges from all earth-disturbing activities conducted prior to active mining activities defined in Part 8.G.3.2(a) and 8.G.3.2(b). These limits supersede the technology-based limits listed in Part 2.1.2 and Part 8.G.5 of the MSGP.

8.G.4.1.1 ***Erosion and sediment control installation requirements.***

- By the time construction activities commence, install and make operational downgradient sediment controls, unless this timeframe is infeasible. If infeasible you must install and make such controls operational as soon as practicable or as soon as site conditions permit.
- All other stormwater controls described in the SWPPP must be installed and made operational as soon as conditions on each portion of the site allows.

8.G.4.1.2 ***Erosion and sediment control maintenance requirements. You must:***

- Ensure that all erosion and sediment controls remain in effective operating condition.
- Wherever you determine that a stormwater control needs maintenance to continue operating effectively, initiate efforts to fix

the problem immediately after its discovery, and complete such work by the end of the next work day.

- When a stormwater control must be replaced or significantly repaired, complete the work within 7 days, unless infeasible. If 7 days is infeasible, you must complete the installation or repair as soon as practicable.

8.G.4.1.3 **Perimeter controls.** You must:

- Install sediment controls along those perimeter areas of your disturbed area that will receive stormwater, except where site conditions prevent the use of such controls (in which case, maximize their installation to the extent practicable).
- Remove sediment before it accumulates to one-half of the above-ground height of any perimeter control.

8.G.4.1.4 ***Sediment track-out.*** For construction vehicles and equipment exiting the site directly onto paved roads, you must:

- Use appropriate stabilization techniques to minimize sediment track-out from vehicles and equipment prior to exit;
- Use additional controls to remove sediment from vehicle and equipment tires prior to exit, where necessary;
- Remove sediment that is tracked out onto paved roads by end of the work day.

Note: EPA recognizes that some fine grains may remain visible on the surfaces of off-site streets, other paved areas, and sidewalks even after you have implemented sediment removal practices. Such “staining” is not a violation of Part 8.G.4.1.4.

8.G.4.1.5 ***Soil or sediment stockpiles.*** You must:

- Minimize erosion of stockpiles from stormwater and wind via temporary cover, if feasible.
- Prevent up-slope stormwater flows from causing erosion of stockpiles (e.g., by diverting flows around the stockpile).
- Minimize sediment from stormwater that runs off of stockpiles, using sediment controls (e.g., a sediment barrier or downslope sediment control).

8.G.4.1.6 ***Sediment basins.*** If you intend to install a sediment basin to treat stormwater from your earth-disturbing activities, you must:

- Provide storage for either (1) the 2-year, 24-hour storm, or (2) 3,600 cubic feet per acre drained.
- Prevent erosion of (1) basin embankments using stabilization controls (e.g., erosion control blankets), and (2) the inlet and outlet points of the basin using erosion controls and velocity dissipation devices.

8.G.4.1.7 **Minimize dust.** You must minimize the generation of dust through the appropriate application of water or other dust suppression techniques that minimize pollutants being discharged into surface waters.

8.G.4.1.8 ***Restrictions on use of treatment chemicals.*** If you intend to use sediment treatment chemicals at your site, you are subject to the following minimum requirements:

- Use conventional erosion and sediment controls prior to and after application of chemicals;
- Select chemicals suited to soil type, and expected turbidity, pH, flow rate;
- Minimize the discharge risk from stored chemicals;
- Comply with state/local requirements;
- Use chemicals in accordance with good engineering practices and specifications of chemical supplier;
- Ensure proper training;
- Provide proper SWPPP documentation.

If you plan to use cationic treatment chemicals (as defined in Appendix A), you are ineligible for coverage under this permit, unless you notify your applicable EPA Regional Office in advance and the EPA Regional Office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards.

8.G.4.1.9 ***Site stabilization requirements for earth-disturbing activities performed for purposes of mine site preparation as defined in 8.G.3.2(a) (i.e., not applicable to construction of staging areas for structures and access roads as defined in 8.G.3.2(b)).*** You must comply with the following stabilization requirements except where the intended function of the site accounts for such disturbed earth (e.g., the earth disturbances will become actively mined, or the controls implemented at the active mining area effectively control the disturbance) (although you are encouraged to do so within the active mining area, where appropriate):

- *Temporary stabilization of disturbed areas.* Stabilization measures must be initiated immediately in portions of the site where earth-disturbing activities performed for purposes of mine site preparation (as defined in 8.G.3.2(a)) have temporarily ceased, but in no case more than 14 days after such activities have temporarily ceased. In arid, semi-arid, and drought-stricken areas, or in areas subject to snow or freezing conditions, where initiating perennial vegetative stabilization measures is not possible within 14 days after earth-disturbing activities performed for purposes of mine site preparation has temporarily ceased, temporary vegetative stabilization measures must be initiated as soon as practicable. Until temporary vegetative stabilization is achieved, interim measures such as erosion control blankets with an appropriate seed base and tackifiers must be employed. In areas of the site where earth-disturbing activities performed for purposes of mine site preparation have permanently ceased prior to active mining, temporary stabilization measures must be implemented to minimize mobilization of sediment or other pollutants until active mining activities commence.
- *Final stabilization of disturbed areas.* Stabilization measures must be initiated immediately where earth-disturbing activities performed for purposes of mine site preparation (as defined in 8.G.3.2(a)) have permanently ceased, but in no case more than 14 days after the earth- disturbing activities have permanently ceased. In arid, semi-

arid, and drought-stricken areas, or in areas subject to snow or freezing conditions, where initiating perennial vegetative stabilization measures is not possible within 14 days after earth-disturbing activities have permanently ceased, final vegetative stabilization measures must be initiated as soon as possible. Until final stabilization is achieved, temporary stabilization measures, such as erosion control blankets with an appropriate seed base and tackifiers, must be used.

8.G.4.2 ***Additional Technology-Based Effluent Limits Applicable Only to the Construction of Staging Areas for Structures and Access Roads.*** The following technology-based effluent limits apply to authorized discharges from earth-disturbing activities associated with the construction of staging areas and the construction of access roads, as defined in Part 8.G.3.2(b). These limits supersede the technology-based limits listed in Part 2.1.2 and Part 8.G.5 of the MSGP. These limits do not apply to earth-disturbing activities performed for purposes of mine site preparation (as defined in 8.G.3.2(a)).

8.G.4.2.1 **Area of *disturbance*.** You must minimize the amount of soil exposed during construction activities.

8.G.4.2.2 ***Erosion and sediment control design requirements***. You must:

- Design, install and maintain effective erosion and sediment controls to minimize the discharge of pollutants from construction activities. Account for the following factors in designing your erosion and sediment controls:
  - The expected amount, frequency, intensity and duration of precipitation;
  - The nature of stormwater discharges and run-on at the site, including factors such as impervious surfaces, slopes and site drainage features;
  - The range of soil particle sizes expected to be present on the site.
- Direct discharges from your stormwater controls to vegetated areas of your site to increase sediment removal and maximize stormwater infiltration, including any natural buffers, unless infeasible. Use velocity dissipation devices if necessary to prevent erosion when directing stormwater to vegetated areas.
- If any stormwater flow becomes or will be channelized at your site, you must design erosion and sediment controls to control both peak flowrates and total stormwater volume to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.
- If you install stormwater conveyance channels, they must be designed to avoid unstabilized areas on the site and to reduce erosion, unless infeasible. In addition, you must minimize erosion of channels and their embankments, outlets, adjacent streambanks, slopes, and downstream waters during discharge conditions through the use of erosion controls and velocity dissipation devices within and along the length of any constructed stormwater conveyance channel, and at any outlet to provide a non-erosive flow velocity.

8.G.4.2.3 **Natural Buffers.** For any stormwater discharges from construction activities within 50 feet of a water of the U.S., you must comply with one of the following compliance alternatives:

1. Provide a 50-foot undisturbed natural buffer between construction activities and the water of the U.S.; or
2. Provide an undisturbed natural buffer that is less than 50 feet supplemented by additional erosion and sediment controls, which in combination, achieve a sediment load reduction that is equivalent to a 50-foot undisturbed natural buffer; or
3. If it is infeasible to provide an undisturbed natural buffer of any size, implement erosion and sediment controls that achieve a sediment load reduction that is equivalent to a 50-foot undisturbed natural buffer.

There are exceptions when buffer requirements do not apply:

- There is no stormwater discharge from construction disturbances to a water of the U.S;
- The natural buffer has already been eliminated by preexisting development disturbances;
- The disturbance is for the construction of a water-dependent structure or construction approved under a CWA section 404 permit;
- For linear construction projects, you are not required to comply with the requirements if there are site constraints provided that, to the extent feasible, you limit disturbances within 50 feet of a water of the U.S. and/or you provide supplemental erosion and sediment controls to treat stormwater discharges from any disturbances within 50 feet of a water of the U.S.

See EPA's industrial stormwater website under "Fact Sheets and Guidance" for information on complying with these alternatives: https://www.epa.gov/npdes/stormwater-discharges-industrial-activities.

8.G.4.2.4 **Soil *or sediment stockpiles***. In addition to the requirements in Part 8.G.4.1.5, you must locate any piles outside of any natural buffers established under Part 8.G.4.2.3.

8.G.4.2.5 ***Sediment basins***. In addition to the requirements in Part 8.G.4.1.6, you must locate sediment basins outside of any surface waters and any natural buffers established under Part 8.G.4.2.3, and you must utilize outlet structures that withdraw water from the surface, unless infeasible.

8.G.4.2.6 ***Native topsoil preservation.*** You must preserve native topsoil removed during clearing, grading, or excavation, unless infeasible. Store topsoil in a manner that will maximize its use in reclamation or final vegetative stabilization (e.g., by keeping the topsoil stabilized with seed or similar measures). This requirement does not apply if the intended function of the disturbed area dictates that topsoil be disturbed or removed.

8.G.4.2.7 ***Steep slopes.*** You must minimize the disturbance of steep slopes. The permit does not prevent or prohibit disturbance on steep slopes.

Depending on site conditions and needs, disturbance on steep slopes may be necessary (e.g., a road cut in mountainous terrain; for grading steep slopes prior to erecting the mine office). Where steep slope disturbances are necessary, you can minimize the disturbances to steep slopes through the implementation of a number of standard erosion and sediment control practices, such as by phasing disturbances in these areas and using stabilization practices specifically for steep grades.

8.G.4.2.8 ***Soil compaction.*** Where final vegetative stabilization will occur or where infiltration practices will be installed, you must either restrict vehicle/ equipment use in these areas to avoid soil compaction or use soil conditioning techniques to support vegetative growth. Minimizing soil compaction is not required where compacted soil is integral to the functionality of the site.

8.G.4.2.9 ***Dewatering Practices.*** You are prohibited from discharging ground water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults or other similar points of accumulation, unless such waters are first effectively managed by appropriate controls (e.g., sediment basins or sediment traps, sediment socks, dewatering tanks, tube settlers, weir tanks, or filtration systems). Uncontaminated, non-turbid dewatering water can be discharged without being routed to a control. (An uncontaminated discharge is a discharge that meets applicable water quality standards.)

You must also meet the following requirements for dewatering activities:

- Discharge requirements:
  - No discharging visible floating solids or foam;
  - Remove oil, grease and other pollutants from dewatering water via an oil-water separator or suitable filtration device (such as a cartridge filter);
  - Utilize vegetated upland areas of the site, to the extent feasible, to infiltrate dewatering water before discharge. In no case shall waters of the U.S. be considered part of the treatment area;
  - Implement velocity dissipation devices at all points where dewatering water is discharged;
  - Haul backwash water away for disposal or return it to the beginning of the treatment process; and
  - Clean or replace the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer’s specifications.
- Treatment chemical restrictions: If you use polymers, flocculants or other chemicals to treat dewatering water, you must comply with the requirements in Parts 8.G.4.1.8.

8.G.4.2.10 ***Pollution prevention requirements.***

- *Prohibited discharges* (this non-exhaustive list of prohibited non-stormwater discharges is included here as a reminder that only the only authorized non-stormwater discharges are those enumerated in Part 1.2.2):
  - Wastewater from washout of concrete;
  - Wastewater from washout and cleanout of stucco, paint, form

release oils, curing compounds, and other construction materials;
    - Fuels, oils, or other pollutants used for operation and maintenance of vehicles or equipment;
    - Soaps, solvents, or detergents used in vehicle or equipment washing;
    - Toxic or hazardous substances from a spill or other release.
- *Design and location requirements:* Minimize the discharge of pollutants from pollutant sources by:
    - Minimizing exposure;
    - Using secondary containment, spill kits, or other equivalent measures;
    - Locating pollution sources away from surface waters, storm sewer inlets, and drainageways;
    - Cleaning up spills immediately (do not clean by hosing area down).
- *Pollution prevention requirements for wash waters:* Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
- *Pollution prevention requirements for the storage, handling, and disposal of construction products, materials, and wastes:* Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to stormwater. Minimization of exposure is not required in cases where the exposure to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

8.G.4.2.11 ***Site Stabilization requirements for the construction of staging areas for structures and access roads as defined in 8.G.3.2(b)*** (i.e., not applicable to earth-disturbing activities performed for purposes of mine site preparation as defined in 8.G.3.2(a)). You must comply with the following stabilization requirements, except where the intended function of the site accounts for such disturbed earth (e.g., the area of construction will become actively mined, or the controls implemented at the active mining area effectively control the disturbance):

- By no later than the end of the next work day after construction work in an area has stopped permanently or temporarily ("temporarily" means the land will be idle for a period of 14 days or more but earth-disturbing activities will resume in the future), immediately initiate stabilization measures;
- If using vegetative measures, by no later than 14 days after initiating stabilization:
    - Seed or plant the area, and provide temporary cover to protect the planted area;
    - Once established, vegetation must be uniform, perennial (if final stabilization), and cover at least 70% of stabilized area based on

density of native vegetation.

- If using non-vegetative stabilization, by no later than 14 days after initiating stabilization:
  - o Install or apply all non-vegetative measures;
  - o Cover all areas of exposed soil.

Note: For the purposes of this permit, EPA will consider any of the following types of activities to constitute the initiation of stabilization: 1. Prepping the soil for vegetative or non-vegetative stabilization; 2. Applying mulch or other non-vegetative product to the exposed area; 3. Seeding or planting the exposed area; 4. Starting any of the activities in # 1 – 3 on a portion of the area to be stabilized, but not on the entire area; and 5. Finalizing arrangements to have stabilization product fully installed in compliance with the applicable deadline for completing stabilization.

Exceptions:

- Arid, semi-arid (if construction occurs during seasonally dry period), or drought-stricken areas:
  - o Within 14 days of stopping construction work in an area, install any necessary non-vegetative stabilization measures;
  - o Initiate vegetative stabilization as soon as conditions on the site allow;
  - o Document the schedule that will be followed for initiating and completing vegetative stabilization;
  - o Plant the area so that within 3 years the 70% cover requirement is met.
- Sites affected by severe storm events or other unforeseen circumstances:
  - o Initiate vegetative stabilization as soon conditions on the site allow;
  - o Document the schedule that will be followed for initiating and completing vegetative stabilization;
  - o Plant the area so that so that within 3 years the 70% cover requirement is met.

8.G.4.3 *Water Quality-Based Requirements Applicable to Earth-Disturbing Activities Conducted Prior to Active Mining Activities.*

The following water quality-based limits apply to earth-disturbing activities conducted prior to active mining activities defined in Part 8.G.3.2(a) and 8.G.3.2(b), in addition to the water quality-based limits in Part 2.2 of the MSGP.

Stricter requirements apply if your site will discharge to an impaired water or a water that is identified by your state, tribe, or EPA as a Tier 2 or Tier 2.5 for antidegradation purposes:

- More rapid stabilization of exposed areas: Complete initial stabilization activities within 7 days of stopping earth-disturbing work.
- More frequent site inspections: Once every 7 days and within 24 hours of a storm event of 0.25 inches or greater.

8.G.4.4 *Inspection Requirements Applicable to Earth-Disturbing Activities Conducted Prior to Active Mining Activities.*

The following requirements supersede the inspection requirements in Part 3 and 8.G.7 of the MSGP for earth-disturbing activities conducted prior to active mining activities defined in Part 8.G.3.2(a) and 8.G.3.2(b).

8.G.4.4.1 *Inspection frequency*

- At least once every 7 calendar days, or
- Once every 14 calendar days and within 24 hours of a storm event of 0.25 inches or greater.

Note:

- o Inspections only required during working hours;
- o Inspections not required during unsafe conditions; and
- o If you choose to inspect once every 14 days, you must have a method for measuring rainfall amount on site (either rain gauge or representative weather station)

Note: To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, you must record the total rainfall measured for that day.

Note: You are required to specify in your SWPPP which schedule you will be following.

Note: "Within 24 hours of the occurrence of a storm event" means that you are required to conduct an inspection within 24 hours once a storm event has produced 0.25 inches, even if the storm event is still continuing. Thus, if you have elected to inspect bi-weekly and there is a storm event at your site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, you are required to conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.

8.G.4.4.2 *Reductions in inspection frequency.*

- Stabilized areas: You may reduce the frequency of inspections to once per month in any area of your site where stabilization has occurred pursuant to Part 8.G.4.1.9 or 8.G.4.2.11.
- Arid, semi-arid, and drought stricken areas: If earth-disturbing activities are occurring during the seasonally dry period or during a period in which drought is predicted to occur, you may reduce inspections to once per month and within 24 hours of a 0.25 inch storm event.
- Frozen conditions: You may temporarily suspend or reduce inspections to once per month until thawing conditions occur if frozen conditions are continuous and disturbed areas have been stabilized. For extreme conditions in remote areas, e.g., where transit to the site is perilous/restricted or temperatures are routinely below freezing, you may suspend inspections until the conditions are conducive to safe access, and more frequent inspections can resume.

8.G.4.4.3 **Areas to be inspected.** You must at a minimum inspect the all of the following areas:

- Disturbed areas;
- Stormwater controls and pollution prevention measures;
- Locations where stabilization measures have been implemented;
- Material, waste, borrow, or equipment storage and maintenance areas;
- Areas where stormwater flows;
- Points of discharge.

8.G.4.4.4 ***What to check for during inspections.*** At a minimum you must check:

- Whether all stormwater controls are installed, operational and working as intended;
- Whether any new or modified stormwater controls are needed;
- For conditions that could lead to a spill or leak;
- For visual signs of erosion/sedimentation at points of discharge.

If a discharge is occurring, check:

- The quality and characteristics of the discharge;
- Whether controls are operating effectively.

8.G.4.4.5 **Inspection report.** Within 24 hours of an inspection, complete a report that includes:

- Inspection date;
- Name and title of inspector(s);
- Summary of inspection findings;
- Rainfall amount that triggered the inspection (if applicable);
- If it was unsafe to inspect a portion of the site, include documentation of the reason and the location(s);
- Each inspection report must be signed;
- Keep a current copy of all reports at the site or at an easily accessible location.

8.G.5 Technology-Based Effluent Limits for Active Mining Activities

Note: These requirements do not apply for any discharges from earth-disturbing activities conducted prior to active mining as defined in 8.G.3.2(a) or 8.G.3.2(b).

8.G.5.1 ***Employee training***. (See also Part 2.1.2.8) Conduct employee training at least annually at active and temporarily inactive facilities.

8.G.5.2 ***Stormwater controls.*** Apart from the control measures you implement to meet your Part 2 technology-based effluent limits, where necessary to minimize pollutant discharges in stormwater, implement the following control measures at your site. The potential pollutants identified in Part 8.G.6.3 shall determine the priority and appropriateness of the control measures selected. For mines subject to dust control requirements under state or county air quality permits, provided the requirements are equivalent, compliance with such air permit dust requirements shall constitute compliance with the dust control effluent limit in Part 2.1.2.10.

Stormwater diversions: Divert stormwater away from potential pollutant sources through implementation of control measures such as the following, where determined to be feasible (list not exclusive): interceptor or diversion controls (e.g., dikes, swales, curbs, berms); pipe slope drains; subsurface drains; conveyance systems (e.g., channels or gutters, open-top box culverts, and waterbars; rolling dips and road sloping; roadway surface water deflector and culverts); or their equivalents.

Capping: When capping is necessary to minimize pollutant discharges in stormwater, identify the source being capped and the material used to construct the cap.

Treatment: If treatment of stormwater (e.g., chemical or physical systems, oil - water separators, artificial wetlands) is necessary to protect water quality, describe the type and location of treatment used. Passive and/or active treatment of stormwater is encouraged, where feasible. Treated stormwater may be discharged as a stormwater source regulated under this permit provided the discharge is not combined with discharges subject to effluent limitation guidelines for the Ore Mining and Dressing Point Source Category (40 CFR Part 440).

8.G.5.3 ***Discharge testing.*** (See also Part 6.2.3.4) Test or evaluate all discharge points covered under this permit for the presence of specific mining-related but unauthorized non-stormwater discharges such as seeps or adit discharges, or discharges subject to effluent limitations guidelines (e.g., 40 CFR Part 440), such as mine drainage or process water. Alternatively (if applicable), you may keep a certification with your SWPPP consistent with Part 8.G.6.6.

8.G.6 Additional SWPPP Requirements for Mining Operations

Note: The requirements in Part 8.G.6 are not applicable to inactive metal mining facilities.

8.G.6.1 ***Nature of industrial activities***. (See also Part 6.2.2) Briefly document in your SWPPP the mining and associated activities that can potentially affect the stormwater discharges covered by this permit, including a general description of the location of the site relative to major transportation routes and communities.

8.G.6.2 ***Site map***. (See also Part 6.2.2) Document in your SWPPP the locations of the following (as appropriate): mining or milling site boundaries; access and haul roads; outline of the drainage areas of each stormwater discharge points within the facility with indications of the types of discharges from the drainage areas; location(s) of all permitted discharges covered under an individual NPDES permit; outdoor equipment storage, fueling, and maintenance areas; materials handling areas; outdoor manufacturing, outdoor storage, and material disposal areas; outdoor chemicals and explosives storage areas; overburden, materials, soils, or waste storage areas; location of mine drainage (where water leaves mine) or other process water; tailings piles and ponds (including proposed ones); heap leach pads; off-site points of discharge for mine drainage and process water; surface waters; boundary of tributary areas that are subject to effluent limitations guidelines; and location(s) of reclaimed areas.

8.G.6.3 ***Potential pollutant sources.*** (See also Part 6.2.3) For each area of the mine or mill site where stormwater discharges associated with industrial activities occur, identify the types of pollutants (e.g., heavy metals, sediment) likely to be present in significant amounts. Consider these factors: the mineralogy of the ore and waste rock (e.g., acid forming); toxicity and quantity of chemicals used, produced, or discharged; the likelihood of contact with stormwater; vegetation of site (if any); and history of significant leaks or spills of toxic or hazardous pollutants. Also include a summary of any existing ore or waste rock or overburden characterization data and test results for potential generation of acid rock. If any new data is acquired due to changes in ore type being mined, update your SWPPP with this information.

8.G.6.4 ***Documentation of control measures.*** Document all control measures that you implement consistent with Part 8.G.5.2. If control measures are implemented or planned but are not listed in Part 8.G.5.2 (e.g., substituting a less toxic chemical for a more toxic one), include descriptions of them in your SWPPP. If you are in compliance with dust control requirements under state or county air quality permits, you must include (or summarize, as necessary) what the state or county air quality permit dust control requirements are and how you've achieved compliance with them.

8.G.6.5 ***Employee training***. All employee training(s) must be documented in the SWPPP.

8.G.6.6 ***Certification of permit coverage for commingled non-stormwater discharges***. If you are able, consistent with Part 8.G.5.3 above, to certify that a particular discharge composed of commingled stormwater and non-stormwater is covered under a separate NPDES permit, and that permit subjects the non-stormwater portion to effluent limitations prior to any commingling, retain such certification with your SWPPP. This certification must identify the non-stormwater discharges, the applicable NPDES permit(s), the effluent limitations placed on the non-stormwater discharge by the permit(s), and the points at which the limitations are applied.

8.G.7 Additional Inspection Requirements *(See also Part 3.1)*

Except for earth-disturbing activities conducted prior to active mining activities as defined in Part 8.G.3.2(a) and 8.G.3.2(b), which are subject to Part 8.G.4.4, inspect sites at least quarterly unless adverse weather conditions make the site inaccessible. Sites which discharge to waters designated as Tier 2 or 2.5 or waters which are impaired for sediment or nitrogen must be inspected monthly. See Part 8.G.8.5 for inspection requirements for inactive and unstaffed sites.

8.G.8 Monitoring and Reporting Requirements (See also Part 4)

Note: There are no Part 8.G.8 monitoring and reporting or impaired waters monitoring requirements for inactive and unstaffed sites.

8.G.8.1 Indicator Monitoring (See also Part 4.2.1)

Table 8.G-1 identifies indicator monitoring that applies to the specific subsectors of Sector G. This indicator monitoring applies to both your primary industrial activity and any co-located industrial activities.

Table 8.G-1		
Subsector (You may be subject to requirements for more than one sector/subsector)	**Indicator Monitoring Parameter**	**Indicator Monitoring Threshold**
Applies to all Sector G (Subsectors G1 and G2) facilities with stormwater discharges from paved surfaces that will be initially sealed or re-sealed with coal-tar sealcoat where industrial activities are located during coverage under this permit	Polycyclic Aromatic Hydrocarbons (PAHs)*	Report Only/ No thresholds or baseline values

* Monitoring is required for the 16 individual PAHs identified at Appendix A to 40 CFR Part 423: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, benzo[g,h,i]perylene, indeno[1,2,3-c,d]pyrene, and dibenz[a,h]anthracene.

8.G.8.2 *Benchmark Monitoring for Active Copper Ore Mining and Dressing Facilities.*

Table 8.G-2 identifies benchmarks that apply to active copper ore mining and dressing facilities. These benchmarks apply to both your primary industrial activity and any co- located industrial activities.

Table 8.G-2		
Subsector (You may be subject to requirements for more than one sector/subsector)	**Parameter**	**Benchmark Monitoring Concentration**
Subsector G1. Active Copper Ore Mining and Dressing Facilities (SIC 1021)	Total Suspended Solids (TSS)	100 mg/L
	Nitrate plus Nitrite Nitrogen	0.68 mg/L
	Chemical Oxygen Demand (COD)	120 mg/L

8.G.8.3 *Benchmark Monitoring Requirements for Discharges From Waste Rock and Overburden Piles at Active Metal Mining Facilities.* For discharges from waste rock and overburden piles, perform benchmark monitoring once in the first year for the parameters listed in Table 8.G-3, and twice annually in all subsequent years of coverage under this permit for any parameters for which the benchmark has been exceeded. You are also required to conduct analytic monitoring for the parameters listed in Table 8.G-4 in accordance with the requirements in Part 8.G.8.4. The Director may also notify you that you must perform additional monitoring to accurately characterize the quality and quantity of pollutants discharged from your waste rock and overburden piles.

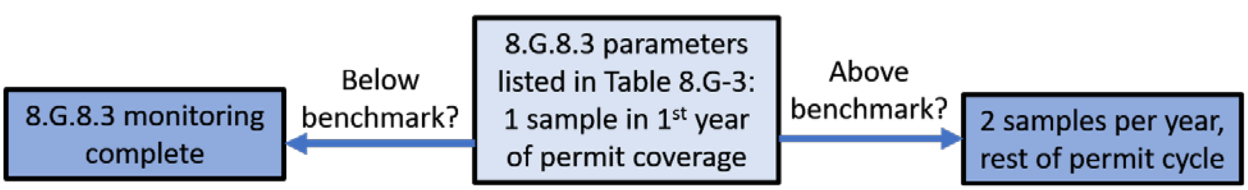


Table 8.G-3.		
Subsector (Discharges may be subject to requirements for more than one sector/subsector)	**Parameter**	**Benchmark Monitoring Concentration**
Subsector G2. Iron Ores; Copper Ores; Lead and Zinc Ores; Gold and Silver Ores; Ferroalloy Ores, Except Vanadium; and Miscellaneous Metal Ores (SIC Codes 1011, 1021, 1031, 1041, 1044, 1061, 1081, 1094, 1099) (Note: when analyzing hardness for a suite of metals, it is more cost effective to add analysis of calcium and magnesium, and have hardness calculated than to require hardness analysis separately)	Total Suspended Solids (TSS)	100 mg/L
	Turbidity	50 NTU
	pH	6.0-9.0 s.u.
	Hardness (as $CaCO_3$; calc. from Ca, Mg)[2]	no benchmark value
	Total Recoverable Antimony	640 µg/L
	Total Recoverable Arsenic (freshwater) Total Recoverable Arsenic (saltwater)[1]	150 µg/L 69 µg/L
	Total Recoverable Beryllium	130 µg/L
	Total Recoverable Cadmium (freshwater)[2] Total Recoverable Cadmium (saltwater)[1]	Hardness Dependent 33 µg/L
	Total Recoverable Copper (freshwater) Total Recoverable Copper (saltwater)[1]	5.19 µg/L 4.8 µg/L
	Total Recoverable Lead (freshwater)[2] Total Recoverable Lead (saltwater)[1]	Hardness Dependent 210 µg/L
	Total Recoverable Mercury (freshwater) Total Recoverable Mercury (saltwater)[1]	1.4 µg/L 1.8 µg/L
	Total Recoverable Nickel (freshwater)[2] Total Recoverable Nickel (saltwater)[1]	Hardness Dependent 74 µg/L
	Total Recoverable Selenium (freshwater) Total Recoverable Selenium (saltwater)[1]	1.5 µg/L for still/standing (lentic) waters; 3.1 µg/L for flowing (lotic) waters 290 µg/L
	Total Recoverable Silver (freshwater)[2] Total Recoverable Silver (saltwater)[1]	Hardness Dependent 1.9 µg/L
	Total Recoverable Zinc (freshwater)[2] Total Recoverable Zinc (saltwater)[1]	Hardness Dependent 90 µg/L

[1]Saltwater benchmark values apply to stormwater discharges into saline waters where indicated.
[2] The freshwater benchmark values of some metals are dependent on water hardness. For these parameters,

permittees must determine the hardness of the receiving water (see Appendix J, "Calculating Hardness in Receiving Waters for Hardness Dependent Metals," for methodology), in accordance with Part 4.2.2.1, to identify the applicable 'hardness range' for determining their benchmark value applicable to their facility. Hardness Dependent Benchmarks follow in the table below:

Freshwater Hardness Range	**Cadmium** (µg/L)		**Lead** (µg/L)	**Nickel** (µg/L)	**Silver** (µg/L)	**Zinc** (µg/L)
0-24.99 mg/L	0.49		14	145	0.37	37
25-49.99 mg/L	0.73		24	203	0.80	52
50-74.99 mg/L	1.2		45	314	1.9	80
75-99.99 mg/L	1.7		69	418	3.3	107
100-124.99 mg/L	2.1		95	518	5.0	132
125-149.99 mg/L	2.6		123	614	7.1	157
150-174.99 mg/L	3.1		152	707	9.4	181
175-199.99 mg/L	3.5		182	798	12	204
200-224.99 mg/L	4.0		213	888	15	227
225-249.99 mg/L	4.4		246	975	18	249
250+ mg/L	4.7		262	1019	20	260

8.G.8.4 ***Additional Analytic Monitoring Requirements for Discharges From Waste Rock and Overburden Piles at Active Metal Mining Facilities.*** In addition to the monitoring required in Part 8.G.8.3 for discharges from waste rock and overburden piles, you must also conduct monitoring for additional parameters based on the type of ore you mine at your site. The schedule for monitoring for this Part 8.G.8.4 is the same as specified in Part 8.G.8.3: once in the first year for the parameters listed in Table 8.G-4 (except radium and uranium), and twice annually in all subsequent years of coverage under this permit for any parameters for which the benchmark has been exceeded. Where a parameter in Table 8.G-4 is the same as a pollutant you are required to monitor for in Table 8.G-3 (i.e., for all of the metals), you must use the corresponding benchmark in Table 8.G-3 and you may use any monitoring results conducted for Part 8.G.8.3 to satisfy the monitoring requirement for that parameter for Part 8.G.8.4. For radium and uranium, which do not have corresponding benchmarks in Table 8.G-3, there are no applicable benchmarks. For radium and uranium, you must monitor quarterly (as identified in Part 4.1.7) for your first four full quarters of permit coverage commencing no earlier than [insert 90 days after permit effective date], after which you may discontinue monitoring for these two parameters.

Table 8.G-4. Additional Monitoring Requirements for Discharges from Waste Rock and Overburden Piles

Supplemental Requirements			
	Pollutants of Concern		
Type of Ore Mined	**Total Suspended Solids (TSS)**	**pH**	**Metals, Total**
Tungsten Ore	X	X	Arsenic, Cadmium (H), Copper, Lead (H), Zinc (H)
Nickel Ore	X	X	Arsenic, Cadmium (H), Copper, Lead (H), Zinc (H)
Aluminum Ore	X	X	Iron
Mercury Ore	X	X	Nickel (H)
Iron Ore	X	X	Iron (Dissolved)

Table 8.G-4. Additional Monitoring Requirements for Discharges from Waste Rock and Overburden Piles			
Supplemental Requirements			
Type of Ore Mined	**Pollutants of Concern**		
	Total Suspended Solids (TSS)	**pH**	**Metals, Total**
Platinum Ore			Cadmium (H), Copper, Mercury, Lead (H), Zinc (H)
Titanium Ore	X	X	Iron, Nickel (H), Zinc (H)
Vanadium Ore	X	X	Arsenic, Cadmium (H), Copper, Lead (H), Zinc (H)
Molybdenum	X	X	Arsenic, Cadmium (H), Copper, Lead (H), Mercury, Zinc (H)
Uranium, Radium, and Vanadium Ore	X	X	Chemical Oxygen Demand, Arsenic, Radium (Dissolved and Total), Uranium, Zinc (H)

Note: An "X" indicated for TSS and/or pH means that you are required to monitor for those parameters. (H) indicates that hardness must also be measured when this pollutant is measured.

8.G.8.5 ***Inactive and Unstaffed Sites – Conditional Exemption from No Exposure Requirements for Quarterly Visual Assessments and Routine Facility Inspections.*** As a Sector G facility, if you are seeking to exercise a waiver from the quarterly visual assessment and routine facility inspection requirements for inactive and unstaffed sites (including temporarily inactive sites), you are conditionally exempt from the requirement to certify that "there are no industrial materials or activities exposed to stormwater" in Parts 3.1.5 and 3.2.4.4. This exemption is conditioned on the following:

- If circumstances change and your facility becomes active and/or staffed, this exception no longer applies and you must immediately begin complying with the quarterly visual assessment requirements; and
- EPA retains the authority to revoke this exemption and/or the monitoring waiver where it is determined that the discharge causes, has a reasonable potentialto cause, or contributes to an instream excursion above an applicable water quality standard, including designated uses.

Subject to the two conditions above, if your facility is inactive and unstaffed, you are waived from the requirement to conduct quarterly visual assessments and routine facility inspections. You must still do an annual site inspection in accordance with Part 3.1. You are encouraged to inspect your site more frequently where you have reason to believe that severe weather or natural disasters may have damaged control measures or increased discharges.

Table 8.G-5. Applicability of the Multi-Sector General Permit to Stormwater From Active Mining and Dressing Sites, Temporarily Inactive Sites, and Sites Undergoing Reclamation	
Discharge/Source of Discharge	**Note/Comment**
Piles	
Waste rock/overburden	Covered under the MSGP if composed entirely of stormwater and not combined with mine drainage. See note below.
Topsoil	--

Table 8.G-5. Applicability of the Multi-Sector General Permit to Stormwater From Active Mining and Dressing Sites, Temporarily Inactive Sites, and Sites Undergoing Reclamation	
Discharge/Source of Discharge	**Note/Comment**
Roads constructed of waste rock or spent ore	
Onsite haul roads	Covered under the MSGP if composed entirely of stormwater and not combined with mine drainage. See note below.
Offsite haul and access roads	--
Roads not constructed of waste rock or spent ore	
Onsite haul roads	Covered under the MSGP except if mine drainage is used for dust control.
Offsite haul and access roads	--
Milling/concentrating	
Runoff from tailings dams and dikes when constructed of waste rock/tailings	Covered under the MSGP except if process fluids are present and only if composed entirely of stormwater and not combined with mine drainage. See Note below.
Runoff from tailings dams/dikes when not constructed of waste rock and tailings	Covered under the MSGP except if process fluids are present.
Concentration building	Covered under the MSGP If stormwater only and no contact with piles.
Mill site	If stormwater only and no contact with piles.
Ancillary areas	
Office and administrative building and housing	Covered under the MSGP if mixed with stormwater from the industrial area.
Chemical storage area	--
Docking facility	Covered under the MSGP except if excessive contact with waste product that would otherwise constitute mine drainage.
Explosive storage	--
Fuel storage (oil tanks/coal piles)	--
Vehicle and equipment maintenance area/building	--
Parking areas	Covered under the MSGP but coverage unnecessary if only employee and visitor-type parking.
Power plant	
Truck wash area	Covered under the MSGP except when excessive contact with waste product that would otherwise constitute mine drainage.
Reclamation-related areas	
Any disturbed area (unreclaimed)	Covered under the MSGP only if not in active mining area.
Reclaimed areas released from reclamation requirements prior to Dec. 17, 1990	--
Partially/inadequately reclaimed areas or areas not released from reclamation requirements	--

Note: Stormwater from these sources are subject to the NPDES program for stormwater unless mixed with discharges subject to 40 CFR Part 440 that are regulated by another permit prior to mixing. Non-stormwater discharges from these sources are subject to NPDES permitting and may be subject to the effluent limitation guidelines under 40 CFR Part 440. Discharges from overburden/waste rock and overburden/waste rock-related areas are not subject to 40 CFR Part 440 unless: (1) it drains naturally (or is intentionally diverted) to a point source; and (2) combines with "mine drainage" that is otherwise regulated under the Part 440 regulations. For such sources, coverage under this permit would be available if the discharge composed entirely of stormwater does not combine with other sources of mine drainage that are not subject to 40 CFR Part 440, as well as meeting other eligibility criteria contained in Part 1.1 of the permit.

Operators bear the initial responsibility for determining the applicable technology-based standard for such discharges. EPA recommends that operators contact the relevant NPDES permit issuance authority for assistance to determine the nature and scope of the "active mining area" on a mine-by-mine basis, as well as to determine the appropriate permitting mechanism for authorizing such discharges.

8.G.9 Termination of Permit Coverage

8.G.9.1 ***Termination of Permit Coverage for Sites Reclaimed After December 17, 1990***. A site or a portion of a site that has been released from applicable state or federal reclamation requirements after December 17, 1990, is no longer required to maintain coverage under this permit. If the site or portion of a site reclaimed after December 17, 1990, was not subject to reclamation requirements, the site or portion of the site is no longer required to maintain coverage under this permit if the site or portion of the site has been reclaimed as defined in Part 8.G.3.3.

8.G.9.2 ***Termination of Permit Coverage for Sites Reclaimed Before December 17, 1990.*** A site or portion of a site that was released from applicable state or federal reclamation requirements before December 17, 1990, or that was otherwise reclaimed before December 17, 1990, is no longer required to maintain coverage under this permit if the site or portion of the site has been reclaimed. A site or portion of a site is considered to have been reclaimed if: (1) stormwater that comes into contact with raw materials, intermediate byproducts, finished products, and waste products does not have the potential to cause or contribute to violations of state water quality standards, soil disturbing activities related to mining at the sites or portion of the site have been completed, (3) the site or portion of the site has been stabilized to minimize soil erosion, and (4) as appropriate depending on location, size, and the potential to contribute pollutants to stormwater discharges, the site or portion of the site has been revegetated, will be amenable to natural revegetation, or will be left in a condition consistent with the post-mining land use.

Appendix B: Delegation of Authority Forms

Perpetua Resources Corp.
405 S. 8th Street, Ste. 201
Boise, ID 83702
Tel:208.9013060
www.perpetuaresources.com

MEMO

Subject: Delegation of Authority Form
From: Alan Haslam
To: Kyle Fend
Date: May 2021

Delegation of Authority Form

I, Alan Haslam, hereby designate the person or specifically described position below to be a Duly Authorized Representative for the purpose of overseeing compliance with environmental requirements, including the U.S EPA's Multi-Sector General Permit (MSGP) for stormwater discharges at Perpetua Resources Idaho, Inc.'s Stibnite Gold Project. The Duly Authorized Representative is authorized to sign any reports, Plans and all other documentation required by the permit.

Kyle Fend (name of Person or Position)

Perpetua Resources Idaho, Inc. (Company)

13181 Hwy 55, PO Box 429 (Address)

Donnelly, ID 83615 (City, State, Zip)

208-901-3047 (Phone)

By signing this Authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix B, Part B.11.A of the MSGP and that the Duly Authorized Representative above meets the definition of a Duly Authorized Representative as described in MSGP Appendix B, Part B.11.B.

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

Name: Alan Haslam

Company: Perpetua Resources Idaho, Inc.

Title: Vice President of Permitting

Signature: Alan D. Haslam

Date: May 27, 2021

Appendix C: Site Maps

Figure 1: Site Location Map

Figure 2: Surrounding Waters Overview Map

Figure 3: Property Extent Map

Figure 4: North Camp Area Detail Map

Figure 5: South Camp Area Detail Map

Figure 6: Drill Pad Detail Map (example)

BMP Figures:

ASAOC BMPs

DMEA BMPs

Hangar BMPs

Heli Pay Laydown BMPs

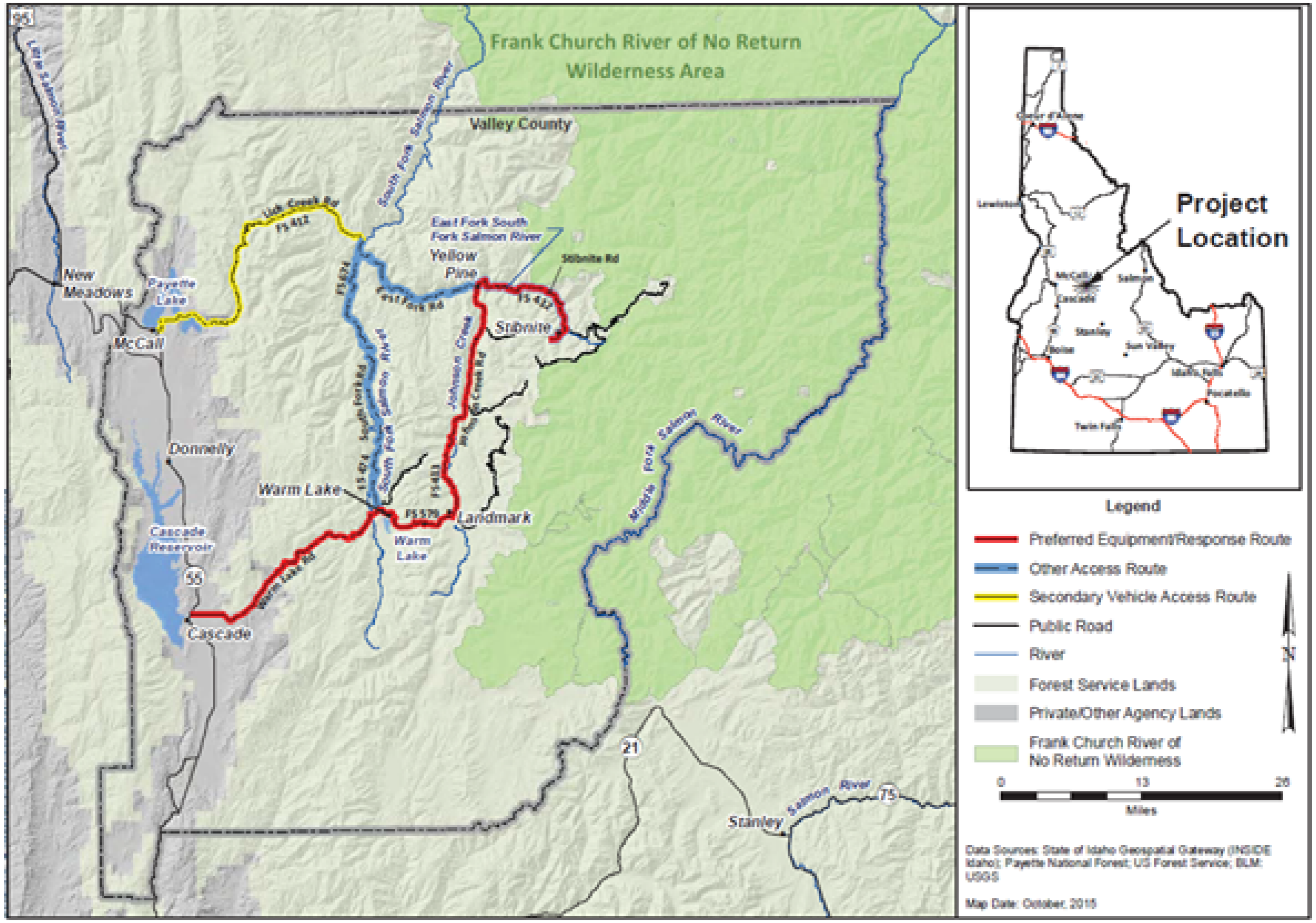
Homestake BMPs

Shop BMPs

Stibnite Road BMPs

West End BMPs

YPP BMPs



LOCATION MAP

REVISION	DATE

Aquionix
EHS Services

5545 W. 56th Ave.
Arvada, CO 80002
303-289-7520
www.aquionix.com

Perpetua Resources

Perpetua Resources Idaho, Inc.- Stibnite Gold Project

SWPPP Figure 1:

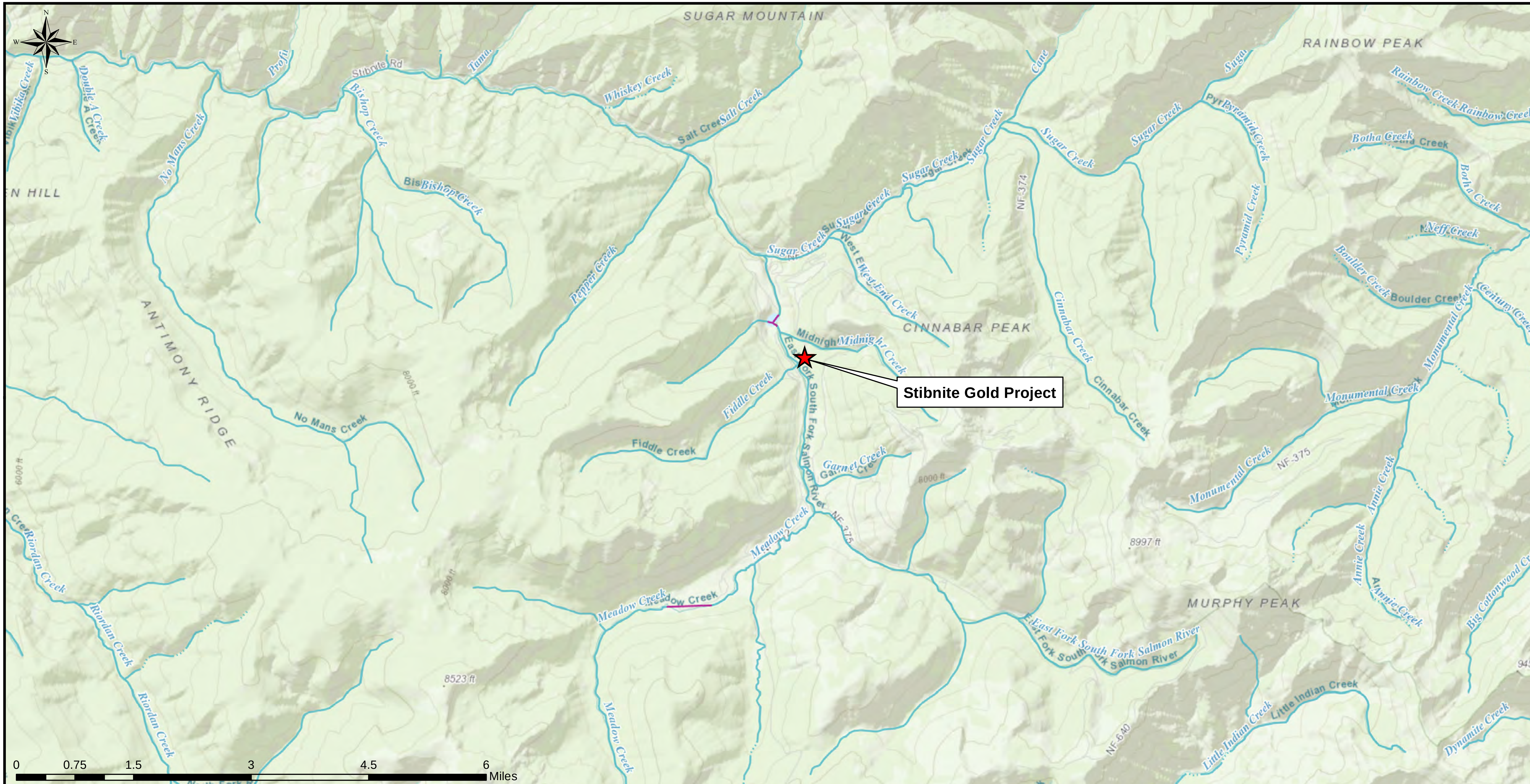
SITE LOCATION MAP

DESIGNED BY: Midas/Perpetua

DRAWN BY: Midas/Perpetua

DATE DRAWN:

D:\ArcGIS_AutoCAD\Perpetua -3230\mxds



LOCATION MAP

MAP FEATURES

- Perennial Flowline
- Ephemeral Flowline
- Intermittent Flowline
- Artificial Path
- Canal Ditch
- Pipeline

REVISION / AUTHOR	DATE

Perpetua Resources

Perpetua Resources Idaho, Inc.- Stibnite Gold Project
SWPPP Figure 2:

SURROUNDING WATERS OVERVIEW MAP

DESIGNED BY: MT (Aquionix)

DRAWN BY: MT (Aquionix)

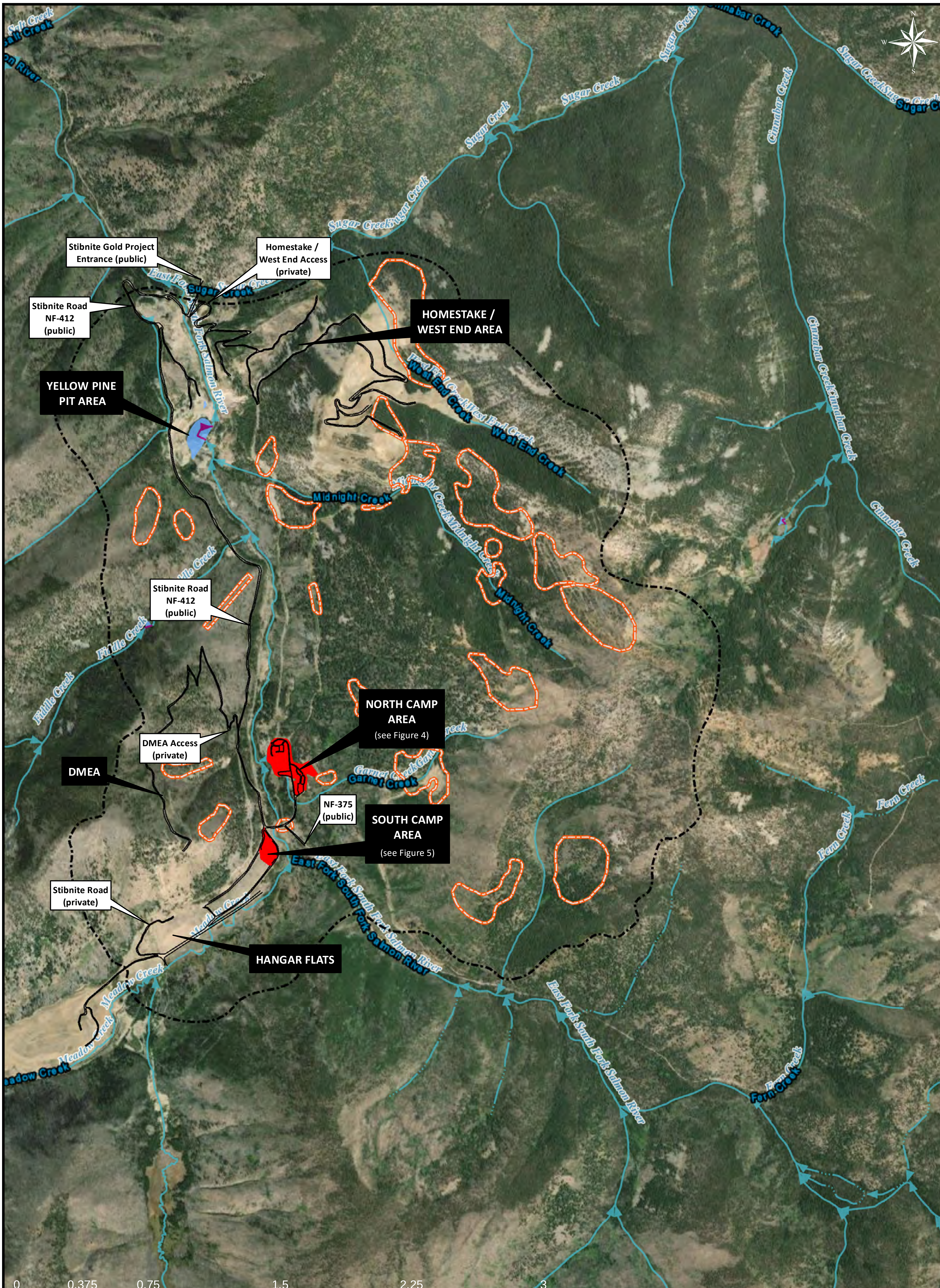
DATE DRAWN: 5/3/2021

SCALE: 1:75,000

DATA FRAME COORD SYSTEM: WGS_1984_Web _Mercator_Auxiliary_Sphere

Aquionix EHS Services
1841 Wadsworth Blvd.
Lakewood, CO 80214
303-289-7520
www.aquionix.com

D:\ArcGIS_AutoCAD\Perpetua 3230\mxds



MAP FEATURES

- Project Area Boundary (Approx.)
- Private Land
- Lake
- Perennial Stream/River
- Intermittent Stream/River
- Artificial Path
- Canal Ditch
- Industrial Activity Area
- Potential Exploration Area
- Perpetua Road

NOTES

(1) North Camp Industrial Activity Area approximately 14 acres

(2) South Camp Industrial Activity Area approximately 4.8 acres

(3) Refer to BMP Map series for the most current location of BMPs / Control Measures at the site

REVISION / AUTHOR	DATE
Updated template layout	1/7/2025

Aquionix EHS Services
1841 Wadsworth Blvd.
Lakewood, CO 80214
303-289-7520
www.aquionix.com

Perpetua Resources

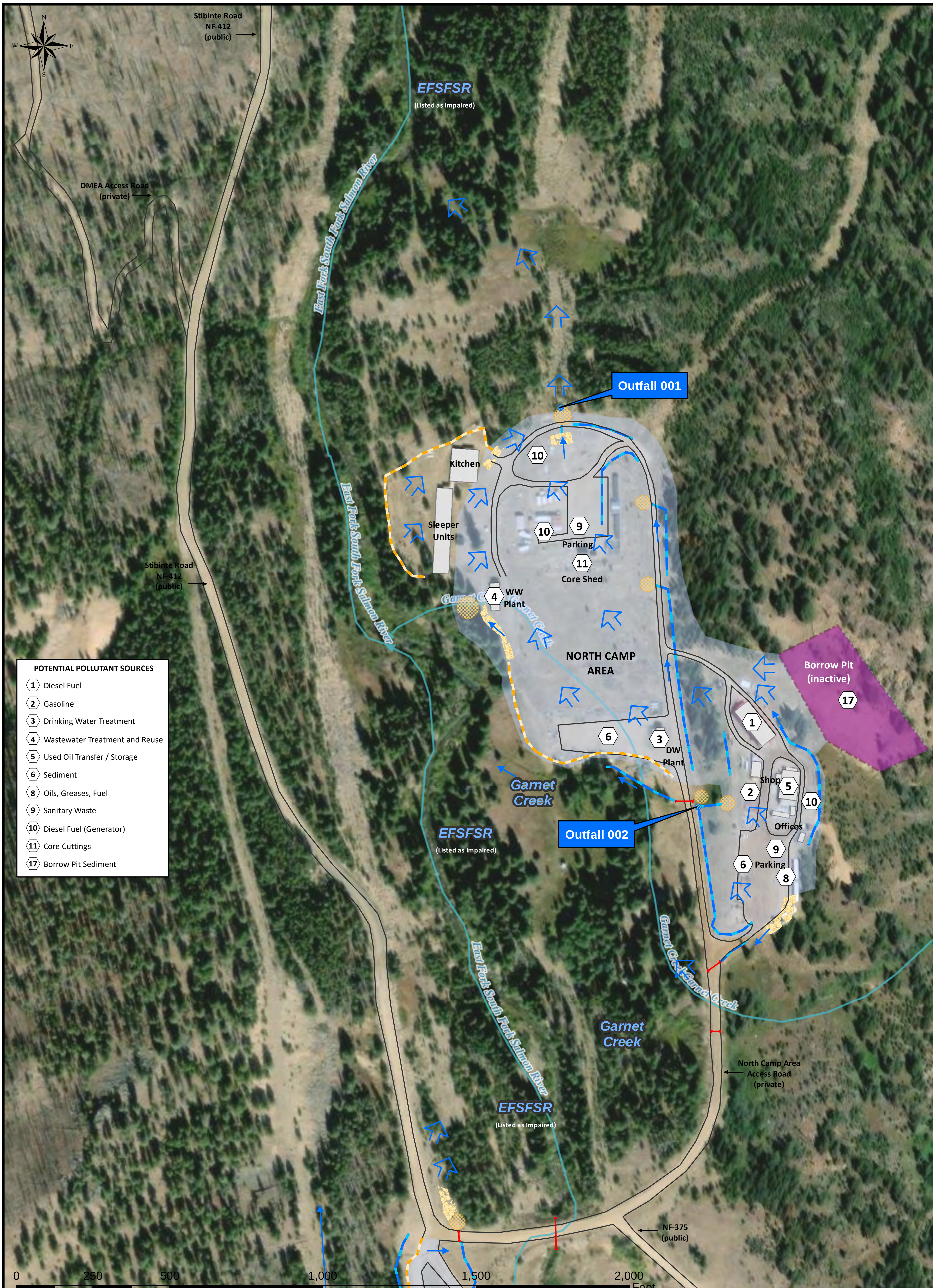
Perpetua Resources Idaho, Inc. - Stibnite Gold Project
SWPPP Figure 3:

PROPERTY EXTENT MAP

DESIGNED BY: MT (Aquionix)
DRAWN BY: MT (Aquionix)
DATE DRAWN: 5/27/2021

SCALE: 1:32,500
DATA FRAME COORD SYSTEM: WGS_1984_Web_Mercator_Auxiliary_Sphere

D:\ArcGIS_AutoCAD\Perpetua -3230\mxds



MAP FEATURES

- Surface Flow (Conc.)
- Surface Flow (Sheet)
- Potential Pollutant Source
- Stormwater Outfall
- Culvert
- Building
- Stream
- Mulch Mat
- Industrial Activity Area
- Borrow Pit (approx.)
- Sediment Pond
- Swale
- Berm
- Rip-Rap

NOTES

(1) Refer to SWPPP for PPS details

(2) Refer to Control Measures Inspection Form in SWPPP for BMP / Control Measure details

(3) Refer to SWPPP for information on Impaired Waters (303(d) listed)

(4) Refer to BMP Map series for the most current location of BMPs / Control Measures at the site

REVISION / AUTHOR	DATE
Updated Map layout information; Removed BMP layer file - refer to BMP map series for details	01/07/2025

Aquionix
EHS Services

1841 Wadsworth Blvd.
Lakewood, CO 80214
303-289-7520
www.aquionix.com

Perpetua Resources

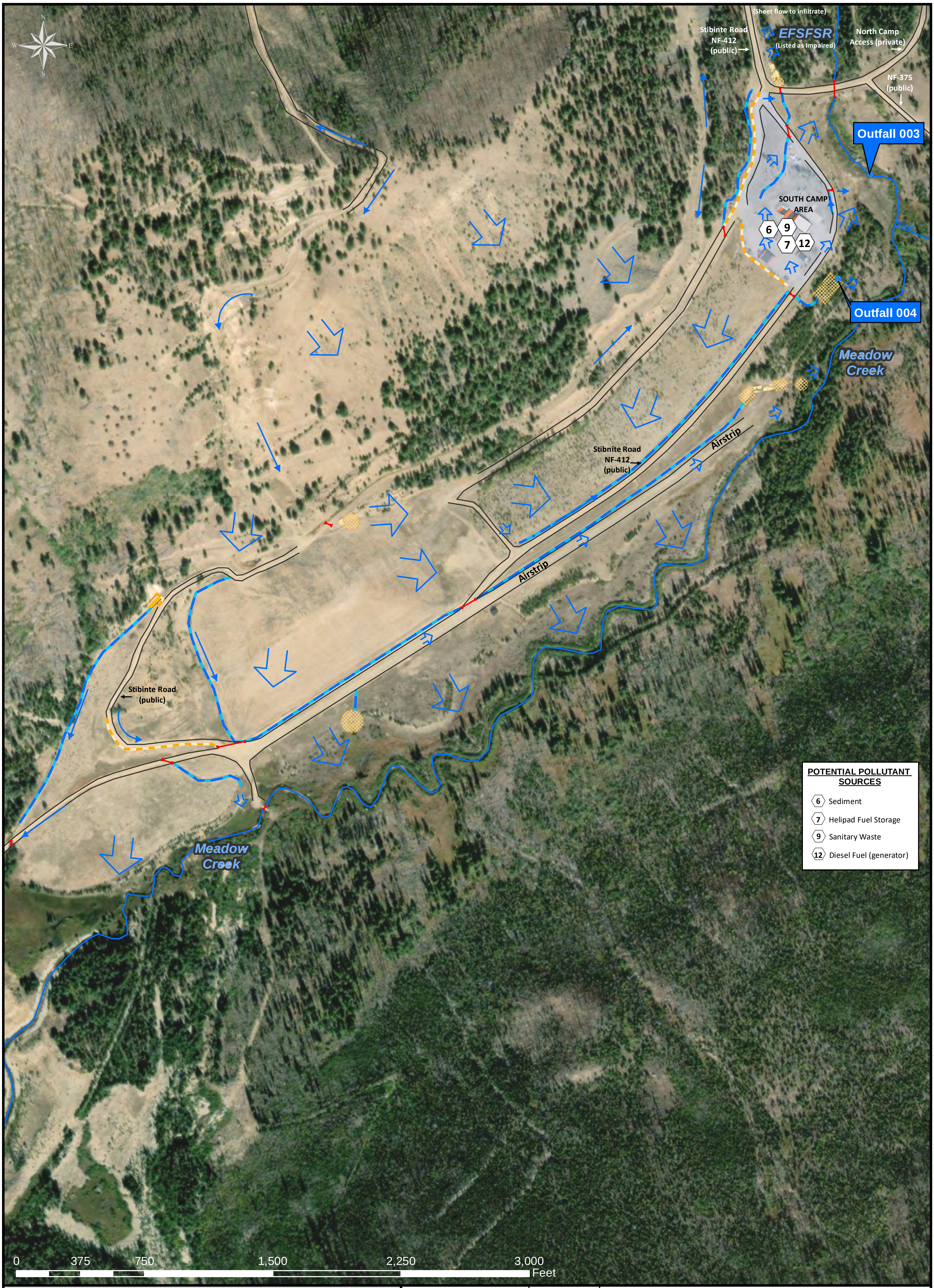
Perpetua Resources Idaho, Inc. - Stibnite Gold Project

SWPPP Figure 4:

NORTH CAMP AREA DETAIL MAP

DESIGNED BY: MT (Aquionix)	SCALE:1:3,500
DRAWN BY: MT (Aquionix)	DATA FRAME COORD SYSTEM: WGS_1984_Web _Mercator_Auxiliary_Sphere
DATE DRAWN: 5/3/2021	

D:\ArcGIS_AutoCAD\Perpetua -3230\mxds



MAP FEATURES

- Surface Flow (Conc.)
- Surface Flow (Sheet)
- Potential Pollutant Source
- Stormwater Outfall
- Culvert
- Building
- Stream
- Mulch Mat
- Industrial Activity Area
- Helipad
- Sediment Pond
- Swale
- Berm
- Rip-Rap

NOTES

(1) Refer to SWPPP for PPS details

(2) Refer to Control Measures Inspection Form in SWPPP for BMP / Control Measure details

(3) Refer to SWPPP for information on Impaired Waters (303(d) listed)

(4) Refer to BMP Map series for the most current location of BMPs / Control Measures at the site

REVISION	DATE
Updated layout; Added HF102	7/19/2021
Added Outfall 004; Updated Map layout information; Removed BMP layer file - see BMP map series for details	1/7/2025

Aquionix
EHS Services
1841 Wadsworth Blvd.
Lakewood, CO 80214
303-289-7520
www.aquionix.com

Perpetua Resources

Perpetua Resources Idaho, Inc. - Stibnite Gold Project

SWPPP Figure 5:

SOUTH CAMP AREA DETAIL MAP

DESIGNED BY: MT (Aquionix)

DRAWN BY: MT (Aquionix)

DATE DRAWN: 5/3/2021

SCALE: 1:6,200

DATA FRAME COORD SYSTEM: WGS_1984_Web_Mercator_Auxiliary_Sphere

D:\ArcGIS_AutoCAD\Perpetua -3230\mxds

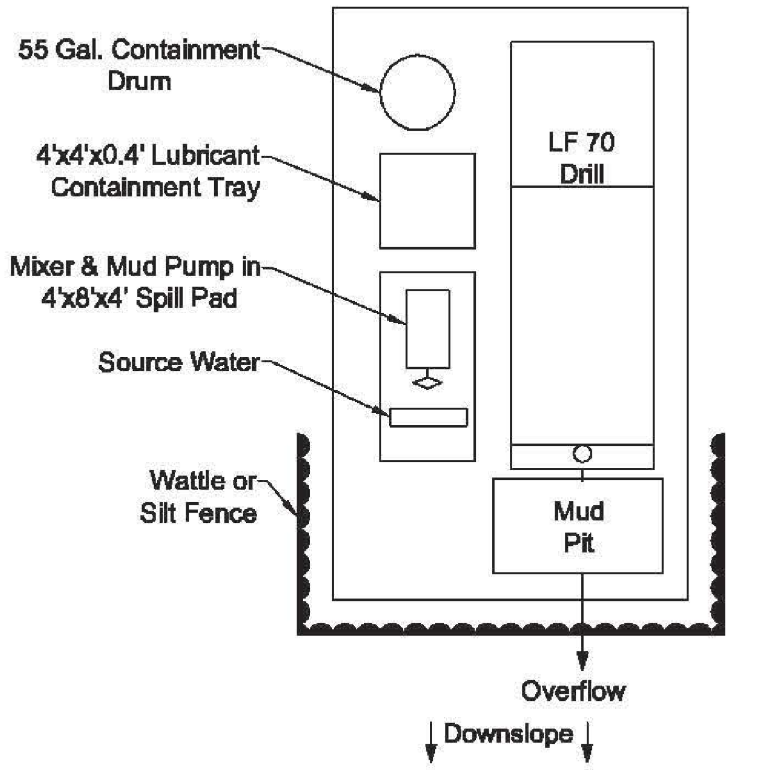


Figure 5a. Typical Track/Helicopter Core Drill Pad Layout SCALE: NTS

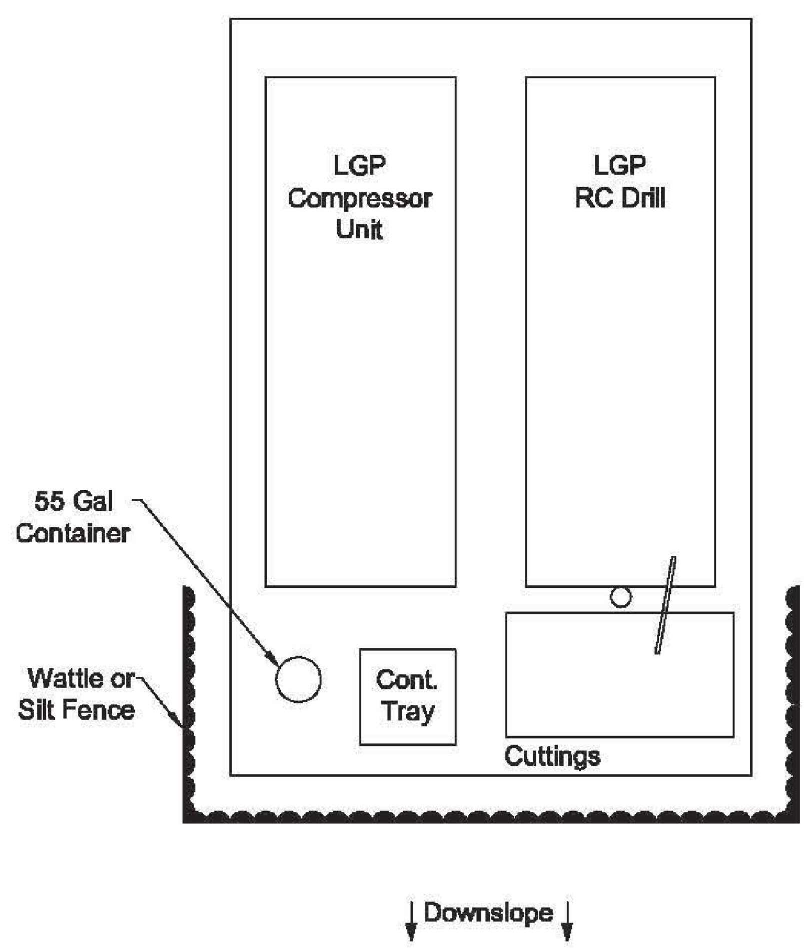


Figure 5b. Typical LGP Reverse Core (RC) Drill Pad Layout SCALE: NTS

Figure 5. Drill Pad Detail

Midas Gold Idaho, Stibnite Gold Exploration Project

REVISION	DATE

Perpetua Resources

Perpetua Resources Idaho, Inc. - Stibnite Gold Project

SWPPP Figure 6:

DRILL PAD DETAIL MAP (EXAMPLE)

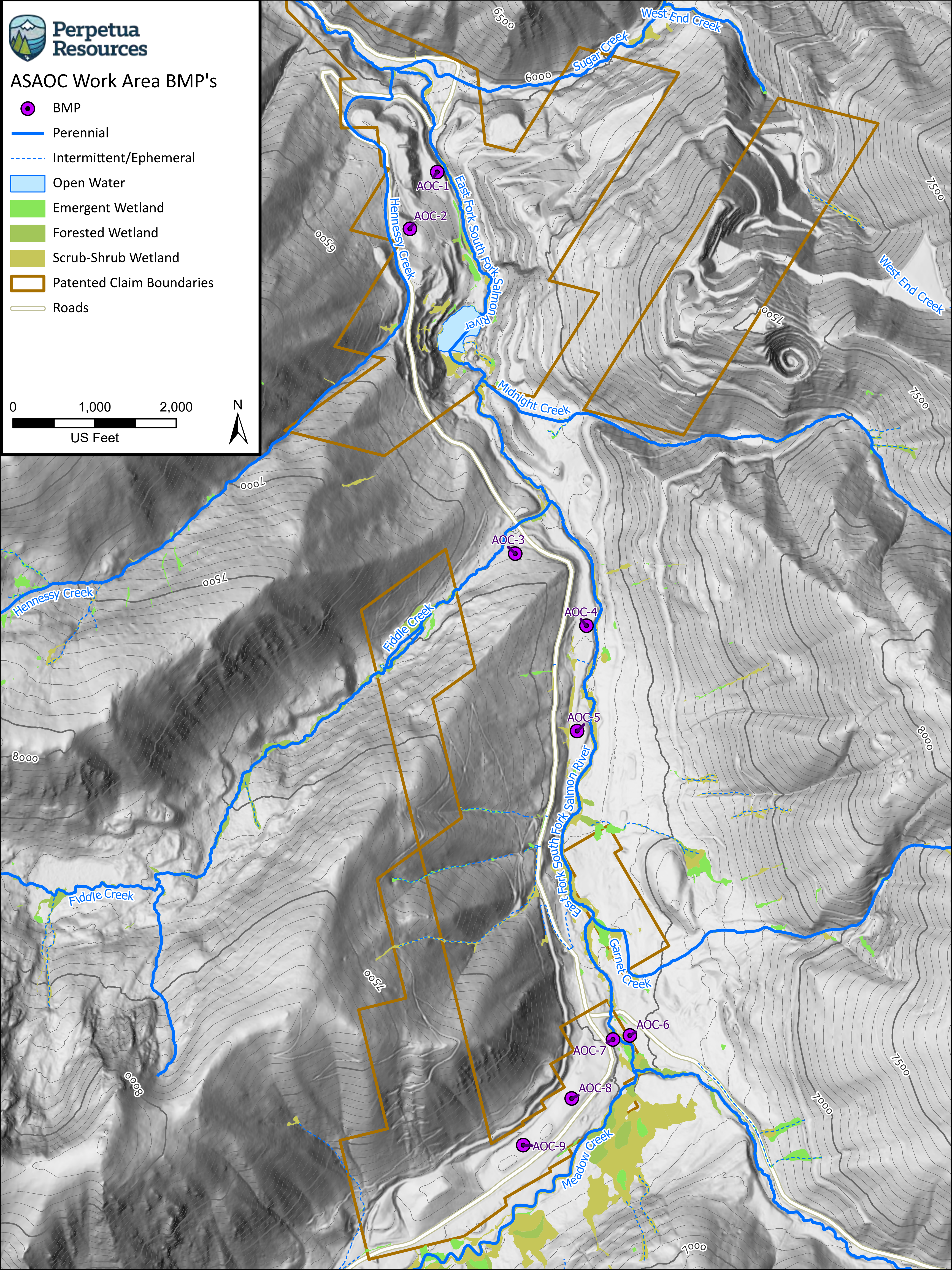
Aquionix EHS Services
5545 W. 56th Ave.
Arvada, CO 80002
303-289-7520
www.aquionix.com

DESIGNED BY: Midas / Perpetua

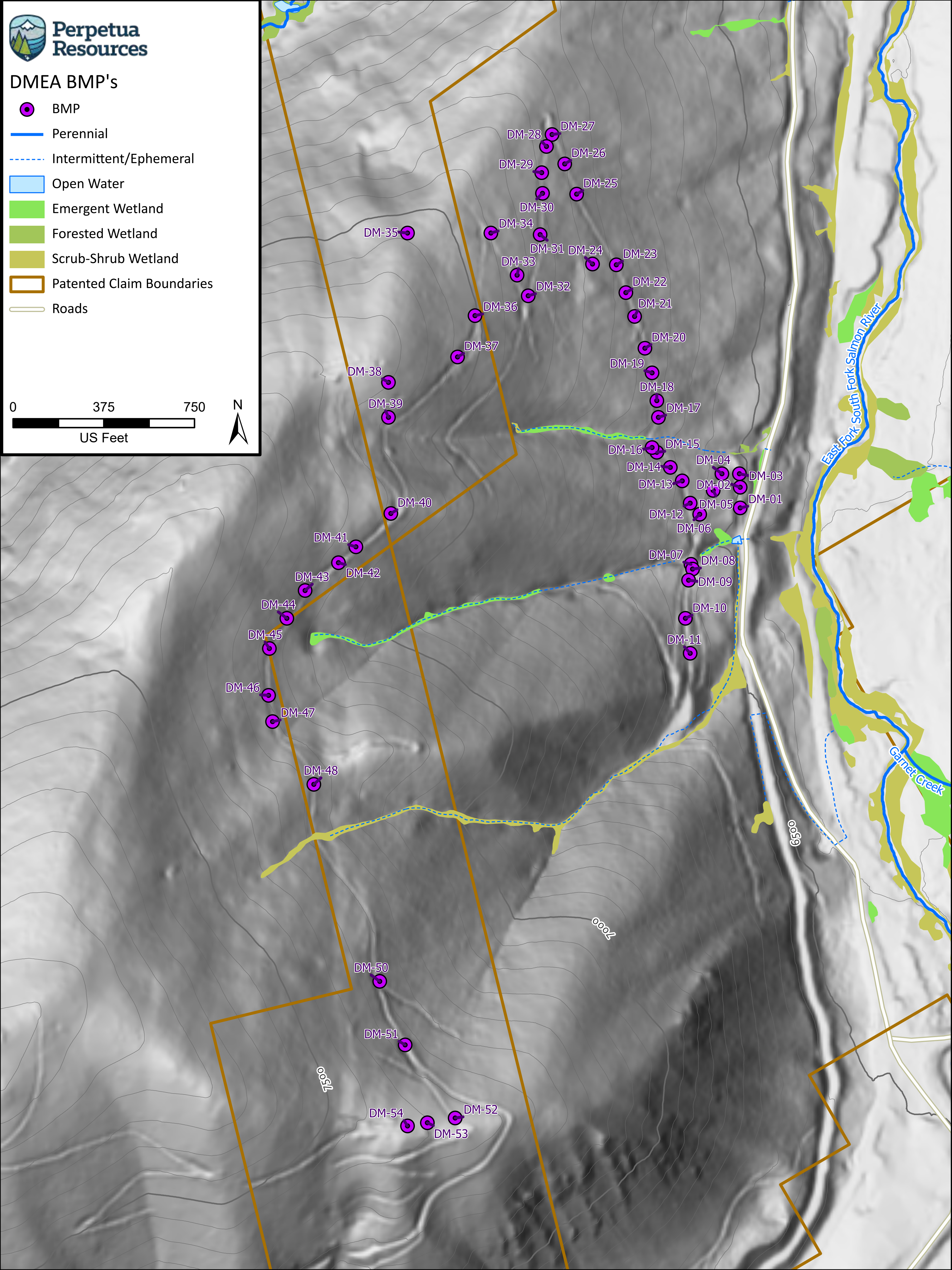
DRAWN BY: Midas / Perpetua

DATE DRAWN:

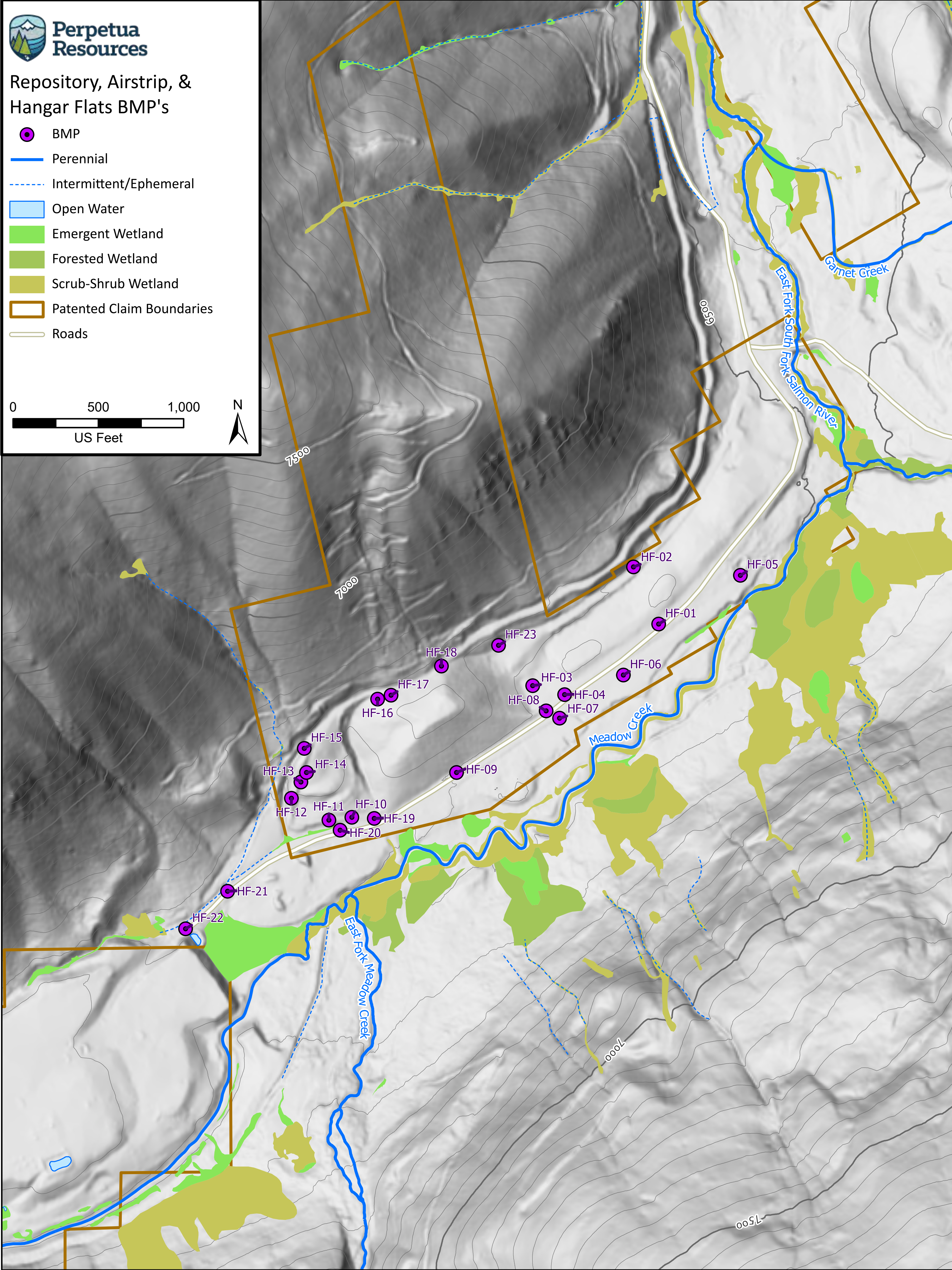
D:\ArcGIS_AutoCAD\Perpetua -3230\mxds



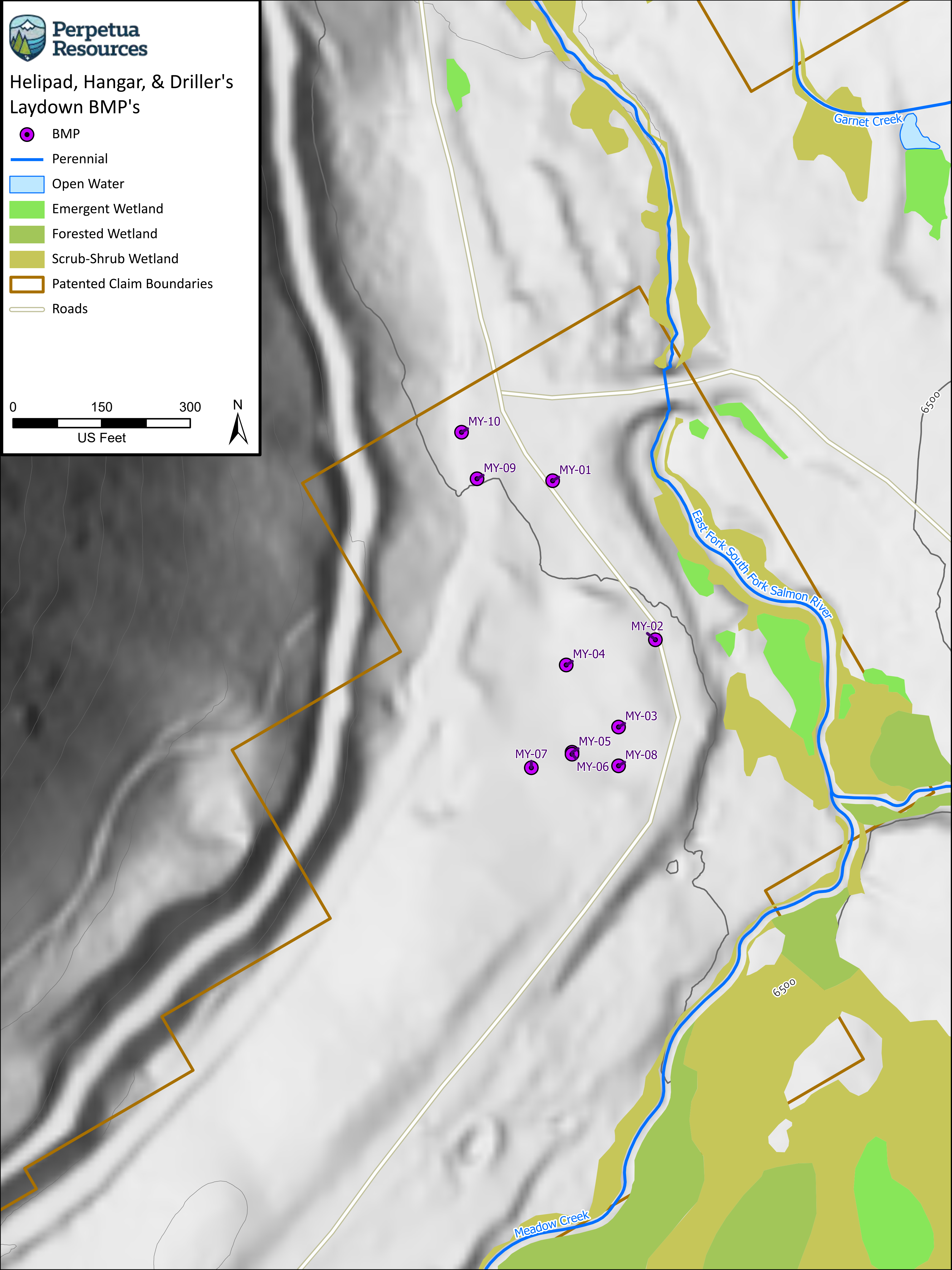
Perpetua Resources
ASAOC Work Area BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
1,000
2,000
US Feet
N
West End Creek
Sugar Creek
Hennessy Creek
East Fork South Fork Salmon River
Midnight Creek
Fiddle Creek
Garnet Creek
Meadow Creek
AOC-1
AOC-2
AOC-3
AOC-4
AOC-5
AOC-6
AOC-7
AOC-8
AOC-9
6500
6000
7000
7500
8000

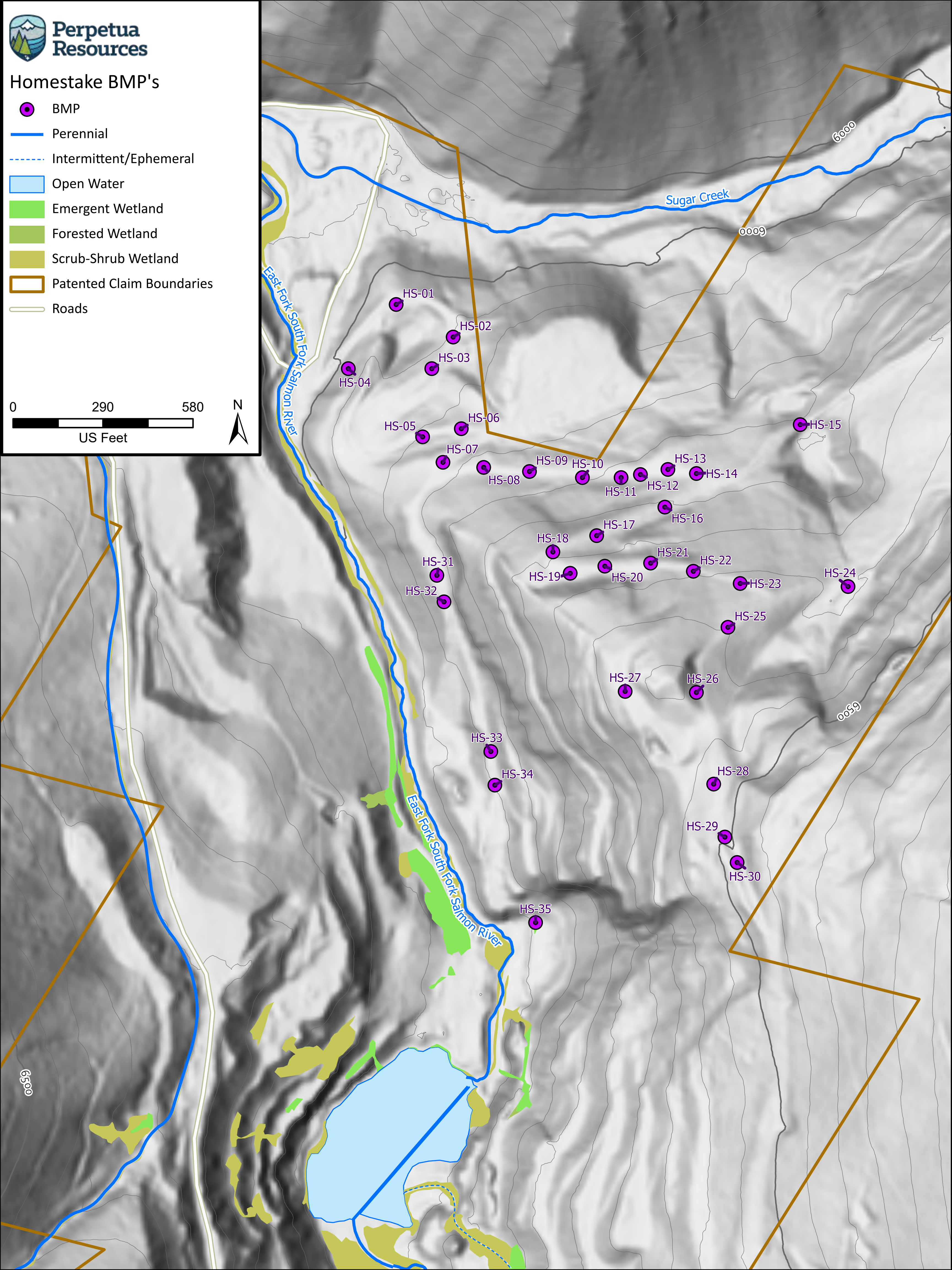


Perpetua Resources
DMEA BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
375
750
US Feet
N
DM-01
DM-02
DM-03
DM-04
DM-05
DM-06
DM-07
DM-08
DM-09
DM-10
DM-11
DM-12
DM-13
DM-14
DM-15
DM-16
DM-17
DM-18
DM-19
DM-20
DM-21
DM-22
DM-23
DM-24
DM-25
DM-26
DM-27
DM-28
DM-29
DM-30
DM-31
DM-32
DM-33
DM-34
DM-35
DM-36
DM-37
DM-38
DM-39
DM-40
DM-41
DM-42
DM-43
DM-44
DM-45
DM-46
DM-47
DM-48
DM-50
DM-51
DM-52
DM-53
DM-54
East Fork South Fork Salmon River
Garnet Creek
6500
7000
7500

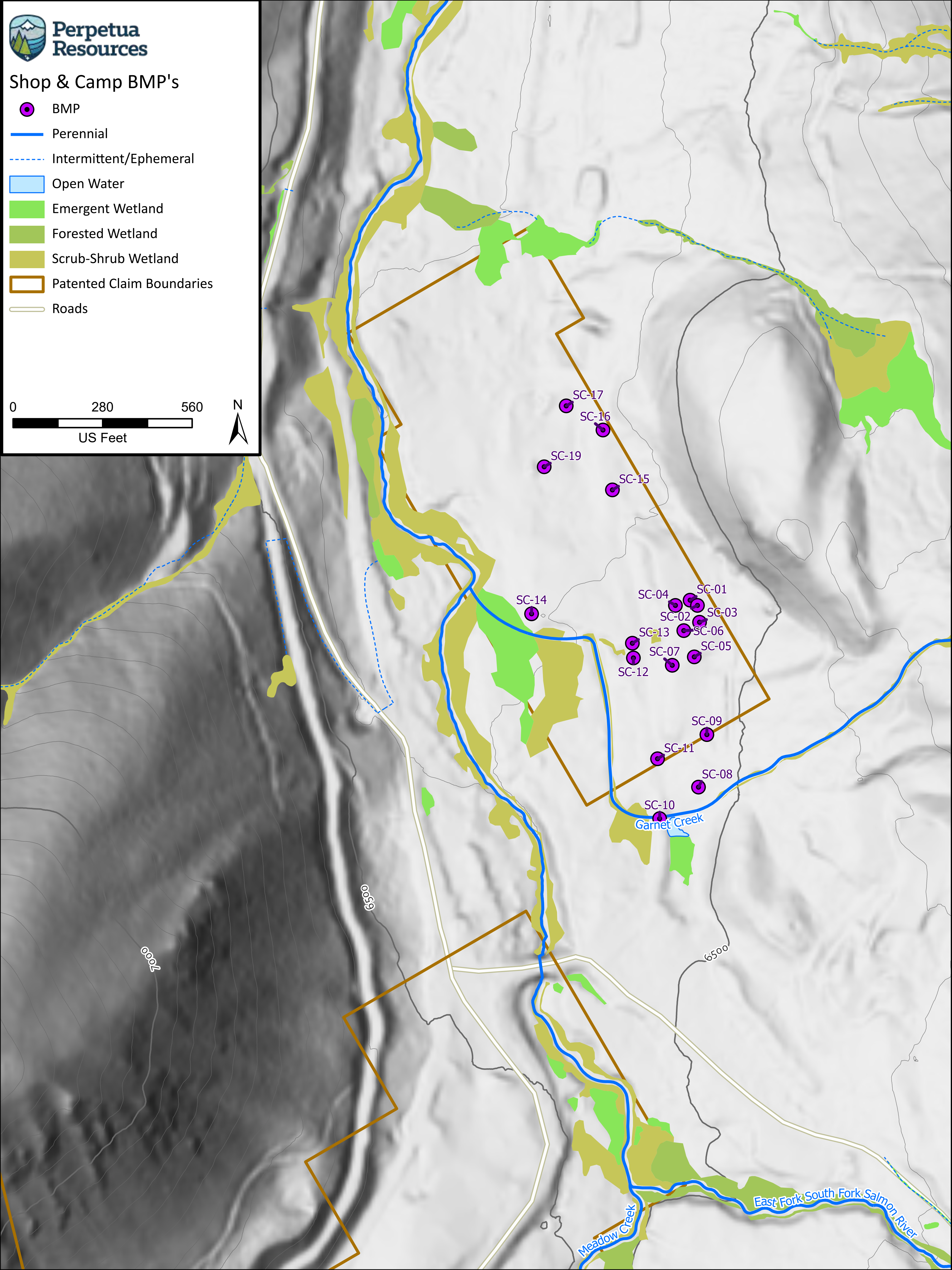


Perpetua Resources
Repository, Airstrip, & Hangar Flats BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
500
1,000
US Feet
N
HF-01
HF-02
HF-03
HF-04
HF-05
HF-06
HF-07
HF-08
HF-09
HF-10
HF-11
HF-12
HF-13
HF-14
HF-15
HF-16
HF-17
HF-18
HF-19
HF-20
HF-21
HF-22
HF-23
Garnet Creek
East Fork South Fork Salmon River
Meadow Creek
East Fork Meadow Creek
7500
7000
6500

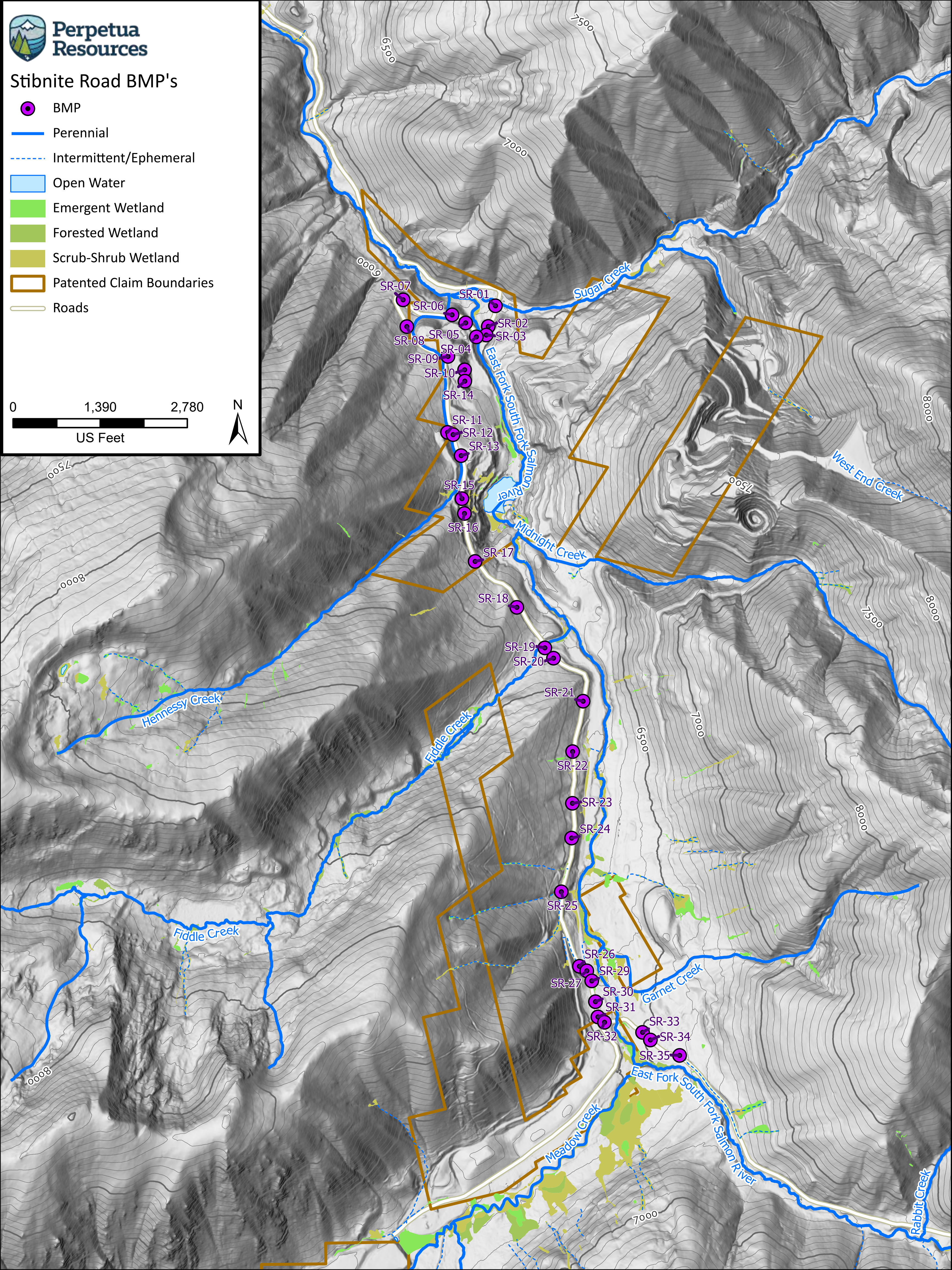

Perpetua Resources
Helipad, Hangar, & Driller's Laydown BMP's
BMP
Perennial
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
150
300
US Feet
N
MY-10
MY-09
MY-01
MY-02
MY-04
MY-03
MY-05
MY-07
MY-06
MY-08
Garnet Creek
East Fork South Fork Salmon River
Meadow Creek
6500
6500



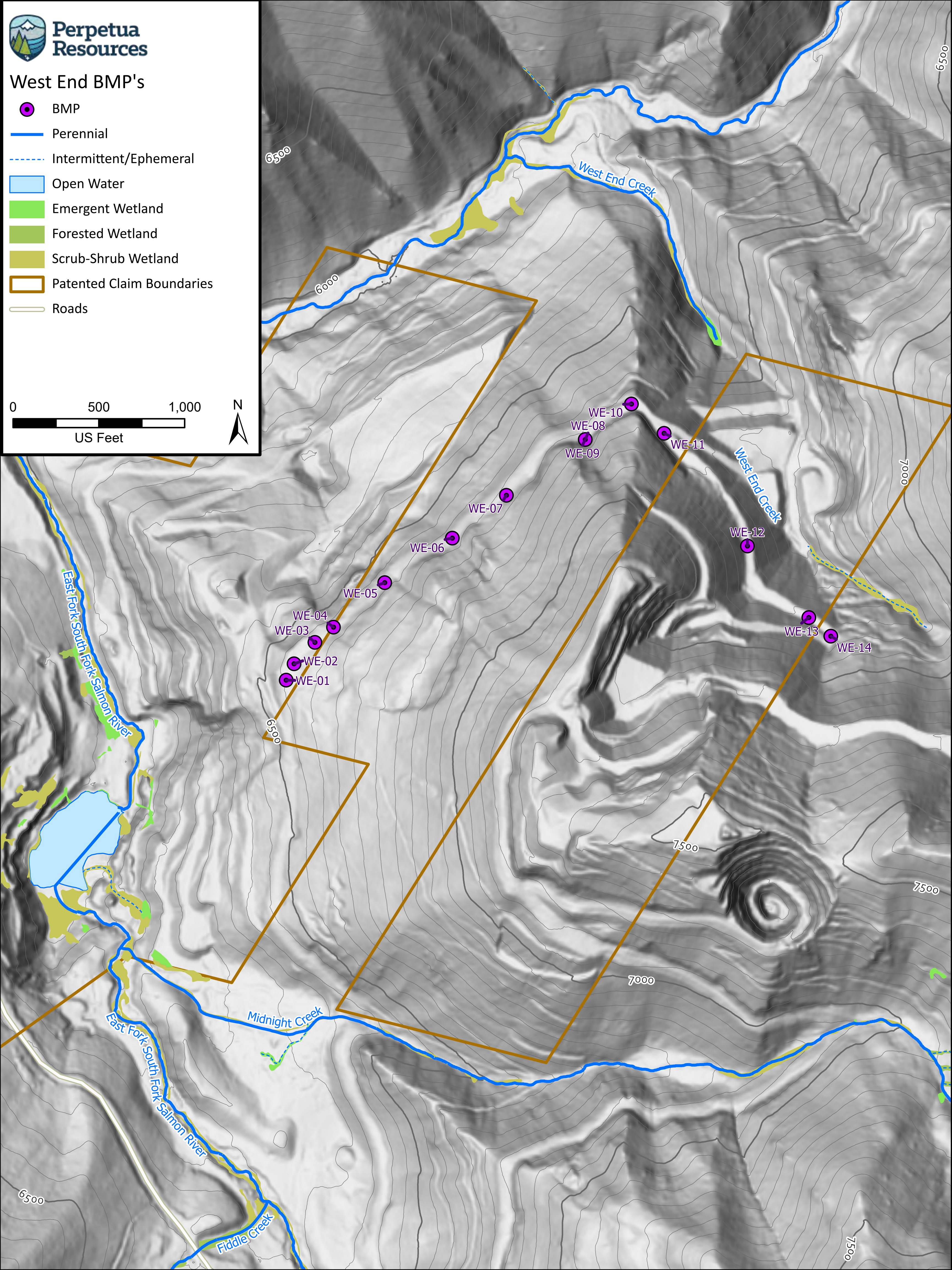
Perpetua Resources
Homestake BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
290
580
US Feet
N
Sugar Creek
East Fork South Fork Salmon River
6000
6500
HS-01
HS-02
HS-03
HS-04
HS-05
HS-06
HS-07
HS-08
HS-09
HS-10
HS-11
HS-12
HS-13
HS-14
HS-15
HS-16
HS-17
HS-18
HS-19
HS-20
HS-21
HS-22
HS-23
HS-24
HS-25
HS-26
HS-27
HS-28
HS-29
HS-30
HS-31
HS-32
HS-33
HS-34
HS-35

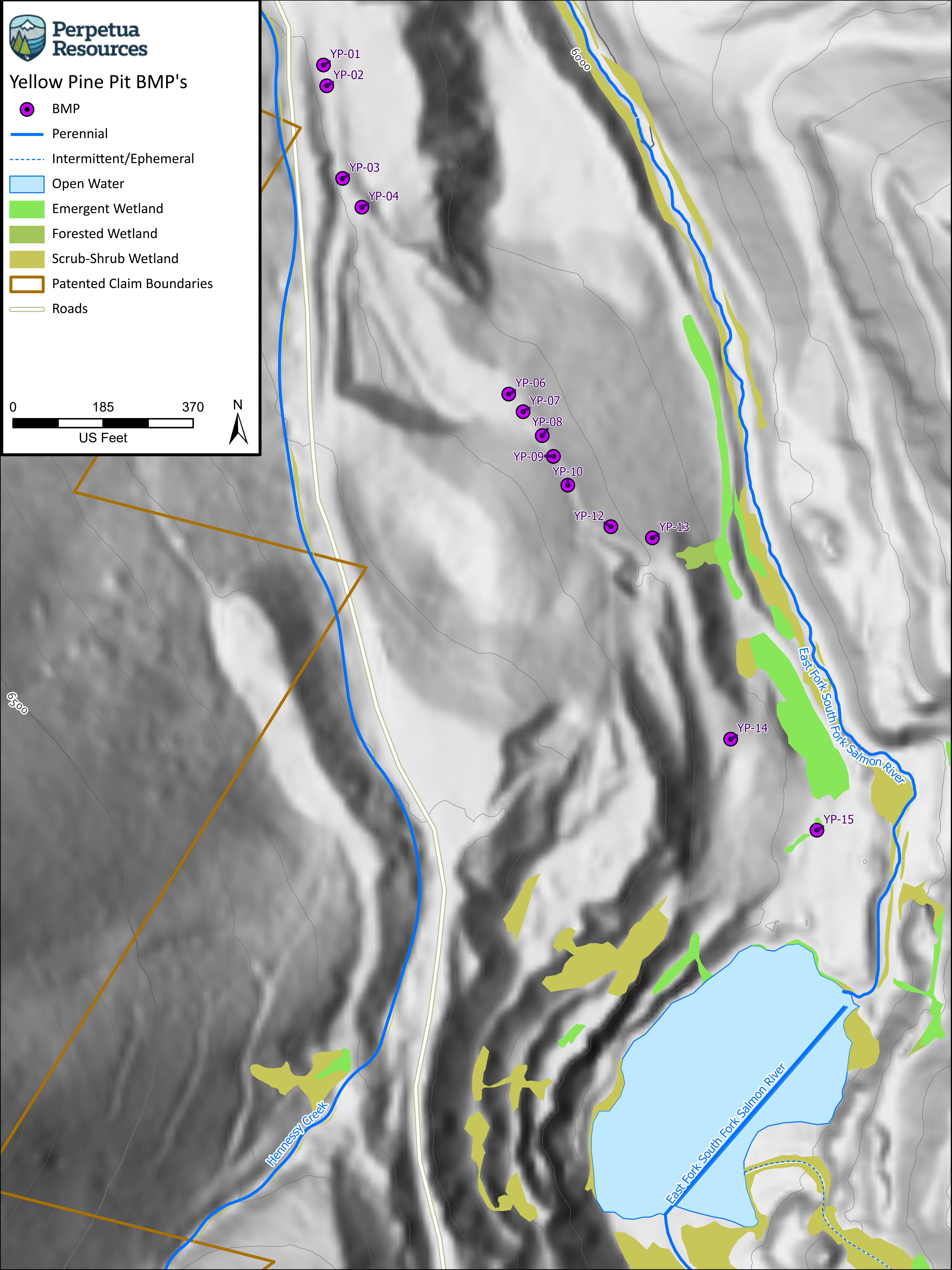


Perpetua Resources
Shop & Camp BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
280
560
US Feet
N
SC-17
SC-16
SC-19
SC-15
SC-14
SC-04
SC-01
SC-02
SC-03
SC-13
SC-06
SC-05
SC-07
SC-12
SC-09
SC-11
SC-08
SC-10
Garnet Creek
6500
7000
Meadow Creek
East Fork South Fork Salmon River



Perpetua Resources
Stibnite Road BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
1,390
2,780
US Feet
N
SR-01
SR-02
SR-03
SR-04
SR-05
SR-06
SR-07
SR-08
SR-09
SR-10
SR-11
SR-12
SR-13
SR-14
SR-15
SR-16
SR-17
SR-18
SR-19
SR-20
SR-21
SR-22
SR-23
SR-24
SR-25
SR-26
SR-27
SR-29
SR-30
SR-31
SR-32
SR-33
SR-34
SR-35
Sugar Creek
East Fork South Fork Salmon River
Midnight Creek
West End Creek
Hennessy Creek
Fiddle Creek
Garnet Creek
Meadow Creek
Rabbit Creek
6000
6500
7000
7500
8000


Perpetua Resources
West End BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
500
1,000
US Feet
N
West End Creek
East Fork South Fork Salmon River
Midnight Creek
Fiddle Creek
WE-01
WE-02
WE-03
WE-04
WE-05
WE-06
WE-07
WE-08
WE-09
WE-10
WE-11
WE-12
WE-13
WE-14
6000
6500
7000
7500



Perpetua Resources
Yellow Pine Pit BMP's
BMP
Perennial
Intermittent/Ephemeral
Open Water
Emergent Wetland
Forested Wetland
Scrub-Shrub Wetland
Patented Claim Boundaries
Roads
0
185
370
US Feet
N
YP-01
YP-02
YP-03
YP-04
YP-06
YP-07
YP-08
YP-09
YP-10
YP-12
YP-13
YP-14
YP-15
6000
6500
East Fork South Fork Salmon River
Hennessy Creek
East Fork South Fork Salmon River

Appendix D: IDEQ Control Measure Sheets

BMP 11: Vegetated Filter Strip

Description

A vegetative filter strip is a vegetated surface designed to treat sheet flow from adjacent impervious surfaces by reducing runoff velocities, filtering sediments, and allowing time for infiltration (Figure 25). A successfully functioning filter strip uses dense vegetation (typically grass), allows only overland sheet flow to cross the strip, and avoids concentrated flows. Vegetative filter strips are engineered runoff treatment measures and should not be confused with natural buffers (BMP 2), which are natural undisturbed areas used to protect streams, creeks, canals, wetlands, and other surface waters.

Figure 25. Filter strip (ITD 2018).

Applicability

Use vegetative filter strips to treat sheet flow runoff from parking lots, roadways, roofs, or other small impervious surfaces. The filter strips are effective at pretreating runoff to protect filtration BMPs from siltation or serve as an *outer zone* of a natural buffer. The strips are especially applicable as part of a storm water treatment train of BMPs.

Figure 26 shows how a vegetative filter can be used with a vegetative swale and natural buffer along a roadway. Filter strips may also be a viable treatment measure for small, less intensely developed sites and on shallow slopes with low runoff velocities.

Vegetative filter strips can help disconnect impervious areas (BMP 4) and are an important component of LID design. If the design requirements listed below cannot be met due to space constraints, vegetative filters can provide some pollutant removal and volume reduction benefits.

Primary BMP Functions and Controls

☐ Construction	☒ Permanent
☐ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☒ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
◖	Phosphorus
◖	Metals
○	Bacteria
◖	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	5 acres
Max. Slope	6%
NRCS Soil Group	ABC
Min. Ground Water Separation	3 feet
Min. Bedrock Separation	5 feet

Limitations

The prime limitation of vegetated filter strips is their inability to handle concentrated flows due their decreased effectiveness and potential for erosion, which could cause the filter strips to become a source of pollution. Unlike swales, a vegetative filter strip should not be used for conveyance of major storms because of the need to maintain sheet flow conditions. Vegetative filter strips should not be used on slopes greater than 6% because of the difficulty in maintaining sheet-flow conditions on steep slopes.

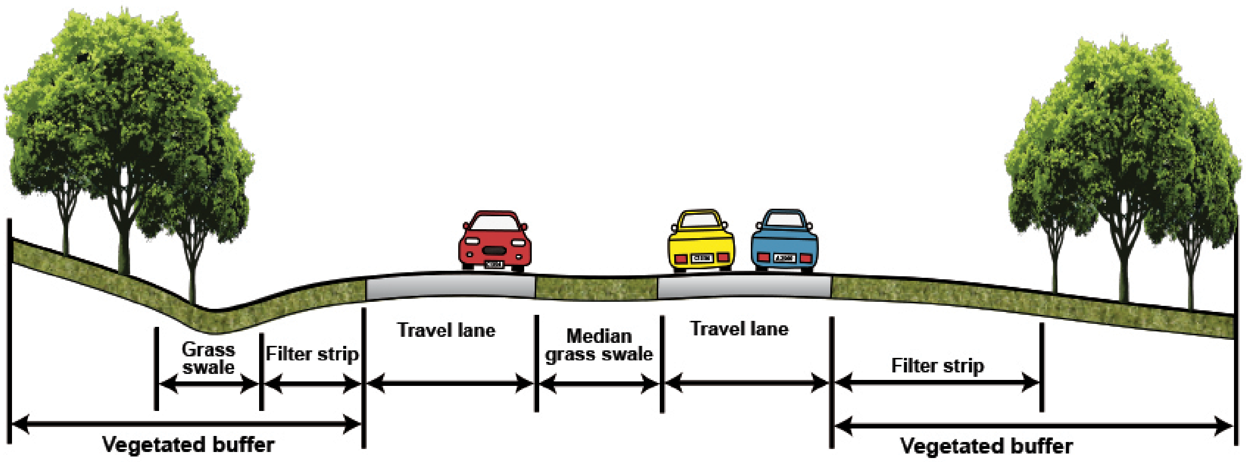


Figure 26. Application of vegetated filter strip with swale and buffer BMPs (Storey 2009).

Similar to vegetated swales (BMP 9), vegetated filters are not appropriate for storm water hotspots with highly contaminated runoff due to their questionable performance in reliably removing pollutants (EPA 2018).

Vegetated filters should not be used in soil with high clay content because of their reliance on some infiltration for treatment. This filter cannot be used where limited land area is available as they can require approximately the same amount of infiltration area as the area being treated.

Design Basis

Filter strip design is based on providing adequate length to treat runoff and ensuring sheet-flow conditions (Figure 27).

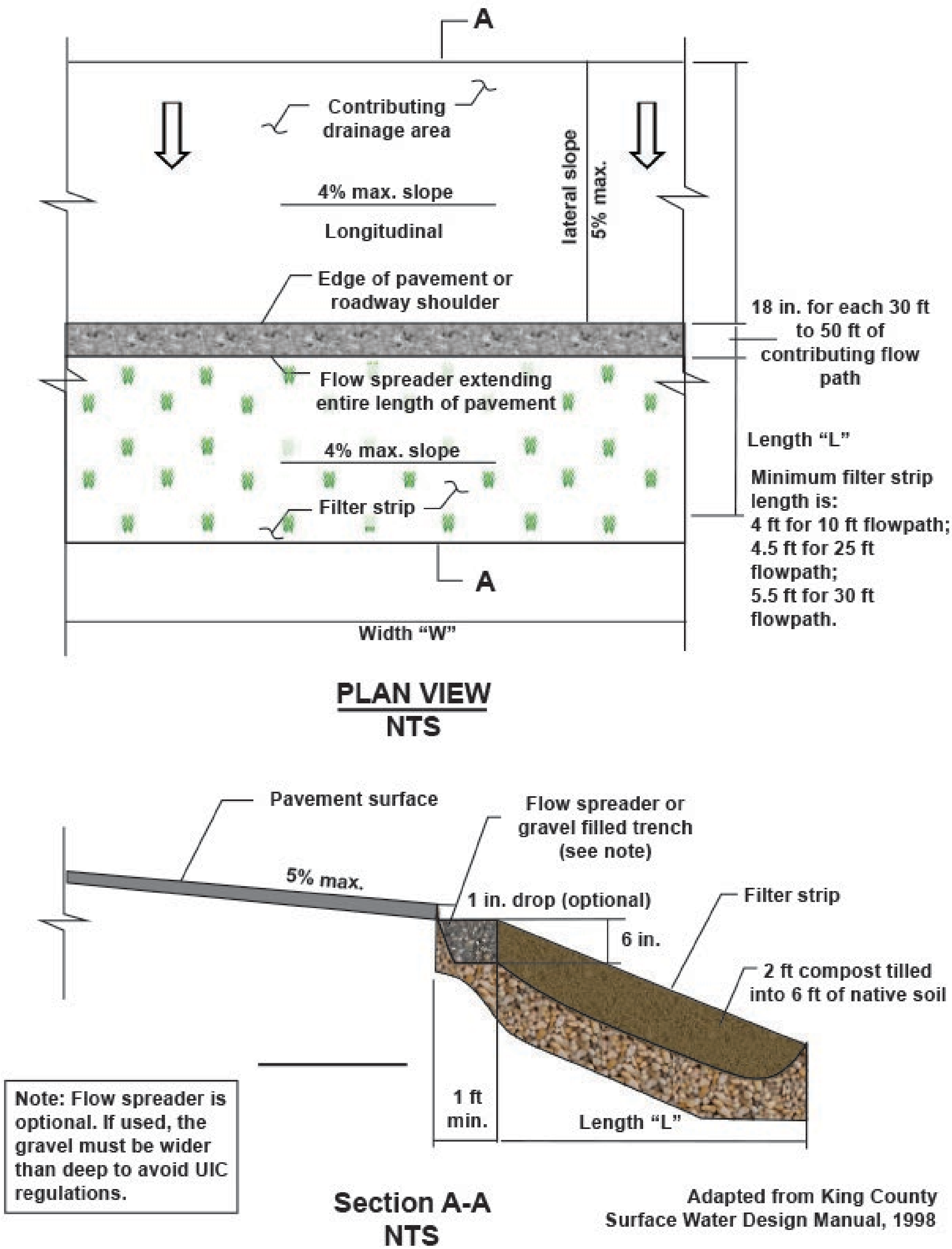


Figure 27. Plan and section view of a typical vegetated filter strip (adapted from King County 1998).

Drainage Area

Although the maximum recommended drainage area for a vegetative filter strip is 5 acres, the limiting design factor is often the flow path length leading up to the strip because flows tend to concentrate after traveling a certain distance. Sheet flows concentrate within a maximum of 75 feet for impervious surfaces and 150 feet for pervious surfaces (Caraco and Claytor 1997). Unless a flow spreader is used, a filter strip length of 580 feet is needed to treat 1 acre of impervious surface.

Design Discharge

Determine the peak flow to be conveyed to the filter strip for the water quality design storm under fully developed conditions. Use hydrologic procedures presented in section 3.6 to determine peak flows.

Flow Depth

Set the width of the filter strip perpendicular to flow equal to the width of the contributing area. Determine the resulting depth of flow needed to convey the design discharge. The design flow depth is limited to 0.5 to 1 inch to maintain sheet flow over the strip. Due to the shallow flow depth, a hydraulic radius approximately equal to the design flow depth can be assumed and Manning's equation for open channel flow can be expressed (Equation 12):

$$y = \left(\frac{Qn}{1.49WS^{\frac{1}{2}}}\right)^{0.6}$$

Equation 12. Design flow depth for vegetative filter.

Where

y = depth of flow (feet)

Q = flow rate (cubic feet per second)

n = Manning's roughness coefficient

W = width of filter perpendicular to flow (feet)

S = longitudinal slope (feet per feet)

Select a value for the Manning's roughness coefficient, n, based on the vegetation to be used (generally n = 0.35). Calculate velocity through the filter strip using Equation 13:

$$V = \frac{Q}{Wy}$$

Equation 13. Velocity through a vegetative filter.

Where

V = velocity (feet per second)

y = depth of flow (feet)

Q = flow rate (cubic feet per second)

W = width of filter perpendicular to flow (feet)

If the required depth is greater than 1 inch or the velocity is greater than 0.5 feet per second, the design should be modified to either accept a smaller drainage area, or a flow spreader can be used to distribute runoff over a greater width.

Length

Calculate the necessary length (parallel to flow) to produce a hydraulic residence time of at least 9 minutes. The minimum length should be 25 feet as most pollutant removal occurs within this distance (Storey 2009).

The length can be calculated using Equation 14:

$$L = t\,V = 540\,V$$

Equation 14. Length of vegetative filter.

Where
L = length of filter (feet)
t = hydraulic residence time
= 540 seconds (9 minutes)
V = velocity (feet per second)

Slope

Vegetative filter strips should be designed with a longitudinal slope of 2% to 6% and should not be used for slopes in excess of 10%. Slopes less than 2% tend to pond water on the surface unless very sandy or gravelly soils are used. Sheet-flow conditions are difficult to maintain on slopes greater than 10%. The top and toe of the filter strip slope should be as flat as possible to encourage sheet flow and prevent erosion.

Flow Distribution

Install a shallow stone trench across the top of the strip to serve as a level spreader (BMP 30). The stone trench should have a minimum depth of 6 inches, minimum width of 12 inches, and should be located 1 inch below the impervious surface to allow for sediment to be accommodated in the filter without blocking flow onto the strip. Make provisions to avoid flow bypassing the filter strip. The stone trench will also act as a pretreatment facility to settle out sediment. Use flush curbing to spread flows across the stone trench.

Soil

Soil conditions enhance infiltration and ensure the long-term health of the vegetation. If possible, stockpile and reuse on-site topsoil. If adequate topsoil is not available on site, import topsoil to provide a minimum topsoil depth of 4 inches on the filter strip or amend the existing soil with compost tilled 6 inches deep. Conduct soil tests to determine the required soil amendments.

Vegetation

Vegetation for filter strips should be durable, dense, and tolerant of both wet and dry periods. Turf or mat-forming grasses are often selected for these reasons although small herbaceous shrubs, which provide root penetration into the subsoils and enhance infiltration, can also be used. Vegetative cover of at least 80% is required and at least 90% is preferred for best pollutant removal. For filter strips next to roadways where deicer is regularly used, salt-tolerant species should be selected.

Depending on the plant species selected, irrigation may be required for plant establishment and for ongoing maintenance. Native species will require little or no irrigation after established so they are preferred over species with high water requirements.

Construction Guidelines

Proper construction of vegetative filter strips is important for good performance. Construction guidelines include the following:

- Avoid compaction during construction and protect the area from construction activities to preserve infiltration capacities.
- If the filter area has been compacted, till and/or amend the soil with compost before installing the filter strip.
- Protect plants from predation during establishment by installing netting or fencing.
- Provide irrigation as necessary for plant establishment.
- Perform fine grading, soil amendment, and seeding after upgradient surfaces have been stabilized and any utility work across the filter area has been completed.
- Properly grade the strip to avoid low spots and ponding.
- If necessary, fence the area during and after construction to keep vehicles, pedestrians, and animals out.
- If the filter is being vegetated with sod, stagger the ends of the sod tiles to prevent the formation of channels along the joints. Use a roller on the sod to remove air pockets between the soil and sod.

Maintenance

Maintenance for vegetated filter strips is similar to other vegetative BMP practices and is aimed at keeping the vegetation healthy:

- Inspect filter strips every 3 months for the first 2 years after installation and then every 6 months thereafter. Preferably, inspect filter strips after storm events.
- Check for uniform vegetative cover and inspect for rills and gullies. Spot replace vegetation as necessary.
- Mow grasses if needed for good growth. Mowing requirements vary for different grass species.
- Leave grass clippings and mulched leaves in place. Do not blow them onto impervious areas as they can be washed into the stream and cause problems with oxygen depletion.
- Remove sediment as needed from the stone trench to prevent clogging. Remove sediment buildup within the bottom when it has accumulated to 25% of the original capacity.

- Remove leaves, litter, and oily materials. Clean curb cuts and level spreaders as needed.
- Check for pools of water and regrade to prevent ponding if necessary.
- Control weeds as needed. Mechanical weed control by pulling or mowing is preferred to chemical herbicides.
- Irrigate if moisture is inadequate during summer drought.
  Fertilizing is often unnecessary because runoff from lawns and other areas provides enough nutrients. If fertilizers are needed, use biodegradable nontoxic fertilizers only at an application rate and formula compatible with plant uptake and soil group. Conduct soil tests as needed to determine existing soil fertility and proper application rate.

Additional Resources

Barrett, M. Lantin, A. and S. Austrheim-Smith. 2004. *Stormwater Pollutant Removal in Roadside Vegetated Buffer Strips*. Prepared for the Transportation Research Board: Washington, DC.

EPA (US Environmental Protection Agency). 2018. *Vegetated Filter Strip*. Water: Best Management Practices. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu*

Storey, B.J., et al. 2009. *Stormwater Treatment with Vegetated Buffers*. Texas College Station, TX: Transportation Institute.

Limitations

Vortex separators are not effective at removing dissolved pollutants or pollutants that adhere to fine particles, such as nutrients. Performance can be compromised during low flows as a swirl action is most effective when the inlet pipe is carrying full pipe flow. Site constraints, including the availability of suitable land, appropriate soil depth, and stable soil to support the unit structurally, may also limit the applicability of hydrodynamic separators. The slope of the site or collection system may necessitate using an underground unit, which can result in an extensive excavation.

Design Basis

Criteria should be obtained from the manufacturer to ensure that the correct design and sizing criteria are used in selecting the appropriate system for a particular site. In general, the flow-through configuration and treatment limitations will force drainage areas to remain relatively small. Currently, units are available from a number of manufacturers in sizes ranging from 3 to 40 feet in diameter with processing capacity from 1.6 to 300 cubic feet per second. Some units are small enough to fit into conventional manholes.

The system should be sized for the water quality design storm. If the system is too large, it will not have the volume/velocity relationship to achieve the swirl action. For storms greater than the water quality design storm, an overflow, or bypass, should be used to divert storm water to an appropriately sized storage facility with a sedimentation basin or other BMP for treatment.

Construction Guidelines

Vortex separators should be installed according to manufacturer's instructions and specifications.

Maintenance

This system requires regular inspection and maintenance to maximize effectiveness. The specific maintenance requirements and schedule should be prepared by the manufacturer and signed by the owner/operator. The frequency of maintenance not only depends on the type of manufactured system chosen but also the pollutant load from the contributing drainage area.

In general, frequent inspections after every storm or every 30 days are recommended during the first year after installation and whenever heaving contaminant load occurs, such as after winter sanding or soil disturbances. Deposition can be measured with a calibrated dip stick, and sediment should be removed by vacuum pumping when the unit is filled to within 1 foot of capacity. Remove floatables and clean screens when needed. The frequency of inspections can be adjusted after the first year based on observed sediment accumulation rates.

Additional Resources

EPA (US Environmental Protection Agency). 1999. *Storm Water Technology Fact Sheet: Hydrodynamic Separators*. Washington, DC: Office of Water. EPA 832-F-99-017. *http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_hydro.pdf*.

BMP 31: Topsoiling

Description

Topsoiling places material suitable for vegetative growth over disturbed lands. Often topsoiling includes native seeds and propagules in the plant growth mix. Topsoiling may involve transporting soils from off site or reusing the existing topsoil that has been stripped and stockpiled during earlier site development activities (Figure 83).

Sites improved with topsoiling are benefitted by additional biofiltration capacity, increased storm water retention and, through a more established root zone, less watering, fertilizing, and pesticide application requirements.

Figure 83. Placing new topsoil on Pioneer Mountain scenic byway, Orofino, Idaho (*Debco Construction*).

Applicability

Topsoiling is recommended on slopes no greater than 2:1 where native soils are unsuitable for vegetative growth. Topsoiling is an effective way to improve plant establishment on sites where moisture, nutrients, or pH levels are low, or where the existing soil is incapable of supporting root systems. This BMP should be used with BMP 32: Landscaping.

Primary BMP Functions and Controls

☐ Construction	☒ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Fair
Max. Tributary Drainage Area	Unlimited
Max. Site Slope	50%
NRCS Soil Group	ABCD
Min. Ground Water Separation	3 feet
Min. Bedrock Separation	2 feet

Limitations

Topsoil should not be applied over a subsoil of contrasting permeability. Placing clay-like topsoil over a sandy soil may cause the topsoil to separate from the existing subsoil as water flows between the two soil layers of different permeability. Topsoil should not be applied when the subsoil is frozen or extremely wet.

Stockpiling topsoil for an extended period of time disrupts soil health, resulting in the partial or total loss of microorganisms. Mixing the top foot of stockpiled topsoil with the remainder of the stockpiled topsoil before final placement ensures a uniform distribution of living organisms (BMP 44: Stockpile Management).

Design Basis

To the maximum extent practicable, the moisture-holding capacity of the soil should be maintained or increased by reusing native topsoil or adding soil amendments. The topsoil should be uniformly distributed at a minimum compacted depth of 4 inches on slopes 3:1 or steeper, and 8 inches deep or greater on flatter slopes. The soil should be approved by an agronomist and may consist of loam, sandy loam, clay loam, silt loam, sandy clay loam, or other mixtures. It should be free of subsoil debris such as sticks, invasive species, stones larger than 1.5 inch diameter, and other extraneous materials.

Topsoil can be obtained commercially or stripped, stockpiled, and replaced following construction. Stockpiled topsoil should undergo a laboratory analysis to determine organic content, pH, and soluble salts. A pH of 6.0 to 7.5 and organic content of not less than 1.5% by weight is recommended. Where soil pH is less than 6.0, lime may be applied to adjust pH to 6.5 or higher. Any soils having soluble salt content greater than 500 parts per million should not be reused.

The topsoil should be tailored to the type of permanent native vegetation desired on site. Traditional topsoil will favor grasses, while the addition of acidic high-carbon amendments may encourage more woody species.

Construction Guidelines

The following guidelines apply to the placement of topsoil:

- The existing or established grade of subsoil should be maintained.
- Lime may be uniformly applied over designated areas where the subsoil is highly acidic or high in clay content.
- Before spreading topsoil, scarify the subgrade to 4 inches deep to permit bonding of subsoil to topsoil. Ripping or restructuring (BMP 45: Minimize Soil Compaction) the subgrade may be necessary in areas that have been overly compacted to restore the infiltrative capacity of the subgrade. Tracking a bulldozer vertically over the slope will pack the soil and create horizontal erosion check slots to prevent topsoil from sliding down the slope.
- Where quantities of stockpiled topsoil on site are limited, it is more desirable to cover all areas of exposed subsoil to a lesser depth than to cover partial areas to the suggested minimum depth.
- Topsoil should not be placed when the subgrade is frozen, excessively wet, or in a condition that may otherwise be detrimental to proper grading or proposed sodding or vegetation establishment.
- Immediately after topsoil placement, stabilize the soil using landscaping (BMP 32), mulching (BMP 52), matting (BMP 54), or soil binders (BMP 55) before proceeding to the next construction phase.
- Stockpiled topsoil should be protected from erosion (BMP 44: Stockpile Management).

Maintenance

Before a site is fully established, inspect topsoil periodically and after major storm events for signs of erosion such as rills and gullies. Damaged areas should be repaired with additional topsoil and reseeded as necessary to minimize erosion and loss of topsoil.

Additional Resources

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. *http://www.ecy.wa.gov/programs/wq/stormwater/manual.html*

BMP 32: Landscaping

Description

Landscaping on new or redeveloped sites establishes vegetated cover that stabilizes the soil, reduces storm water runoff through infiltration, minimizes invasive species, acts as a long-term biofiltering system, and improves aesthetics. Landscaping methods include seeding, sodding, and planting perennial grasses, legumes, native shrubs or wild flowers, bushes, and trees (Figure 84).

Figure 84. Native and drought tolerant plants (Driggs, Idaho).

Seeding is the practice of planting seeds on a prepared soil surface. Sodding refers to placing rolls or strips of grass-covered mats held together by dense root systems on the soil surface. Planting establishes vegetation using living plants grown to a specified size or age.

Using native and/or drought-resistant vegetation is strongly encouraged for all landscaping efforts. *Stormwater Plant Materials: A Resource Guide* (City of Boise 2000) or the *North Idaho Native and Beneficial Plant List* (Sterling Codifiers 2014) offers additional design guidance about plant selection and landscaping techniques to maximize water quality benefits.

Primary BMP Functions and Controls

☒ Construction	☒ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☒ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
◖	Phosphorus
◖	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	Unlimited
Max. Site Slope	Varies
NRCS Soil Group	ABCD
Min. Ground Water Separation	3 feet
Min. Bedrock Separation	3 feet

Applicability

Landscaping can be applied and is encouraged on all sites, even those in urban environments. Seeding and sodding can be used for permanent erosion control. Sodding and planting is most appropriate in locations where vegetation establishment is needed quickly, such as immediate erosion control. Possible uses for sod include buffer zones, dikes, swales, slopes, outlets, level spreaders, and filter strips.

Planting is most appropriate for permanent vegetation establishment where seeding and other slope treatments are either not effective or not appropriate. Such areas may include the following:

- Extremely rocky slopes or areas with generally poor soils.
- Areas or sites with established natural vegetation in significant amounts, which are difficult to seed and mulch effectively.
- Areas where special attention to landscape aesthetics or biological diversity is needed.
- Wetlands and wildlife habitat areas where it may be critical to plant the desired species initially so that the site is not overrun by weeds or undesirable plant species that detract from the intended use of the site.
- Where specific types of trees and shrubs are necessary to remove excess moisture from the soil.
- In areas that require soil stabilization and erosion control sooner than can be provided by seeding, such as along streams, rivers, and lakes (the riparian edge).

Limitations

All landscaping should take place at the proper time of year for both the method of application (seeding, sodding, and planting) and the specific species involved. Generally, it is not recommended to landscape during very hot and dry weather. Depending on site conditions and vegetation species used, irrigation may be required either temporarily or permanently to ensure vegetation establishment and prevent die off.

Sodding and planting is more costly than seeding. However, establishing grasses and plants from seed will take longer than sodding or planting. Landscape establishment will occur more quickly in high precipitation areas, usually over 20 inches of rain annually during the growing season, as opposed to arid or semiarid regions. Sodding usually provides less vegetation diversity than either seeding or planting.

Design Basis

Using native drought-resistant vegetation is strongly encouraged for all landscaping efforts. Native species require little or no maintenance (i.e., watering or fertilizing), mimic natural conditions, and may help limit the introduction of invasive species.

All revegetation efforts should be performed according to local requirements, and lists of acceptable landscape plant species should be obtained from an agronomist or the local cooperative extension. Successful landscaping projects depend on selecting suitable species for the site location considering climate and elevation, surrounding species, using healthy vegetation, and revegetating when the season and weather conditions are favorable. The site should be properly prepared and be adequately maintained to ensure long-term survival of the vegetation.

Seeding

Effective seeding requires proper seedbed preparation and should be conducted with various forms of mulching, matting, and annual grass (cereal grain) as a nurse crop to help protect the seed and retain soil moisture.

Before seeding, ensure that site conditions are capable of supporting seeding efforts. If site conditions lack proper nutrient values, organic content, microorganisms, or root restrictions, a seedbed should be established. Seedbeds may consist of topsoil (BMP 31), compost, or soil enhancements (BMP 7).

Sodding

As long as moisture conditions are adequate, sod may be placed at any time of year. Turf, or sod, consists of matted earth formed by grass and soil bound together by a root layer. Rethinking turf as the primary ground cover does not imply that all grassy areas should be replaced. Turf should be planted only where it is desirable and will be used to support designated land uses (e.g., athletic fields or recreation areas) and in an appropriate amount. Turf grass does not always provide the needed erosion control, so interim use of a cover crop to improve soil fertility and stability between construction completion and final planting may be beneficial. Consult a local agronomist, a soil scientist, or an extension office for the proper selection and application of cover crops.

Follow these guidelines for establishing turf in residential areas:

- Place turf in rear yards close to the residence where the bulk of recreational activity is likely to occur.
- Use drought-tolerant and native species of grass.
- To avoid a monoculture, use various species of turf grass in your landscaped areas.

The soil surface should be at final grade and roughened before laying down sod. Topsoil (BMP 31) may be needed in areas where soil textures or conditions are inadequate (such as dense or impermeable soils). Sod may be placed directly on the ground without topsoil only if it has been specifically grown for sites with no topsoil. Add lime and fertilizers as needed to promote good plant growth conditions. Sodding should take place immediately after the soil bed is established, and it should be rolled or compacted immediately after installation to ensure firm contact with the underlying soil.

Sod is commercially available in rolled strips that can be applied in staggered rows or other patterns. Areas not covered by the specified pattern may be seeded to reduce expense. When placed on steep slopes, lay the sod parallel to flow with staggered joints or peg down (or both) and place chicken wire, jute, or other netting over the sod for extra protection against lifting. If slopes will be mowed, do not place sod on grades greater than 3:1 (Figure 85 and Figure 86**).**

Figure 85. Sod laying pattern.

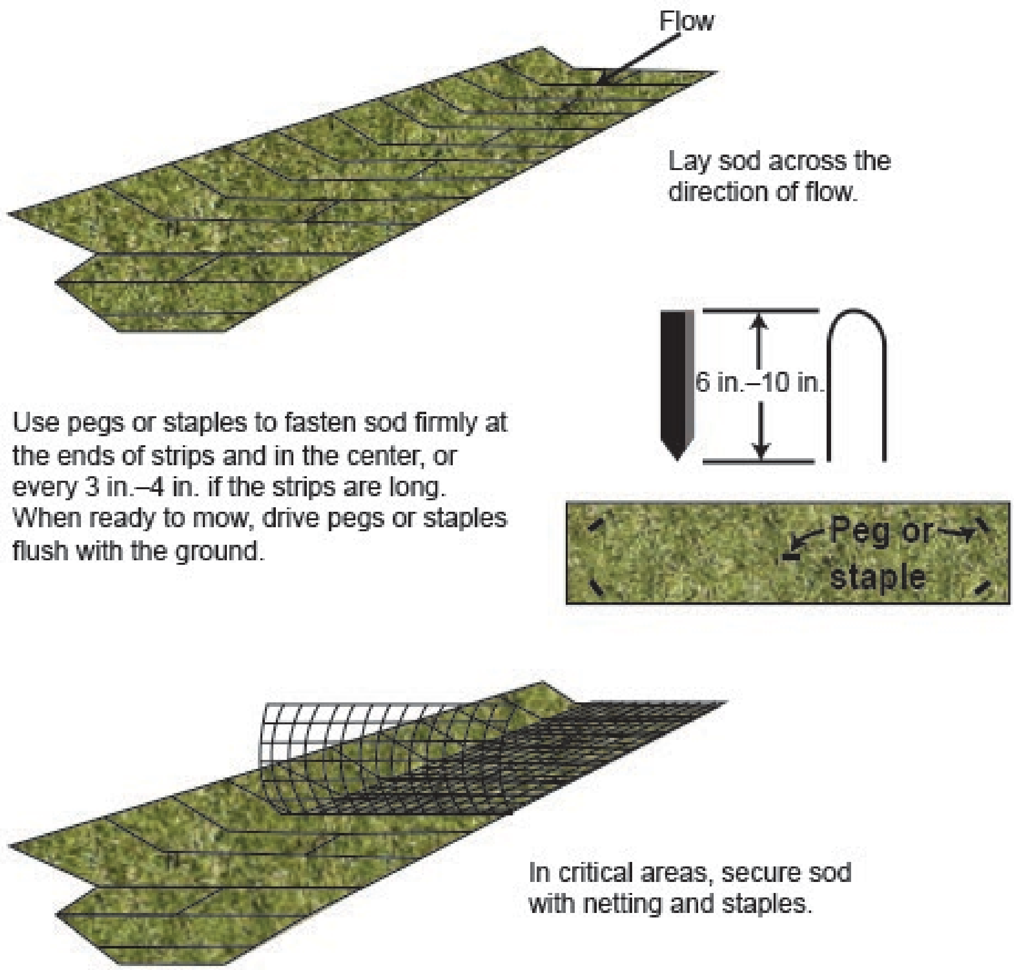


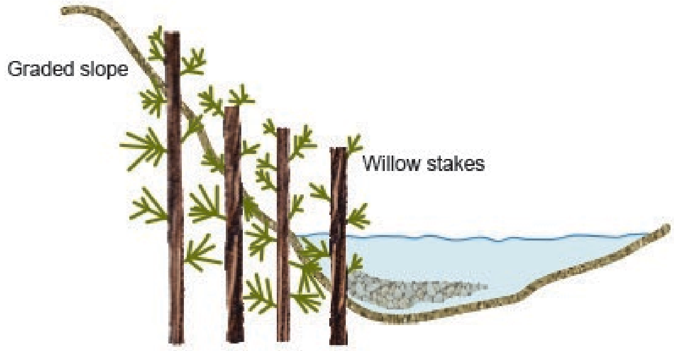
Figure 86. Steep slope details.

Planting

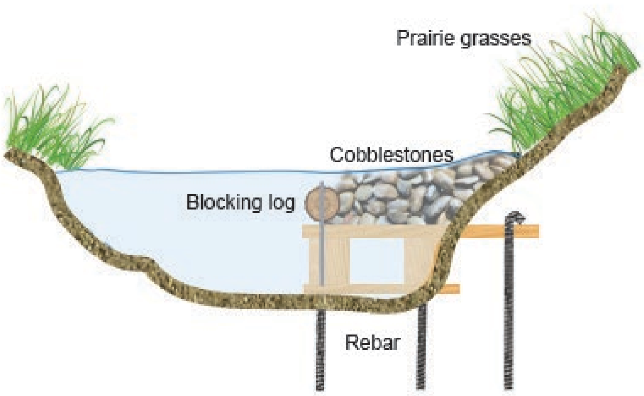
Planted material may be grown from either cuttings or seed. At delivery to a job site, the plants may be potted (in containers), root wrapped, or bare rootstock. Some species are successfully planted as sprigs or tubelings. Vegetative planting may be combined with seeded grasses and legumes that provide immediate surface coverage. Planting methods are shown in Figure 87, Figure 88, and Figure 89.

Examine plant materials before use to ensure that species, container sizes, and root and soil conditions are acceptable. If possible, the growth medium for containerized plants should be similar to the soil type on the revegetation site. Container size guidelines are as follows:

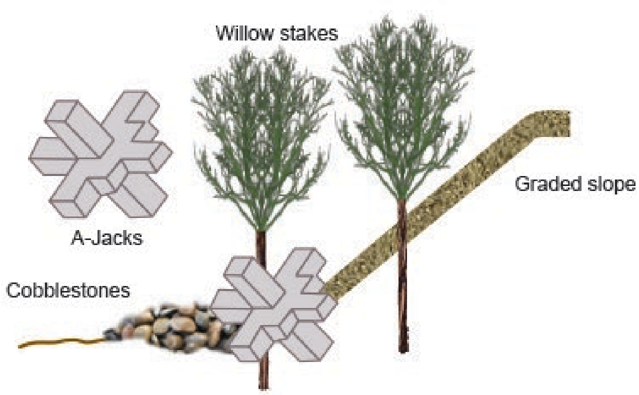
- Tree species may be bare rootstock or potted stock. Pots and containers should be adequate size for the tree, shrub, or plant that it contains.
- Shrub species may be bare rootstock or potted stock.
- Peat pots are not recommended as research shows greater plant mortality from drying. If peat pots are used, remove any exposed peat pot material showing after planting.



Willow posts installed below depth of streambed scour



Lunker with riprap below baseflow stage. Rebar is driven below bed scour depth



A-jack bank structures

Figure 87. Planting methods on graded slopes.

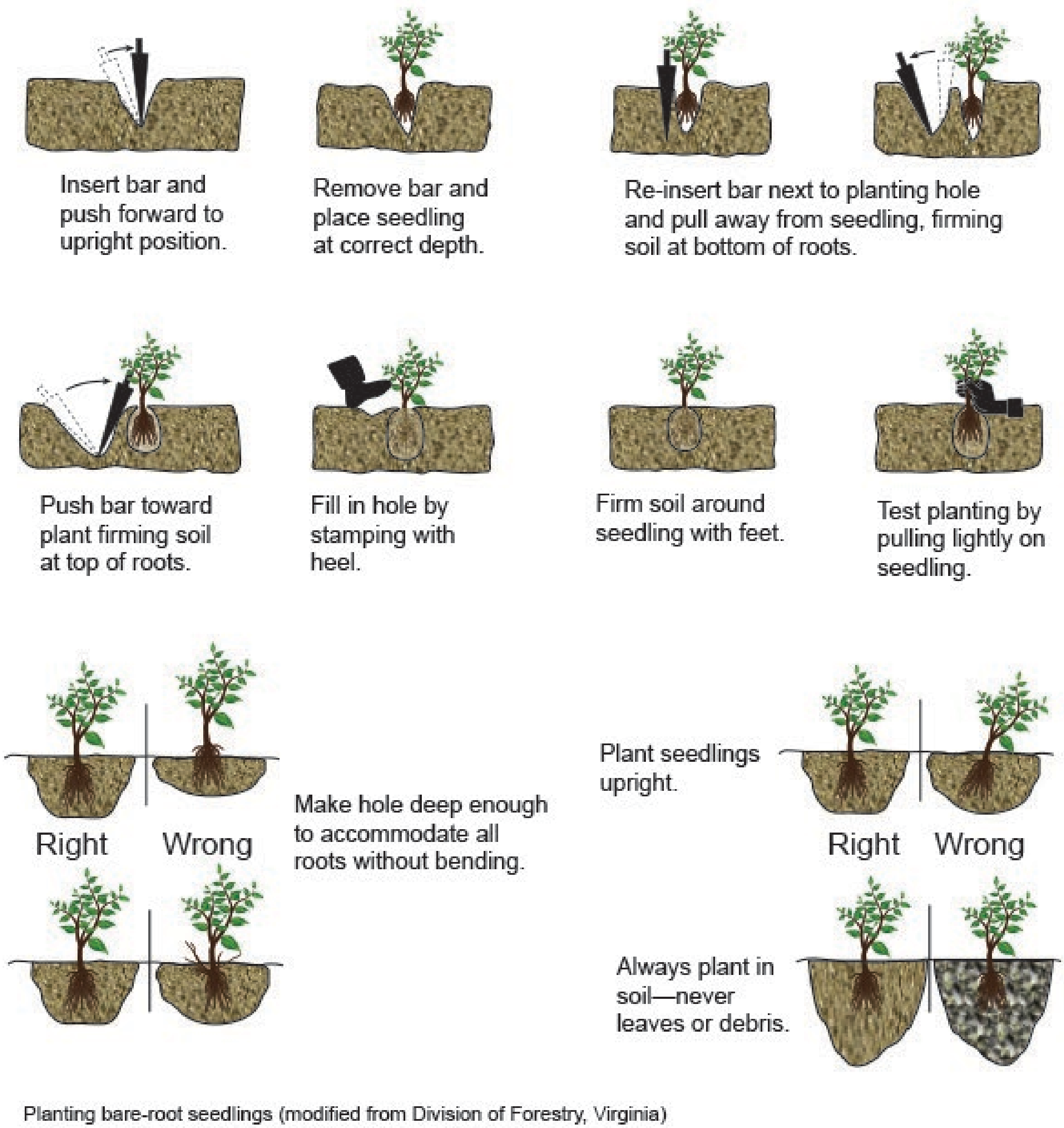


Figure 88. Planting methods for seedlings.

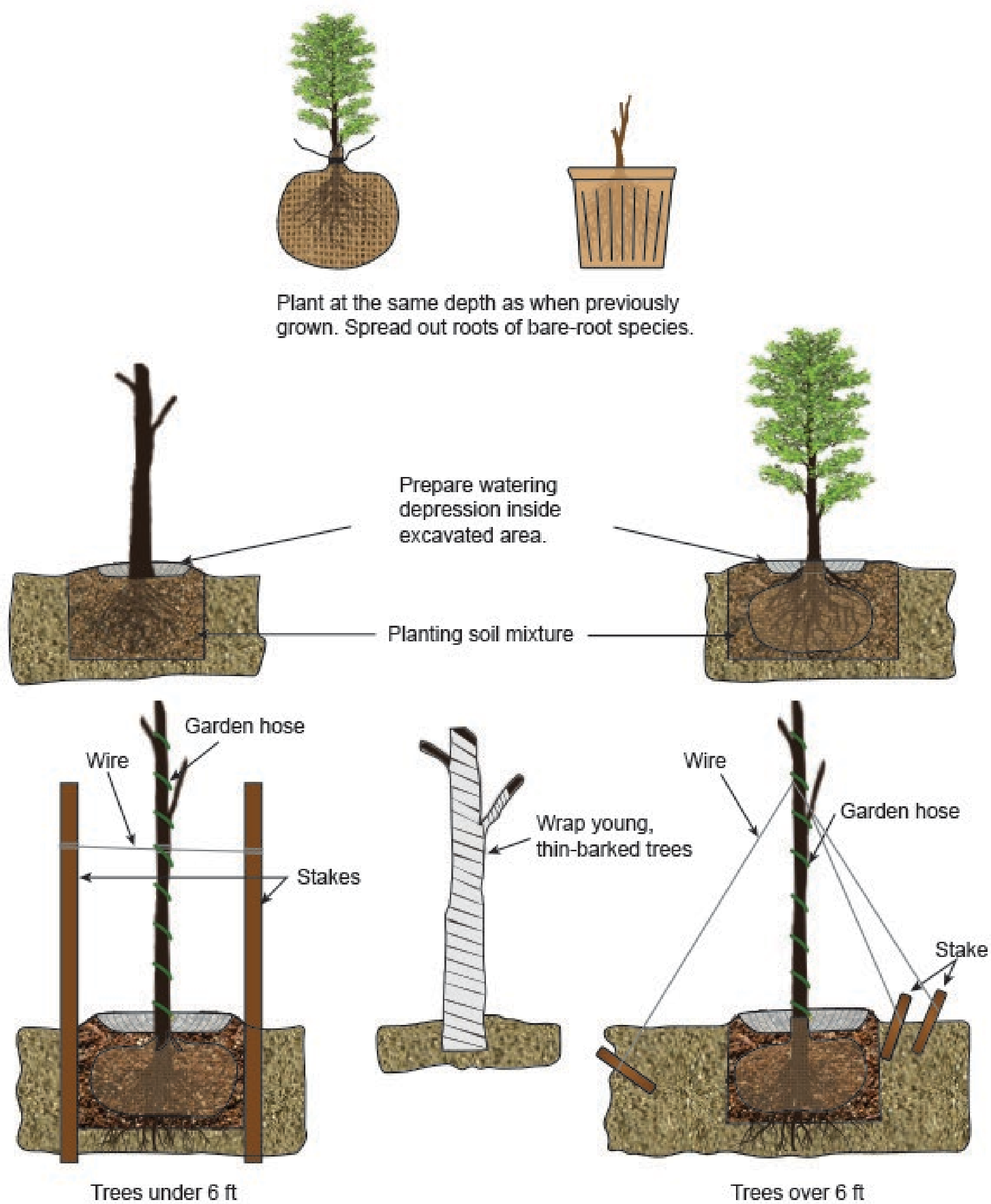


Figure 89. Planting methods for trees.

Construction Guidelines

Before temporary seeding, all runoff control measures should be in place to prevent seed loss during a storm event.

As permanent landscaping is the last phase of reclaiming disturbed soils, all other construction activities should be completed before the final placement of landscaping materials. During construction, avoid compacting areas to be landscaped (BMP 45: Minimize Soil Compaction) as overly compacted planting beds will not vegetation as quickly or thoroughly.

Before planting, the locations of the trees, shrubs, ground covers, and other vegetation should be marked and approved.

Store bundled bare root planting stock, whether tree or shrub species, in a cool, moist place from time of receipt until time of planting. This time should not exceed 10 days. Store potted plant stock in the shade and out-of-doors and maintain a moist soil from the time of receipt to the time of planting. This time should not exceed 30 days.

Maintenance

- Inspect all landscaped areas on a regular basis and after each major storm event to check for areas where corrective measures may have to be made.
- Indicate which areas need to be reseeded, resodded, replanted or where other remedial actions are necessary to ensure the vegetation is permanently established.
- Proper irrigation of landscaped areas during the first 2 years following construction is suggested to increase the survival of the vegetation.
- Any seeded area that has failed to establish at least an 80% ground cover within 1 month should be reseeded. If reseeding is ineffective, an alternative method, such as sodding, should replace seeding efforts.

Additional Resources

City of Boise. 2000. *Stormwater Plant Materials: A Resource Guide*. Boise, ID: Boise Public Works.

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

King County (King County, Washington). 2009. *King County, Washington Surface Water Design Manual.* Seattle, WA: King County, Department of Natural Resources.

NRCS (US Department of Agriculture Natural Resources Conservation Service). 2004. *Plant Guide: Kentucky Bluegrass*. Baton Rouge, LA: National Plants Data Center. *http://plants.usda.gov/plantguide/pdf/pg_popr.pdf*

Sterling Codifiers, Inc. 2014. “Appendix B—North Idaho Native and Beneficial Plant List.” *Bonner County, Idaho County Code*. Bonner County, ID. *https://evogov.s3.amazonaws.com/media/136/media/61416.pdf*

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. *http://www.ecy.wa.gov/programs/wq/stormwater/manual.html*

BMP 36: Construction Timing

Description

Proper timing and sequencing of construction activities minimizes erosion and sediment transport by coordinating land-disturbing activities and erosion and sediment control measures installation and by completing construction during periods of low erosion potential (Figure 97). In construction phasing, only a portion of a site is disturbed at one time, and final stabilization is completed before moving on to another part of the site, which limits potential erosion (BMP 1: Minimize Land Disturbance, BMP 39: Clearing Limits, BMP 38: Preserve Topsoil and Vegetation, and BMP 45: Minimize Soil Compaction).

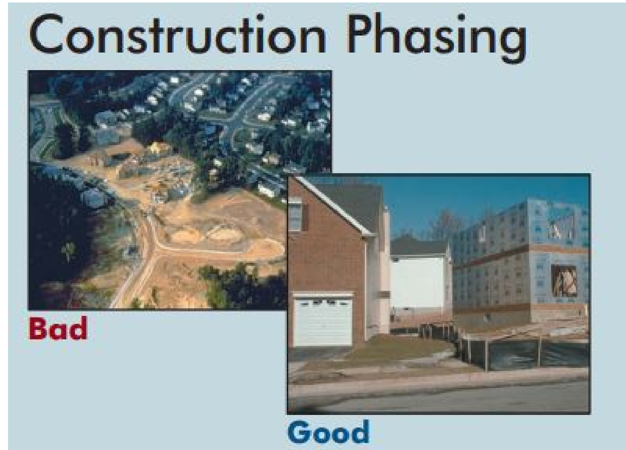


Figure 97. Construction phasing reduces the amount of time soil is exposed (EPA 2003).

Applicability

All construction projects can benefit from upfront planning to phase and sequence construction activities to minimize the extent and duration of disturbance.

Large construction projects and areas where work activities can be timed to coincide with periods of low erosion potential, such as during dry weather, especially benefit from good construction timing. Small projects that are less than 5 acres in size and occur during a short time period during the dry season may qualify for waived NPDES permitting requirements. See EPA's *rainfall erosivity waivers*.

Limitations

Timing construction based on seasonal limitations may not always be possible due to bidding, letting, timing, and contract administration. Additional restrictions may exist on scheduling or sequencing of certain work activities and the maximum allowable exposure of surface area based on environmental permits and requirements.

Primary BMP Functions and Controls

☒ Construction ☐ Permanent
☒ Erosion Control ☒ Sediment Control
☐ Source Control ☐ Flood Control
☐ Filtration ☐ Infiltration

Typical Effectiveness for Targeted Pollutants

● Sediment
● Phosphorus
◖ Metals
○ Bacteria
○ Hydrocarbons
○ Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	N/A
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Design Basis

The locations and dimensions of BMPs appropriate to the major phases of development should be clearly identified on the SWPPP map and included in the construction drawings (Table 21). In some cases, several drawings may be needed to show construction-phase BMPs placed according to phases of construction (e.g., clearing and grading, utility installation, active construction, and final stabilization) as erosion and sediment controls needed at a site will change as construction progresses.

Consider site characteristics and permit conditions when deciding what kind of erosion control devices to incorporate into a construction project. Select measures that can be installed without disrupting critical timing or sequencing of other construction or erosion control activities.

Construction Guidelines

Phasing

Typical phasing best practices include the following:

- Conduct work in phases so that some portions of the project site are final-graded and stabilized before the next phase of the project is started.
- Limit the amount of disturbed area at any given time on a site to the extent practical. For example, a 100-acre subdivision might be constructed in five phases of 20 acres each.
- If stockpiled material is carried over from one phase to the next, position carryover material in a location easily accessible for the pending phase so the stabilized area is not disturbed.

Timing and Sequencing

Typical timing and construction sequencing best practices include the following:

- Schedule construction during seasonal low-runoff periods under favorable soil moisture conditions, whenever possible.
- Allow time to install sediment collection systems, drainage systems, and runoff diversion devices before beginning ground-disturbing work in an area.
- Install and maintain effective soil stabilization measures as work progresses, not just when construction is completed.
- Initiate slope stabilization measures within 14 calendar days after construction activities in the portion of the site where earthmoving activities have temporarily or permanently ceased.
- Develop a scheduling/sequencing plan addressing the construction sequencing to reduce erosion potential. If using a Critical Path Method (CPM) for scheduling, incorporate the erosion control and storm water management practices into the method.

Table 21. Recommended BMPs for construction phases (Colorado UDFCD 2010).

Project Phase	Best Management Practice
Predisturbance site access	• Install sediment controls downgradient of access point (on paved streets this may consist of inlet protection) (BMP 66, BMP 74). • Establish vehicle tracking control at entrances to paved street. Fence as needed (BMP 40, BMP 65). • Use construction fencing to define the project's boundaries and limit access to areas of the site not to be disturbed (BMP 41). **Note**: it may be necessary to protect inlets in the general vicinity of the site, even if not downgradient, if there is a possibility that sediment tracked from the site could contribute to the inlets.
Site clearing and grubbing	• Install perimeter controls (e.g., silt fence and wattles) as needed on downgradient perimeter of site (BMP 64, BMP 65). • Limit disturbance to areas planned for disturbance and protect undisturbed areas within the site (e.g., construction fence and flagging) (BMP 1, BMP 2, BMP 3, BMP 39). • Preserve vegetative buffer at site perimeter (BMP 2, BMP 38). • Create stabilized staging area (BMP 37). • Locate portable toilets on flat surface away from drainage paths. Stake in areas susceptible to high winds (BMP 50). • Construct concrete washout area and provide signage (BMP 47). • Establish waste disposal areas (BMP 51). • Install sediment basins (BMP 66). • Create dirt perimeter berms and or brush barriers during grubbing and clearing (BMP 70). • Separate and stockpile topsoil; leave roughened and/or cover (BMP 31). • Protect stockpiles with perimeter control BMPs. Locate stockpiles away from drainage paths and access from the upgradient side so perimeter controls can remain in place on the downgradient side. Use erosion control blankets, temporary seeding, and/or mulch for stockpiles that will be inactive for an extended period (BMP 44). • Leave disturbed area of site in a roughened condition to limit erosion. Consider temporary revegetation for areas of the site that have been disturbed but will be inactive for an extended period (BMP 8, BMP 32, BMP 58). • Water to minimize dust but not to the point that watering creates runoff (BMP 43).
Utility and infrastructure installation	**In addition to the BMPs above**: • Close trench as soon as possible (generally at the end of the day). • Use rough-cut street control or apply road base for streets that will not be promptly paved (BMP 40, BMP 41). • Provide inlet protection as streets are paved and inlets are constructed (BMP 74). • Protect and repair BMPs as necessary. • Perform street sweeping as needed (BMP 75).
Building construction	**In addition to the BMPs above**: • Implement materials management and good housekeeping practices for home building activities (BMP 80, BMP 90). • Use perimeter controls for temporary stockpiles from foundation excavations (BMP 44). • For lots adjacent to streets, lot-line perimeter controls may be needed at the back of curb (BMP 41).
Final grading	**In addition to the BMPs above**: • Remove excess or waste materials (BMP 48, BMP 49, BMP 50, BMP 51). • Remove stored materials (BMP 32).

Project Phase	Best Management Practice
Final stabilization	**In addition to the BMPs above**: • Seed and mulch/ tackify (BMP 32, BMP 52). • Seed and install blankets on steep slopes (BMP 32, BMP 53, BMP 54) • Remove all temporary BMPs when site reaches final stabilization (BMP 62, BMP 68, BMP 70).

Maintenance

Continually monitor site conditions and work progress. Update the project work schedule to maintain appropriate timing and sequencing of construction and control applications. When the construction schedule is altered, erosion and sediment control measures in the SWPPP and construction drawings should be adjusted to reflect exiting conditions. Maintain appropriate erosion and sediment control measures that align with construction phasing and sequencing.

Additional Resources

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. *http://www.ecy.wa.gov/programs/wq/stormwater/manual.html*

BMP 37: Staging Areas

Description

Staging areas are clearly designated locations where construction equipment, vehicles, stockpiles, waste bins, office trailers, and other construction-related materials may be stored on site. Staging areas should be located, constructed, and maintained to prevent the discharge of sediment, solid waste, dust, trash, debris, or other pollutants from the site (Figure 98).

Figure 98. Construction staging area (Colorado UDFCD 2010).

Applicability

Most construction sites require a staging area. The size of the staging area depends on the size and type of the project and duration of construction.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☐ Erosion Control	☒ Sediment Control
☒ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
◖	Phosphorus
◖	Metals
◖	Bacteria
◖	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Medium
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Limitations

Some sites have limited space available, and it may be desirable to place the staging area off site or within an adjacent roadway. Staging areas in roadways require special measures to prevent materials from washing into existing storm inlets.

Measures to prevent storm water from entering the staging area tend to concentrate flow and can result in excessive erosion downstream if additional BMPs are not installed.

Design Basis

Size and Location

Size the staging area so that it provides appropriate space to accommodate storage and parking needs, as well as loading and unloading operations. When designing the stabilized staging area, minimize the area of disturbance to the maximum extent practical as oversizing the staging area may disturb existing vegetation in excess of the project requirements (BMP 1: Minimize Land Disturbance and BMP 39: Clearing Limits). Oversizing increases costs and requires long-term stabilization after the construction period. Consider using off-site parking areas and restrict vehicle access to the site if possible to minimize the size needed for staging.

Place staging areas where site impacts will be minimized and at least 50 feet away from streams, surface waters, or wetlands. If possible, locate the staging area in a place that will be disturbed, such as the planned location for a road or parking area, and move it as construction progresses to limit the amount of unnecessary site disturbance.

Features

The staging area should have a stabilized surface, either paved or covered with 2- to 4-inch diameter aggregate at 3 to 6 inches deep, and accessed by a stabilized construction entrance. If the staging area is located in an area that would not be otherwise disturbed, consider using construction mats in lieu of rock to minimize long-term stabilization needs. BMP 41: Stabilized Construction Roads and Staging Areas provides more information on surface treatment requirements.

The grading in and around the staging area should control uncontaminated flow by diverting it around areas that may have pollutants and also contain potentially contaminated flows or divert them to treatment facilities.

Surround the staging area by construction fencing to prevent unauthorized access to construction materials. Perimeter sediment controls such as silt fence (BMP 65), sediment fiber rolls (BMP 64), or other measures should also be installed around the area as appropriate.

Materials storage should follow guidelines from BMP 77: Outdoor Storage, BMP 46: Spill Prevention and Control, and BMP 87: Outdoor Loading and Unloading of Materials. To comply with the Construction General Permit (EPA 2012b), storage areas for building products must provide either cover (e.g., plastic sheeting or temporary roofs) to prevent these products from coming into contact with rainwater, or a similarly effective means designed to prevent the discharge of pollutants from these areas.

Materials should be stored separately as appropriate using guidelines from BMP 48: Hazardous Materials Management. Hazardous or toxic wastes should be stored separate from construction and domestic waste. Flammable and combustible material should be segregated and stored in appropriately sized secondary containment.

Flow Diversion

Limiting the flow across staging areas reduces the volume of storm water that may carry pollutants from the area and require treatment. If the staging area cannot be located away from areas expected to receive significant volumes of storm water runoff, flow diversion BMPs, such as storm water conveyances, dikes, or berms, are needed.

Storm Water Conveyances

Storm water conveyances include either temporary or permanent channels, gutters, drains, or sewers. The conveyances are constructed or lined with many different materials, including concrete, clay tiles, asphalt, plastics, metals, riprap, compacted soils, and vegetation. By their nature, storm water conveyances concentrate flow, and storm water should be routed through stabilized structures to discharge to a receiving water or other storm water BMP.

In planning for storm water conveyances, consider the amount and speed of typical storm water runoff. Also, consider the storm water drainage patterns, so that channels may be located to collect the most flow and built to handle the appropriate runoff volume. When deciding on the type of material for the conveyance, consider the material's resistance, durability, and compatibility with any pollutants it may carry.

Conveyance systems are most easily installed when a facility is initially constructed. Where possible, use existing grades to decrease costs. Grades should be positive to allow for the continued movement of the runoff through the conveyance system; however, grades should not increase velocity, causing excess erosion. When assessing erosion potential, consider the materials used for lining the conveyance and types of outlet controls provided. Reference the following BMPs for additional design parameters.

- BMP 28: Conveyance Furrows for Roof Runoff
- BMP 56: Riprap Slope Protection
- BMP 57: Pipe Slope Drain
- BMP 68: Temporary Swale

Dikes and Berms

Diversion dikes or berms are ridges built to block runoff from passing beyond a certain point. In planning for dike installation, consider the slope of the drainage area, height of the dike, amount of runoff it will need to divert, and type of conveyance that will be used with the dike. Steeper slopes result in higher volumes of runoff and higher velocities, which the dike should be capable of handling. Dikes are limited in their ability to manage large volumes of runoff. Temporary dikes (usually made of dirt) generally only last for 18 months or less but can become permanent structures by stabilizing them with vegetation. Slope protection such as vegetation is crucial for preventing the erosion of the dike. For additional design parameters, see BMP 69: Diversion Dike and BMP 70: Temporary Berms.

Construction Guidelines

Staging areas should be planned and designed before starting construction; however, certain BMPs, such as dikes and berms, may be constructed at any time. Implementing staging areas and associated drainage needs should also be incorporated into BMP 36: Construction Timing.

Specific construction methods apply to the type of conveyance, dikes, berms, graded areas, and pavements being used. Refer to applicable BMPs for construction guidelines.

Maintenance

Maintenance of staging areas includes inspecting and repairing the stabilized surface, repairing perimeter controls, and following good housekeeping practices.

Storm water diversions, such as conveyances and dikes, should be inspected regularly and within 24 hours of a storm event. Daily inspections may be required during periods of prolonged rainfall as heavy storms may clog or damage the conveyances or wash away parts of temporary dikes. Any necessary repairs should be made immediately to ensure the structure continues to function effectively.

Inspect unpaved, graded areas to check for gullies and other signs of erosion. Inspect paving regularly for cracks that may allow contaminants to seep into the ground. Ensure drains receiving the discharge from the paved area remain free of clogged sediment or other debris so that the water does not back up into areas where pollutants may be.

When construction is complete, debris, unused stockpiles, and materials should be recycled or disposed of properly (Section 3.10.7, "Construction Disposal Alternatives"). Permanently stabilize staging areas with vegetation or other surface cover planned for the development.

Additional Resources

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

BMP 38: Preserve Topsoil and Vegetation

Description

Protect topsoil and vegetation (e.g., trees, grasses, and other plants) by preventing disturbance or damage to specified areas of the construction site. Preserving natural vegetation and native topsoil prevents soil erosion by minimizing the amount of bare soil exposed to erosive forces (Figure 99). Vegetation also provides storm water detention, biofiltration, and aesthetic value.

Even if existing vegetation will not remain permanently after construction is completed, existing vegetation and topsoil can still be preserved with proper phasing during construction to provide a stable surface cover.

Figure 99. Preserve vegetation (Elkhart County SWCD 2007).

Applicability

This BMP applies to all construction sites with existing vegetation. Areas where preserving vegetation and topsoil can be particularly beneficial are floodplains, wetlands, streambanks, steep slopes, and other areas where structural erosion controls would be difficult to establish, install, or maintain.

Compared to newly planted or seeded areas, preserving natural vegetation has many advantages:

- Handles higher quantities of storm water runoff than newly seeded areas.
- Does not require time to establish.
- Greater filtering capacity because the vegetation and root structure are denser in preserved natural vegetation than in newly seeded areas.
- Requires less maintenance, watering, and chemical application (e.g., fertilizer and pesticides) than new vegetation.
- Enhances aesthetics.
- Provides areas for infiltration, reducing the quantity and velocity of storm water runoff.
- Allows areas where wildlife can remain undisturbed.
- Provides noise buffers and visual screens for construction operations.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Limitations

Preserving natural vegetation may be impractical in some situations because it may constrict the area available for construction activities, or it may not be cost-effective in areas with high land values. In areas with high land values, projects may need to be designed with little or no vegetation intended to remain to maximize development density. For sites with diverse topography, it may be difficult and expensive to save existing vegetation while grading the site for the development.

Design Basis

Successfully preserving vegetation requires good planning and site management. Preserving natural vegetation may affect some aspects of staging, work sequencing, and construction cost. Erosion control measures may be needed around the perimeter of the preserved area to maintain adequate water flow and drainage and prevent damage from excessive erosion or sedimentation.

Identify areas to be protected on the construction plans. Preserve individual natural vegetation, such as trees, shrubs, or vines, although preserving vegetation in clumps may be more practical. Protection areas should extend to the dripline of any trees to be preserved. The dripline marks the edge of the tree’s foliage where drips from rainfall would drop. When selecting trees to be preserved, consider the location, vigor, age, species, and wildlife benefits of the tree. Healthy, older trees that are well-suited to the site conditions and are beneficial to wildlife are most important to preserve.

Vegetation protection areas should be marked in the field before any site disturbance begins. Clearly mark the areas to be preserved with construction fencing and/or a perimeter control, such as silt fencing (BMP 65) or fiber rolls (BMP 64) if the protected area is located downgradient of areas to be disturbed. Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position. No construction activity, including stockpiling, materials storage, or equipment parking, should be allowed within the protected area.

Plants must be protected from three types of injuries possible during construction: impacts, grade changes, and excavations. By instructing employees and subcontractors to honor the limits of protection areas, the vegetation should be protected from these injuries.

Construction Guidelines

Check the project plans for areas designated for preserving natural vegetation. Keep all construction equipment, materials, and waste out of the designated areas. Root pruning and fertilizing before construction is recommended where trees are near the edge of protected areas. These practices should be supervised by a licensed arborist for the maximum survival rate.

Do not modify existing drainage patterns through or into any preservation area unless specifically directed by the plans or approved by the local permitting authority.

Retain protective fencing until all construction activity is complete to avoid damage during site cleanup and final stabilization.

Maintenance

Inspect fencing at regular intervals to ensure it is in place, and the preserved vegetated areas remain undisturbed and are not overwhelmed by sediment. Implement maintenance or restorative actions as needed. Proper maintenance is important to ensure healthy vegetation that can control erosion.

Different species, soil groups, and climatic conditions will require different maintenance activities such as mowing. Perform maintenance regularly, especially during construction.

If damage occurs to a tree, consult an arborist for guidance on how to care for the tree. If a tree in a designated preservation area is damaged beyond repair, remove and replace with a 2-inch diameter tree of the same or similar species. If damage occurs to vegetation, reseed the area with the same or similar species.

Additional Resources

CASQA (California Stormwater Quality Association). 2015. *California Stormwater Best Management Practices Handbook: Construction.* Menlo Park, CA. *https://www.casqa.org*

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

Elkhart County SWCD (Elkhart County Soil and Water Conservation District). 2007. *BMP Hall of Fame*. Goshen, IN.

EPA (US Environmental Protection Agency). 2014. *Preserving Natural Vegetation*. Water: Best Management Practices. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu*

King County (King County, Washington). 2009. *King County, Washington Surface Water Design Manual.* Seattle, WA: King County, Department of Natural Resources.

BMP 39: Clearing Limits

Description

Establishing well-defined clearing limits on a construction site reduces the amount of bare soil exposed to erosive forces and prevents erosion and storm water sedimentation. Limits are accomplished by controlling the amount of ground cleared and grubbed at any one time and minimizing the amount of time bare ground is exposed before slope protection or stabilization measures are put into place (Figure 100).

This measure, with appropriate timing (BMP 36: Construction Timing), can reduce unneeded erosion and sedimentation (BMP 1: Minimize Land Disturbance and BMP 38: Preserve Topsoil and Vegetation).

Figure 100. Construction fencing used to define clearing limits on a construction site.

Applicability

This BMP is suitable for all construction sites where areas of undisturbed vegetation will be retained while other vegetation areas must be removed to facilitate construction. Careful coordination of land clearing, grading, and erosion control measures (BMP 36: Construction Timing) should be a design consideration for all projects.

Limitations

Establishing clearing limits may not apply on sites where existing vegetation cannot be preserved.

Design Basis

Minimizing land disturbance should occur during the site design phase (BMP 1: Minimize Land Disturbance), and clearing limits should be identified on the SWPPP.

- Before site design begins, delineate all sensitive areas and any vegetation (such as desirable trees) to be preserved within the project site.
- Evaluate the erosion potential of the project site (based on slope, soil group intended season of

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
◖	Phosphorus
◖	Metals
○	Bacteria
○	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

work, and use of heavy equipment). Avoid clearing steep slopes whenever possible. Retain the native topsoil and vegetation to the maximum extent possible.

Based on the erosion evaluation, prepare a site plan that minimizes disturbance to sensitive areas, desirable vegetation, steep slopes, and erosive soils. In the project site plan, clearly specify the maximum allowable exposure area (Figure 101).

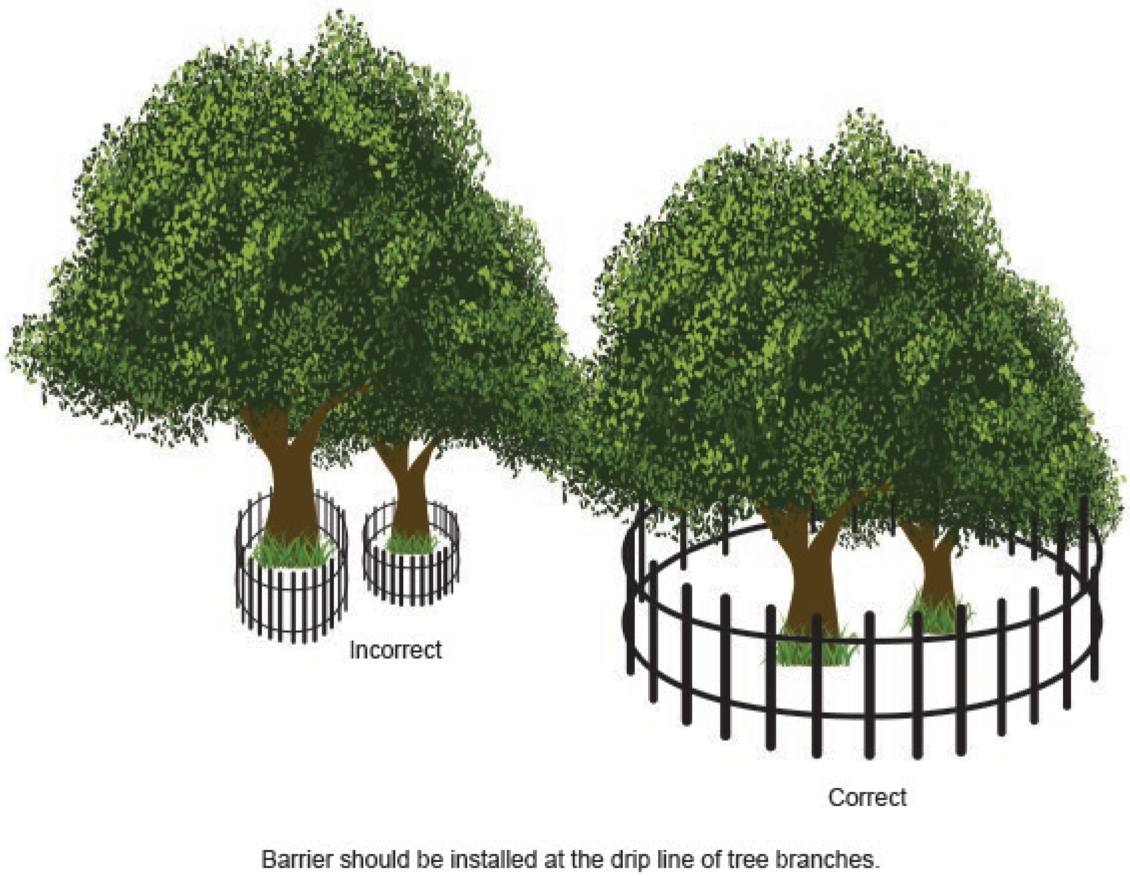


Figure 101. Vegetation barrier installation.

Construction Guidelines

During construction, the clearing limits should be clearly marked with brightly colored tape or plastic or metal safety fencing before beginning any land-disturbing activities, including clearing and grubbing. If tape is used, ensure it is 3 to 6 feet high, supported with sturdy vegetation or stakes, and highly visible.

Inform equipment operators of vegetation areas that should be left undisturbed and those not needed for the specified construction or related staging activities (BMP 38: Preserve Topsoil and Vegetation). Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practicable. Where clearing is required, follow these practices:

- Minimize compacted native soil by using plywood sheets, mulch, or wood chips.
- Do not place fill or deep cuts within dripline of trees to be preserved.

- Stabilize and reclaim the slope as work progresses to minimize the amount of disturbed soil. At a minimum, stabilization measures should be initiated within 14 days after ceasing work in a given area or as soon as practicable during seasonally arid periods.
- Conduct work in units or stages so that construction and stabilization takes place promptly after clearing and grubbing activities are completed.
- Schedule construction phasing to ensure cleared and graded areas are ready for seeding during the specified seeding season for the site location (BMP 32: Landscaping).
- Implement soil stabilization measures concurrently with the clearing and grading progress work to minimize the length of time that bare ground lies exposed to erosion.

Maintenance

Inspect fencing regularly and repair or replace as needed. Conduct periodic inspections to check for unnecessary ground disturbance. Check for clearing and grubbing beyond the contractor's capability to keep grading and pollution control measures current (according to accepted work schedule). Maintain clearing and grubbing limit markings until work is completed in that area. Remove and properly dispose of the material used in implementing this BMP.

Additional Resources

CASQA (California Stormwater Quality Association). 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. https://www.casqa.org

Central Oregon Intergovernmental Council. 2010. *Central Oregon Stormwater Manual.* 2010. Bend, OR.

King County (King County, Washington). 2009. *King County, Washington Surface Water Design Manual.* Seattle, WA: King County, Department of Natural Resources.

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. http://www.ecy.wa.gov/programs/wq/stormwater/manual.html

BMP 40: Vehicle Sediment Control

Description

This BMP describes measures to minimize track out of sediment from construction vehicles exiting the construction site onto off-site streets, other paved areas, and sidewalks. Sediment transported off site onto paved streets is a significant problem because it is difficult to effectively remove, and any sediment not removed ends up in the drainage system.

Temporary devices, such as a pad of coarse aggregate or a construction mat, should be installed at all exits from the construction site to a public roadway to stabilize the road and remove sediment (Figure 102). Additional controls to remove sediment from tires, such as wheel washing, rumble strips, and rattle plates, can also be used where necessary.

Figure 102. Stabilized gravel construction entrance examples (EPA 2003).

<u>Primary BMP Functions and Controls</u>

☒ Construction	☐ Permanent
☐ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

<u>Typical Effectiveness for Targeted Pollutants</u>

●	Sediment
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

<u>Other BMP Considerations</u>

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Medium
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Slope	15%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Applicability

Vehicle sediment control is appropriate for all construction sites in the following locations:

- Wherever vehicles are entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk or parking area.
- At any unpaved entrance/exit location where risk exists of transporting mud or sediment onto paved roads.

Vehicle sediment control is particularly important during wet weather periods when mud is easily tracked off site, during dry weather where dust is a concern, and when poorly drained, clayey soils are present on site.

Limitations

Vehicle sediment control using stabilized construction entrances are most effective when installed on level ground. If wheel washing is needed due to high sediment loads, washwater will need to be available and an additional sediment trap (BMP 66) may need to be installed.

Design Basis

Vehicle sediment controls include aggregate pad construction entrances and turf mat construction entrances. Additional controls may be needed if the stabilized construction entrance does not remove sufficient amounts of sediment from vehicle and equipment tires. The following sections provide design information for these practices.

Access and exits should be limited to one route if possible or two for linear projects such as roadways where more than one access/exit is necessary. Construction entrances should avoid crossing existing sidewalks if possible. If they must cross a sidewalk, the full length of the sidewalk should be covered and protected from sediment leaving the site.

Construct entrances on a level surface, and if feasible, grade to drain towards the construction site to reduce off-site runoff. Runoff from a stabilized construction entrance should drain to a sediment trap or a sediment basin, and a culvert should be installed under the entrance to convey water along the ditch of the public road if necessary.

Aggregate Pad Construction Entrance

A coarse aggregate pad underlain with a geotextile fabric is a common technique for stabilizing construction entrances (Figure 103). The width should be at least 15 feet but not less than the full width of points where ingress or egress occurs. At sites where traffic volume is high, the entrance should be wide enough for two vehicles to pass safely. Flare the entrance where it meets the existing road to provide a sufficient turning radius.

The recommended minimum length should be 50 feet, although 100 feet is preferred. The aggregate should include 3- to 6-inch diameter rock. The placement depth should be 9 inches minimum or as recommended by a soils engineer based on the maximum expected vehicle loads. For entrances that will become permanent or for long-term installations during construction, two layers may be needed with a base layer of 2- to 8-inch diameter crushed stone and a top layer of 2 inch diameter or smaller stone.

Place geotextile filter fabric under the aggregate to prevent fine sediment from pumping up into the rock pad and to reduce maintenance and loss of aggregate. The geotextile should be a nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The geotextile should be inert to commonly encountered chemicals, hydrocarbons, and mildew and rot resistant.

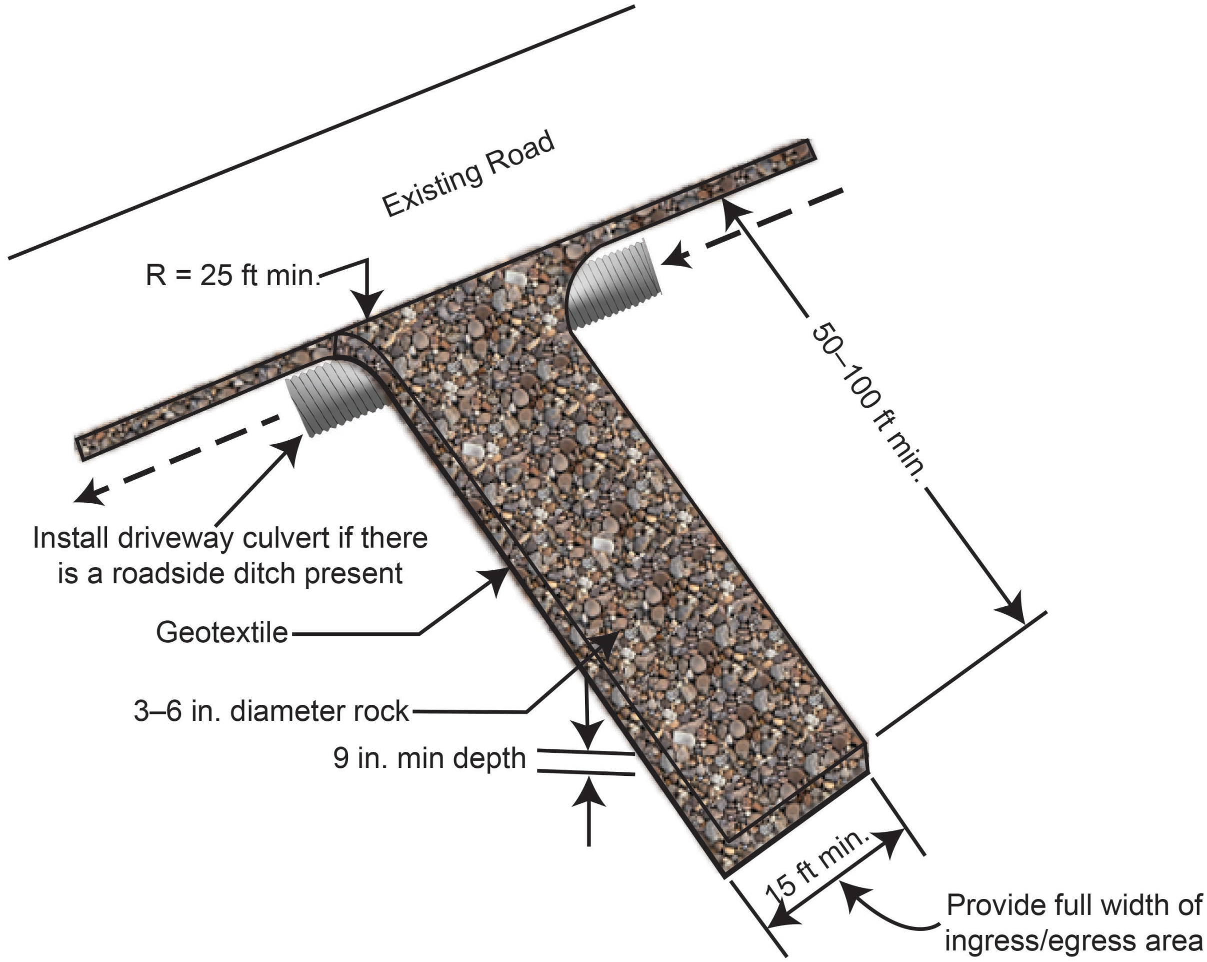


Figure 103. Aggregate pad construction entrance (adapted from King County 2009).

Construction Mat or Turf Reinforcement Mat

For small construction sites with low traffic volume, use a construction mat or turf reinforcement mat to stabilize the entrance (Figure 104 and Figure 105). The mats are made of steel, high-density polyethylene, timber, or a woven geotextile. Turf mats do not remove a significant amount of sediment from vehicles but do stabilize the entrance and prevent vehicles from causing rutting. These mats are especially suited for sites containing saturated soils, wetlands, or soft/poor subgrade as they provide immediate stabilization and some protection to existing vegetation. Some mats can be removed and reused on multiple sites.

Figure 104. Construction mat (*Matrax*).

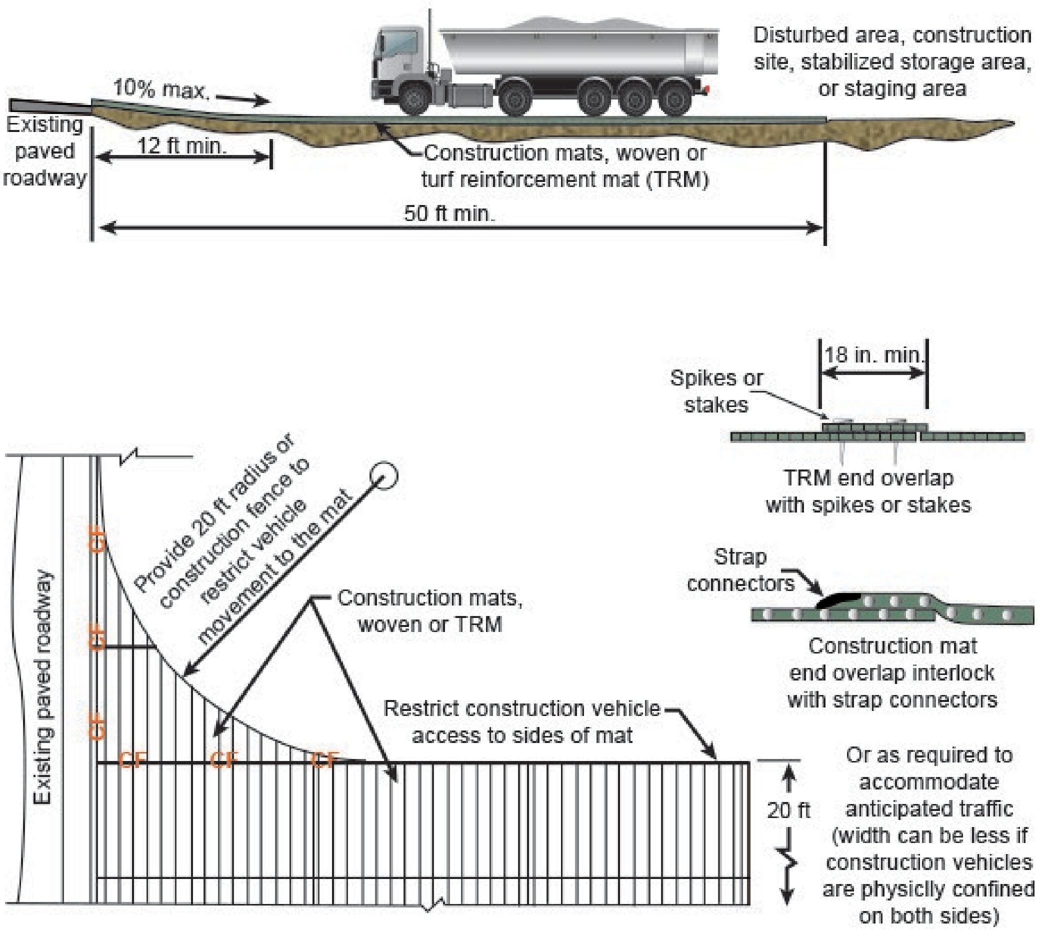


Figure 105. Vehicle-tracking control with construction mat or turf reinforcement mat (Colorado UDFCD 2010).

Additional Controls

If the stabilized construction entrance does not remove sufficient amounts of sediment from vehicle and equipment tires due to site conditions, additional controls may be required. Examples of additional controls include, but are not limited to, wheel washing, mountable berms, rumble strips, and rattle plates.

Wheel-washing facilities can be included within the stabilized construction entrance (Figure 106). It can be as simple as handheld power washing equipment to more advance systems. When washing is required, perform on an area stabilized with aggregate that drains into an approved sediment trap.

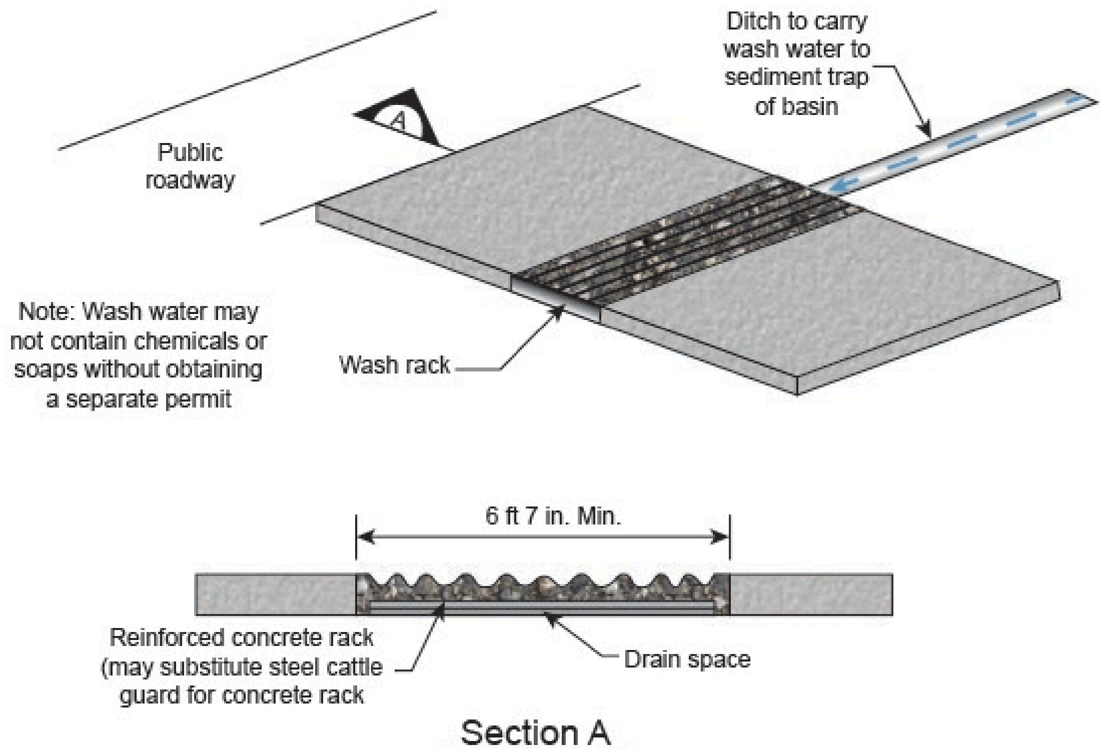


Figure 106. Aggregate vehicle-tracking control with wash rack (Colorado UDFCD 2010).

Mountable berms can be used in construction entrances to *bump* soil off of tires. These berms should be used when the entrance cannot be graded to flow away from the road. A mountable berm traps the pad water and keeps it from entering the adjacent road.

Rumble strips and rattle plates are constructed of steel panels with ridges or corrugations or pipes welded to a steel frame and can be installed within the construction entrance to remove additional sediment from vehicles. Rumble strips loosen and remove dirt and mud from vehicle tires as they pass over the construction entrance. Construct barriers around the sides of the rumble strips to ensure all construction vehicle and equipment tires travel over the rumble strips.

Rumble strip dimensions vary but typically are 8 feet long x 10 feet wide. Place rumble strip panels on a stable base and in the center of an aggregate entrance (Figure 107).

Figure 107. Rattle plates in construction entrance (*The Bag Lady*).

If sediment is tracked out of the construction site and onto off-site streets, sidewalks, or other paved areas, remove the sediment by sweeping, shoveling, or vacuuming. Complete cleanup by the end of the same work day when the track out occurs or by the end of the next work day if track out occurs on a nonwork day. Sediment should not be hosed or swept into an off-site storm water conveyance, storm drain inlet, or surface water.

Construction Guidelines

Stabilized construction entrances and any additional vehicle sediment controls should be installed as the first step in clearing and grading. Clear all vegetation, roots, and all other obstructions to prepare for grading, and ensure the entrance is properly graded and compacted before placing the geotextile fabric in the aggregate construction entrances.

All employees, subcontractors, and suppliers should be required to use the stabilized construction entrance. Place signage to direct construction traffic to the designated stabilized entrance, and use fencing where practical to restrict traffic to the stabilized construction entrance. Vehicle speeds should be limited to control dust (BMP 43: Dust Control). The stabilized construction entrance may be removed after final site stabilization is achieved or after the temporary BMPs are no longer needed. If stabilized entrances are located in a permanent site entrance, a geotechnical engineer should approve the subgrade after removal and before building the permanent entrance.

Maintenance

Inspect construction entrances and additional controls regularly and after storm events. Inspect local roads, sidewalks, and other paved surfaces adjacent to the site daily and sweep or vacuum accumulated sediment. Keep all temporary roadway ditches clear.

Construction entrances should be maintained in a condition that will prevent tracking or flow of mud onto public rights-of-way. Aggregate entrances may require periodic top dressing with additional 2 inches of stone (as conditions demand). If the aggregate pad is clogged with sediment, remove the aggregate and separate and dispose of the sediment. Rumble strips and rattle plates must be kept clean to function properly. Sweep or scrape panels, and if water is used, discharge the washwater into a sediment trap adjacent to the rumble strips.

Additional Resources

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

EPA (US Environmental Protection Agency). 2014. *Construction Entrances*. Water: Best Management Practices. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#constr*

King County (King County, Washington). 2009. *King County, Washington Surface Water Design Manual.* Seattle, WA: King County, Department of Natural Resources.

BMP 41: Stabilized Construction Roads and Staging Areas

Description

Stabilized construction roads and staging areas are clearly designated areas where construction equipment and vehicles travel and stockpiles, waste bins, material storage, and other construction-related equipment are stored. Stabilizing these areas immediately after grading reduces erosion caused by construction traffic and construction activities (Figure 108).

Methods for reducing erosion on stabilized construction roads are included in BMP 42.

Figure 108. Temporary construction access road (ITD 2014).

Applicability

Stabilize roads and staging areas whenever they are used by construction traffic or where concentrated traffic occurs, such as around materials storage areas. Stabilization is especially important for construction during wet weather, where dust can be a problem, on slopes greater than 5%, and/or adjacent to water bodies. This practice is also important on large sites where heavy equipment traverses the site for large grading operations.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Medium
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Slope	15%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	3 feet

Limitations

During design and planning, minimize the disturbance area to the maximum extent practical. Oversizing the stabilized staging area may result disturbing existing vegetation more than required for the project. Excess disruption increases costs and requirements for long-term stabilization after construction.

Temporary roads that encroach on jurisdictional wetlands require appropriate permits.

Design Basis

Location

Place construction roads and staging areas where site impacts will be minimized and as far away as possible from streams, surface waters, or wetlands. Sites that include permanent roads or parking areas are recommended for construction roads and staging areas.

Temporary roads should mimic the natural slope, not disrupt natural drainage pathways, and have a maximum longitudinal slope of 15%. Grade the roads to prevent runoff from leaving the site. Roadways should be graded to drain transversely into stabilized drainage swales or gravel berms next to the road. Direct intercepted runoff from the road to a sediment trap (BMP 66) or other sediment control measure.

Surface

Roads and staging areas should be constructed to handle the maximum expected loads during construction, and whenever possible, placed on a firm, compacted subgrade. If design recommendations are not available from a geotechnical or civil engineer, stabilize the surface by either paving or placing 2- to 4-inch diameter aggregate 3 to 6 inches deep.

The aggregate can be crushed rock, gravel base, recycled concrete, or crushed surfacing base course. Early application of road base is generally suitable where a layer of coarse aggregate is specified for final road construction.

Geotextile Fabric

Most installations will include geotextile fabric placed over the entire area to be covered with aggregate. Work on single residential lots will generally not need geotextile fabric unless there is potential for excessive erosion, a high water table, or other risk factors. The geotextile should be a woven or nonwoven fabric consisting only of continuous chain polymeric filaments or polyester yarns. The geotextile should be rot resistant and inert to commonly encountered chemicals, hydrocarbons, and mildew. ITD's *Standard Specifications for Highway Construction*, Section 718 provides guidance on geotextile properties for a variety of applications (ITD 2017).

Fencing

Construction fencing may be needed to limit access of vehicles to roads and staging areas that are stabilized and to prevent unauthorized access to construction materials.

Sediment Control

Perimeter sediment controls such as silt fence (BMP 65), sediment fiber rolls (BMP 64), or other measures may be needed around construction staging areas. Erosion control methods for temporary roads include road sloping, rolling dips, waterbars, open-top box culverts, or level spreaders. BMP 42: Erosion Prevention on Construction Roads provides more information.

Construction Guidelines

Construction roads and staging areas should be stabilized immediately after grading. If construction roads do not adequately reduce track out to adjacent property or roadways, a wheel wash system may be required as described in BMP 40: Vehicle Sediment Control.

Maintenance

Inspect all devices regularly, especially after large storm events. Make repairs promptly to avoid progressive damage. Aggregate should be added as required to maintain a stable driving surface and to stabilize areas that have eroded. Remove accumulated sediments as necessary from roadside swales to ensure proper functioning.

After construction is complete, temporary construction roads and staging areas should be removed and the area, regraded, and restored to preconstruction condition or better using permanent erosion and sediment control BMPs. Remove or stabilized trapped sediment and permanently stabilize disturbed areas. When a temporary construction road or staging area is used for a permanent road or parking surface, the subgrade is subject to inspection before final paving.

Additional Resources

ITD (Idaho Transportation Department). 2017. “Geotextiles.” Section 718. *Standard Specifications for Highway Construction*. Boise, ID.

ITD (Idaho Transportation Department). 2014. “Sediment Control Best Management Practices.” SC-12 Temporary Roads and Standard Drawing P-1-F. *Best Management Practices*. *http://apps.itd.idaho.gov/apps/env/BMP/PDF%20Files%20for%20BMP/Chapter%201/Chapter%201%20Erosion%20Control%20Best%20Management%20Practices.pdf*

BMP 42: Erosion Prevention on Construction Roads

Description

Haul roads, detours, access roads, and other unpaved or temporary roadbeds associated with a construction project should include erosion prevention measures (Figure 109). BMP 41 provides recommendations for temporary construction roads. Erosion prevention measures for temporary construction roads include the following:

- **Waterbar (or cross ditch)**—A cut and berm built at a downward angle across the roadway, extending from the cut bank to the opposite fill shoulder. Waterbars reduce erosion by diverting storm water runoff from the road surface and directing it to a safe discharge area.
- **Road sloping**—A method of constructing the road with an inward slope of 1% to 2% from the fill slope to the cut slope. Sloped roads are designed to divert surface water off the entire road surface and concentrate flows to discharge into a sediment basin (BMP 66) or another sediment control device.
- **Rolling dip**—A method of constructing the road with shallow, outward-sloping dips or undulations to collect surface runoff and convey it away from the road surface.

Figure 109. Sloped area on side of road directs storm water.

Primary BMP Functions and Controls

☒ Construction ☐ Permanent
☒ Erosion Control ☒ Sediment Control
☐ Source Control ☐ Flood Control
☐ Filtration ☐ Infiltration

Typical Effectiveness for Targeted Pollutants

● Sediment
○ Phosphorus
○ Metals
○ Bacteria
○ Hydrocarbons
○ Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Medium
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	5 acres
Max. Slope	15%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	3 feet

Applicability

A waterbar is a temporary or permanent drainage facility on light-use, low-maintenance, unpaved roads. Waterbars should be placed above grade changes to prevent water from flowing down steeper portions of roads or skid trails. Bars may also be placed above intersections of roads, skid trails, or landings to protect these disturbed areas.

Road sloping is used as a drainage measure on temporary or low-traffic haul roads where erosion of the roadbed and fill slope is unlikely due to low runoff volume or intensity.

A rolling dip is used as a runoff diversion measure to prevent erosion of the road surface. Rolling dips are effective on long inclines to keep storm water from flowing directly down the road, where it may cause gullying and other damage to the road surface and grade.

Limitations

A waterbar is suitable only for light-use, low-maintenance, unpaved roads. Road sloping is suitable only for low-traffic haul roads where runoff volume and intensity are low. A rolling dip is not suitable on road grades steeper than 5%.

Design Basis

Waterbars are generally constructed using a blade-equipped tractor or by hand. The size of the waterbar depends on the amount of precipitation in the area, soil erodibility, and anticipated traffic (Figure 110).

- The waterbar should extend from the cut-bank side of the road completely across to the fill-slope side.
- Cut dimensions: Up to 18 inches deep across road, 8 to 18 inches deep at outlet, 3 to 4 feet wide.
- Berm dimensions and orientation: 12 to 18 inches high with 5-inches minimum height, skewed at angle of 30° to 40° across road.
- Discharge: Runoff should not be directed onto fill material without proper energy dissipation and drainage away from the fill.

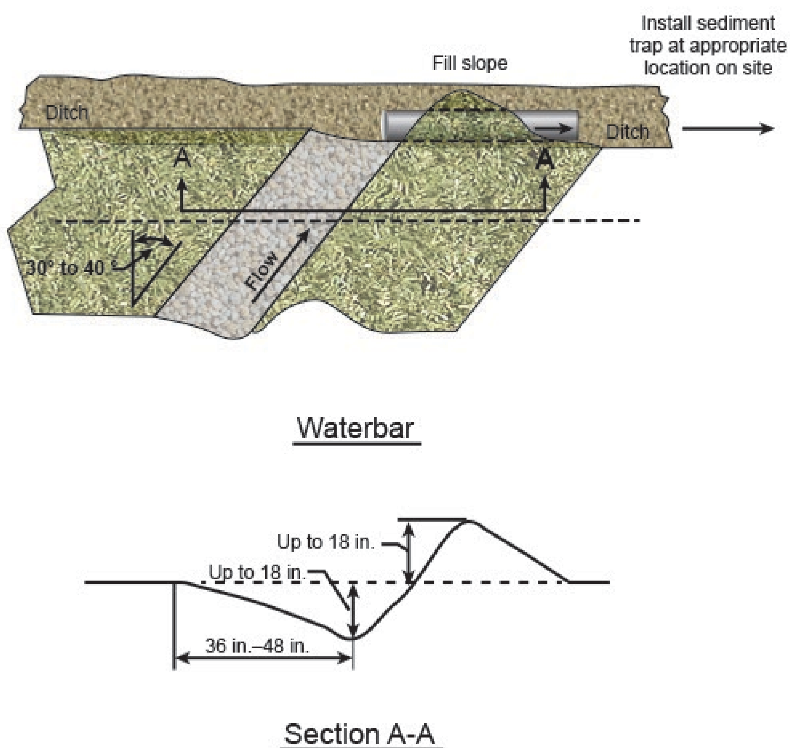


Figure 110. Waterbar (ITD 2014).

Road slope should be approximately 1% to 2% from the fill slope inward to the cut slope. Berms on the outside of the road should be limited or removed to allow water to flow off the road surface. Provide sediment collection or erosion-control measures at the toe of the cut slope to prevent excessive erosion and sediment transport (Figure 111).

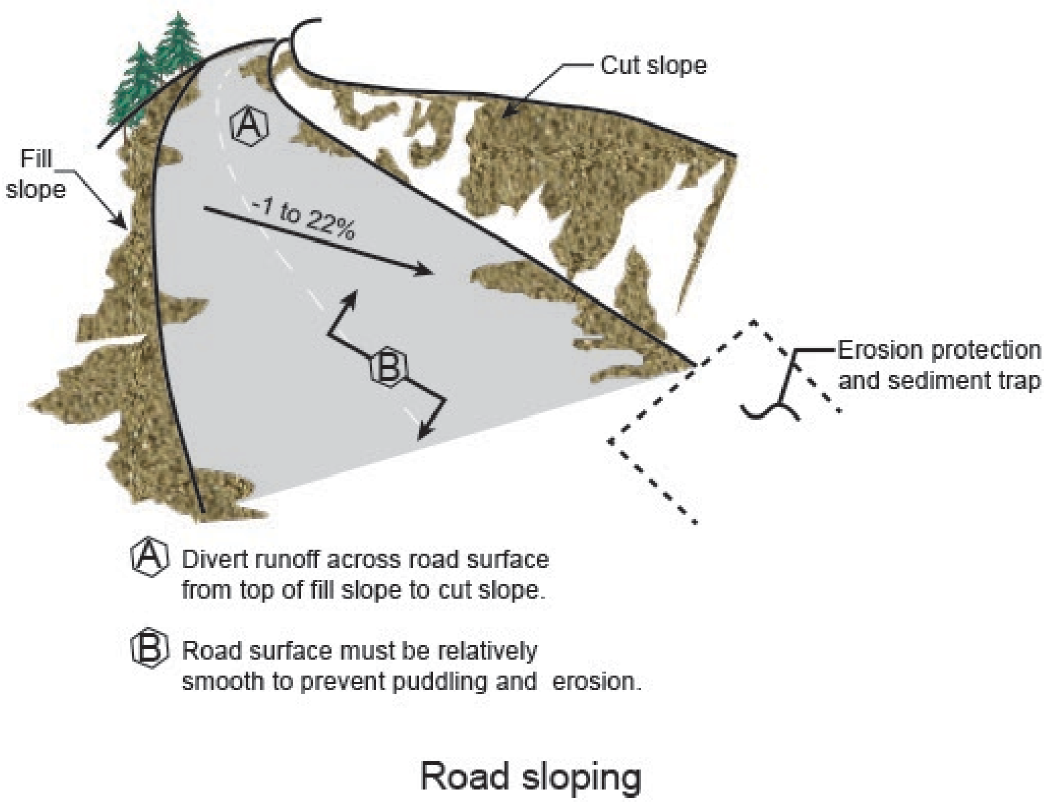
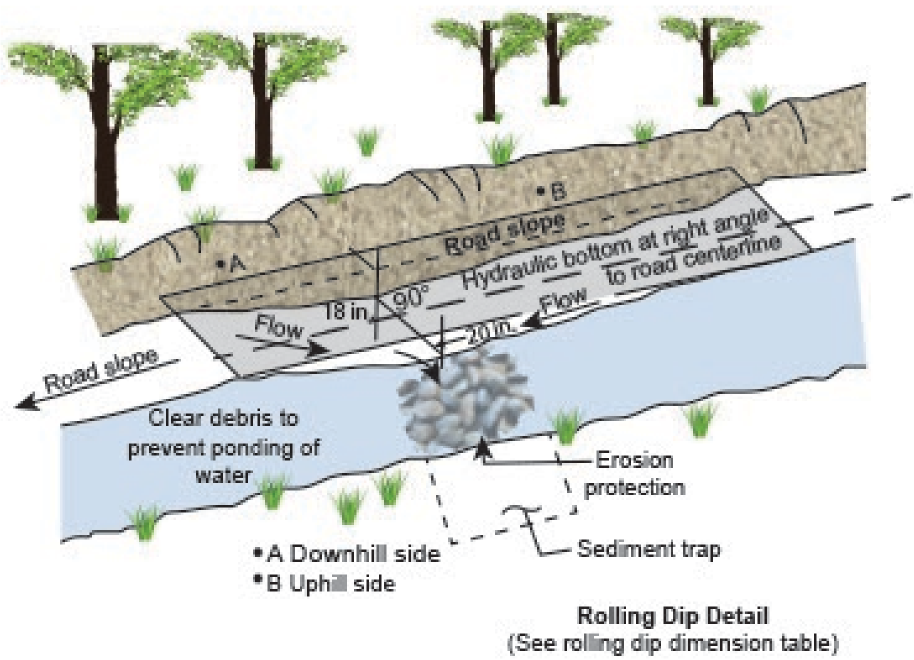


Figure 111. Road sloping (ITD 2014).

A rolling dip applies to roads greater than 150 feet long. When designing rolling dips, consider the unique topography of the site. In general, the dip should be approximately 1 foot below the surface plane of the road. The upgrade approach to the bottom of the dip should be 65 to 75 feet long, and the downgrade approach to the bottom of the dip should be 25 to 35 feet long depending on the longitudinal slope of the road. Align the dip across the road at nearly a 90^{o} angle, and slope it outward approximately 5% (Figure 112).



Rolling Dip Dimension Table		
% Road Slope	A (Downhill)	B (Downhill)
0%—4%	35 ft	65 ft
4%—6%	25 ft	75 ft

Figure 112. Rolling dip (ITD 2014).

As shown in Figure 110 to Figure 112, concentrated discharge from construction roads should be handled appropriately by routing through sediment control BMPs such as a sediment trap (BMP 66) or portable sediment tank (BMP 67).

Construction Guidelines

Waterbar—Cut each waterbar into solid soil to a minimum depth of 6 inches next to the cut bank and 8 inches at the road shoulder, with an adverse grade on the downroad or downgrade side of the waterbar. Build a continuous, firm berm of soil, at least 6-inches above normal grade, parallel to the waterbar cut on its downhill side. Include a bank tie-in point, cut 6 to 12 inches into the roadbed. For added stability, the bar may be compacted with a nonerosive fill material. The completed waterbar should extend across the full roadway width, aligned at an angle of 30° to 40° relative to the roadway. A dissipation or filter device (such as riprap or silt fence) may be needed below the waterbar to control erosion and trap sediment.

Road Sloping—Build into the road during construction. Install erosion- and sediment-control measures downslope before completing the finish grade of the sloped road. Then construct the outward slope of 1% to 2%, as specified in the contract plans.

Rolling Dip—Build into the road, during construction and follow the natural contours of the land. Install erosion and sediment measures at the low point of the dip (drainage outfall to fill slope) before final grading to direct storm water discharge from the dip. Construct the dip according to the specifications shown in the contract plans. If not specified, make the dip 1 foot deep, with a 23-foot long approach on the downgrade side and a 66-foot long approach on the upgrade side.

Maintenance

Inspect all devices regularly according to provisions of the contract or project site plan. Make repairs promptly to avoid progressive damage. Remove accumulated sediments as necessary to ensure proper functioning.

Properly constructed waterbars should require little or no maintenance. However, all waterbars need to be open at the lower end so water can easily flow away from the roadway. Hand shovel work may be necessary following high runoff periods or severe storms to ensure unrestricted flow.

For road sloping, minor regrading may be required to maintain slope angle.

For a rolling dip, outflows should be kept free of debris to prevent ponding.

Additional Resources

ITD (Idaho Transportation Department). 2014. "Sediment Control Best Management Practices." Standard Drawing Erosion and Sediment Control Drawing P-1-F. *Best Management Practices*. *https://apps.itd.idaho.gov/apps/StandardDrawings/All_Standards_2016-06.pdf*

BMP 43: Dust Control

Description

Dust control and wind erosion prevention BMPs keep soil particles from entering the air as a result of land-disturbing construction activities by protecting the soil surface, roughening the surface, and/or reducing the surface wind velocity (Figure 113).

Figure 113. Sprinkling water for dust control on a pathway construction project, Driggs, Idaho.

Dust control practices apply to either disturbed graded areas or construction roadways. For disturbed graded areas, practices such as seeding or sodding (BMP 32), mulching (BMP 52), using soil binders (BMP 55), sprinkling, surface roughing (BMP 58) or practices that provide prompt surface cover can be used. For construction roadways, practices such as using a stabilized surface (BMP 41), sprinkling, or using chemical dust tackifiers are options. Wind barriers can control wind currents and minimize the amount of dust transported into air and water.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
◖	Metals
○	Bacteria
◖	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Applicability

Use control measures on any construction site where the potential exists for air or water pollution from dust, especially when open, dry areas of soil are anticipated on site and where heavy construction activity such as clearing, grading, excavation, demolition, or excessive vehicle traffic takes place. Dust control is especially important in regions experiencing long periods without rain and during the summer when soil can become dry and vulnerable to transport by wind. In many cases, water erosion control measures incorporated into the project will indirectly prevent wind erosion.

Limitations

Vegetative dust control measures may not be practical during dry periods without a reliable supply of establishment water. Other methods should be stipulated in the project contract to ensure that dust control is not overlooked.

Wind barriers (such as walls or fences) can be part of the long-term dust control strategy in arid and semiarid areas, but they are not a substitute for permanent stabilization.

Chemically treated subgrades may make the soil water repellent, interfering with long-term infiltration and vegetation/revegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents that must be handled properly.

Overwatering may cause erosion and wash sediment or other constituents into the drainage system.

Design Basis

Develop a dust control plan before construction. The plan should evaluate the site with potential dust emission sources identified, provide a selection of dust control methods for each area of the site, determine the maintenance needed, and monitor the effectiveness of the selected dust control measures. The site evaluation should consider the soil type, prevailing wind direction, and effects of other prescribed erosion control measures.

Dust Prevention

The best method of controlling dust is to prevent dust production:

- **Minimize the surface area disturbed—**By limiting the amount of bare soil exposed at one time, less ground is disturbed, less dust is raised while working, and less cleanup is required when work is done. During project design, identify areas where ground disturbance will not be allowed and fence or provide signage during construction. Design and locate haul roads, detours, and staging areas to avoid unnecessary exposure of bare ground.
- **Limit dusty work on windy days—**Minimize amount of ground disturbance occurring when potential for wind erosion is highest. Apply dust suppression measures when needed. Monitor dust suppression efforts to ensure dust emissions are adequately controlled. Depending on weather conditions, adjust to fewer or more frequent application intervals.
- **Clean up dusty spills immediately—**Do not wait for the next scheduled housekeeping; the mess will just get bigger and cleanup will take longer.
- **Plan ahead to limit dust—**Avoid using areas most susceptible to wind erosion. In the storm water site plan, specify staging or work-sequencing techniques that minimize the risk of wind erosion from bare soil. In most cases, a change will be required from traditional construction techniques that allow large areas to be disturbed at the outset of construction and remain exposed for long periods of time.

Graded Areas

Clearing and grading activities create the opportunity for large amounts of dust to become airborne. Stabilize graded areas as soon as practicable after disturbance and do not leave open areas uncovered. The following practices can help with dust control in graded areas:

- **Grow vegetative ground cover—**Exposed areas that are not being paved should be stabilized using vegetation and landscaping (BMP 32) to prevent wind and water erosion. When rainfall is insufficient to establish vegetative cover, mulching (BMP 52) conserves moisture, prevents surface crusting, reduces run-off erosion, and helps to establish vegetation. It is a critical treatment on sites with erosive slopes.

- **Use wind barriers**—Barriers prevent erosion by obstructing the wind near the ground and preventing the soil from blowing off site. Wind, snow, or silt fences or similar barriers are temporary measures that can reduce wind velocity. Perennial grass, bushes, stands of trees, rock walls, wooden board fences, or earthen banks are more permanent measures that can serve as wind barriers. A wind barrier generally protects soil downwind for a distance of 10 times the height of the barrier. If additional protection is needed, use other methods with the barrier.
- **Surface roughening**—Deep tillage in large open areas brings soil clods to the surface where they rest on top of dust, preventing it from becoming airborne. Tilling or disking should leave 6-inch (minimum) furrows, preferably perpendicular to the prevailing wind direction, to gain the greatest reduction in wind erosion. If the surface cannot be furrowed perpendicular to the prevailing wind direction, roughening the surface by using a ripper/scarifier (grader) or a ripper (cat) will produce the desired result of a 6-inch irregular surface. BMP 58: Slope Roughening provides more information.

Construction Roadways and Storage Areas

Temporary construction roads and storage areas should be stabilized using recommendations in BMP 42: Erosion Prevention on Construction Roads to minimize the amount of dust generated by construction vehicles. Other recommendations for dust control on construction roadways and storage areas include the following:

- **Water and/or sweep often**—Sprinkle the site with water until the surface is wet. Apply at a rate of 3 gallons per acre so that the soil is wet but not saturated or muddy and so that no dust is being generated. To ensure vehicle traffic is not picking up dust from wind action and carryout, water and sweep roadways often. Fewer treatments are necessary in cool, wet weather.
- **Spray-on chemical soil treatments (palliatives)**—Spray-on soil binders form a bond between soil particles keeping them grounded. Chemicals include mineral salts, petroleum resins, asphalt emulsion, acrylics, and adhesives. These treatments must be reapplied periodically to ensure continued effectiveness. Chemical tackifiers should only be used on mineral soils, and the chemicals should not create any adverse effects on storm water, plant life, surface water, or ground water. Check with DEQ to ensure the material to be applied is not harmful and may be used for this purpose.
- **Reduce speed limits**—Reduce speed limits on unpaved surfaces to 10 to 15 miles per hour for well-traveled areas and heavy vehicles. Never exceed 25 miles per hour for any vehicle on any unpaved surface.
- **Prevent transport of dusty material off site**—Minimize transport of dusty material off site by rinsing vehicles before they leave the property, tightly cover loaded trucks, and provide stabilized construction roads and staging areas (BMP 41).
- **Enclose storage and handling areas**—If dusty materials are frequently loaded and unloaded in storage and handling areas, enclose the areas to reduce dust production. Use storage silos, three-sided bunkers, or open-ended buildings. If handling is less frequent, try wind fencing. Conveyor loading may require enclosure or the use of water or foam spray bars both above and below the belt surface to reduce emissions.

- **Keep storage piles covered**—When storage piles are not in use, apply a physical cover or a dust suppressant spray to reduce dust emissions. Limit the working face of the pile to the downwind side. Most emissions come from loading the pile, loadout from the pile, and truck and loader traffic in the immediate area if the pile is batch loaded. Keep the drop height low to reduce dust and the ground at the base of the pile clear of spills.

Construction Guidelines

Dust control measures should be considered and selected before clearing and grading activities. During construction, monitor dust control activities on a regular basis to ensure the measures taken are adequately preventing airborne dust from leaving the site.

Maintenance

Dust control requires constant attention: it is not a one-time or once-in-awhile activity. Dust control sprinkling may have to be done several times a day during hot, dry weather.

Areas protected by mulch, adhesive emulsions, or barriers need to be checked at regular intervals according to the inspection schedule in the storm water plan.

Apply spray-on chemical treatments using the manufacturer's specified rates and according to all federal, state, and local regulations. Chemical products should be stored, handled, and disposed of according to all applicable local and state regulations and policies.

Additional Resources

DEQ (Idaho Department of Environmental Quality). 2013. *Controlling Fugitive Dust at Construction Sites.* Boise, ID: DEQ.

EPA (US Environmental Protection Agency). 2014. *Dust Control*. Water: Best Management Practices. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#constr*

BMP 44: Stockpile Management

Description

Stockpile management procedures and practices reduce or eliminate air and storm water pollution from stockpiled erodible materials, such as soil, sawdust, landscaping bark, compost, sand, fly ash, stucco, hydrated lime, Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, aggregate subbase, premixed aggregate, asphalt minder (or *cold mix* asphalt), and pressure-treated wood. Raw material stockpiles can easily erode during storm events and contribute suspended solids, nutrients, metals, and pH changes to storm water runoff (Figure 114).

Figure 114. Covered stockpile (ITD 2014).

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☐ Sediment Control
☒ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
◖	Phosphorus
◖	Metals
○	Bacteria
○	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Applicability

Implement stockpile management on all construction sites that stockpile and store erodible materials or have land-clearing debris composed, in whole or in part, of sediment or soil.

Limitations

Covering alone may not protect exposed materials from contact with storm water runoff and run-on. Using plastic sheeting to cover stockpiles can increase runoff volume and rates and potentially cause failure of sediment controls placed around the stockpile's perimeter. In extremely windy areas, tarpaulins and sheeting may require additional weights or securing.

Design Basis

Location

Locate stockpiles a minimum of 50 feet away from concentrated storm water flows, drainage courses, and inlets and outside of any natural buffers (BMP 2) and in areas that will remain undisturbed for the longest period of time as construction progresses.

Do not place stockpiles in streets or paved areas unless no other practical alternative exists.

Covering

Covering prevents storm water from coming into contact with potential pollutants, minimizes sediment discharge, and reduces material loss from blowing wind. Covering is a simple, effective, and inexpensive way to reduce or prevent pollution from stockpiles. Materials used as stockpile covers include tarpaulins, plastic sheeting, and pervious fabrics; mulches (BMP 52), vegetation (BMP 32), or soil binders (BMP 55) can be used for soil stockpiles that will be in place for longer periods of time.

Plastic sheeting with nylon reinforcement can be more durable than standard sheeting; avoid sheeting made of photodegradable plastics. Due to the relatively rapid breakdown of most polyethylene sheeting, it is unsuitable for applications over 6 months.

Sediment Control

Place a temporary sediment control barrier around the stockpile's perimeter to protect it from storm water run-on from the site and the site from runoff from the stockpile. Perimeter control barriers such as berms (BMP 70), dikes (BMP 69), fiber rolls (BMP 64), silt fences (BMP 65), or biofilter bags (BMP 63) can be used. For stockpiles located on paved areas, rock socks are recommended for perimeter control, and all inlets with the potential to receive sediment from the stockpile should be protected (BMP 74: Inlet Protection).

Implement dust and wind erosion control practices as appropriate on all stockpiled material. Place bagged materials on pallets and under cover.

Accumulated sediment on pavement or other impervious surfaces should not be hosed down or swept into any storm water conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water.

Nonactive Stockpile Protection

Nonactive stockpiles of the following materials should be protected as follows:

Soil stockpiles—Cover soil stockpiles or protect with soil stabilization measures and a temporary perimeter sediment barrier at all times. Unless permit requirements or other local regulations specify otherwise, soil stockpiles should be covered or stabilized within 14 days after the stockpile is placed or sooner if site conditions, such as highly erodible soils or expected rainfall, warrant. For site discharges to impaired waters, complete stabilization activities within 7 calendar days.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate subbase—Cover and protect stockpiles with a temporary perimeter sediment barrier at all times.

Stockpiles of *cold mix*—Place cold mix stockpiles on and cover with plastic sheeting, or a comparable material, at all times and surround covered stockpile with a berm.

Stockpiles/storage of pressure-treated wood—Cover pressure-treated wood with plastic sheeting or comparable material at all times and surround with a berm.

Stockpiles of fly ash, stucco, and hydrated lime (basic materials)—At all times, cover stockpiles of materials that may raise the pH of runoff with plastic sheeting and surround with a berm.

Active Stockpile Protection

For actively used stockpiles, the perimeter sediment control barrier should have a stabilized designated access point on the upgradient side of the stockpile. Divert runoff around or away from the stockpile on the upstream side of the stockpile.

Cover all actively used stockpiles before the onset of precipitation. Stockpiles of *cold mix*, treated wood, and basic materials should be placed on and covered with plastic sheeting or a comparable material and surrounded by a berm before the onset of precipitation.

Construction Guidelines

Stockpiles should be protected immediately if they are not scheduled to be used within 14 days of placement.

To cover stockpiles with tarpaulins or plastic sheeting, obtain enough fabric or sheeting to cover the indicated volume or area. Anchor the edges of the covering with stakes, tie-down ropes, large rocks, tires, or other readily available, heavy objects. Maintain an overlap of 3 feet along the borders and securely anchor the overlap area so that it does not separate (by wind or other causes).

Maintenance

During the rainy season, inspect the stockpile BMPs weekly before forecasted rain events, daily during extended rain or high wind events, and after the rain or high wind events end. During the nonrainy season, inspect BMPs every 2 weeks. Make any necessary repairs after inspection.

Repair and/or replace perimeter controls and covers as needed to keep them functioning properly. Sediment should be removed when it reaches one-third of the barrier height.

Frequently inspect coverings for damage and general wear. Repair or replace coverings immediately, or as needed. Inspect plastic sheeting more frequently during periods of high winds or extreme heat.

Additional Resources

CASQA (California Stormwater Quality Association). 2015. "Stockpile Management." *California Stormwater Best Management Practices Handbook: Construction.* Menlo Park, CA. *https://www.casqa.org/resources*

ITD (Idaho Department of Transportation). 2014. "Stockpile Management." *Best Management Practices.* Boise, ID: ITD. *https://apps.itd.idaho.gov/apps/env/BMP/PDF%20Files%20for%20BMP/Chapter%204/WM-4%20Stockpile%20Management.pdf*

BMP 46: Spill Prevention and Control

Description

A spill prevention and control plan includes procedures for preventing spills of hazardous waste and methods for handling and cleaning up spills (Figure 116). Numerous spill containment methods range from large structural barriers to simple, small drip pans. The benefits vary based on cost, maintenance requirements, and the size of spill control.

Figure 116. Collapsible wall containment berm (*The Spill Source*).

Applicability

Develop a spill prevention and control plan for any construction site where hazardous wastes are stored or used. Hazardous wastes include pesticides, paints, cleaners, petroleum products, fertilizers, deicing materials, and solvents.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☐ Erosion Control	☐ Sediment Control
☒ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

○	Sediment
○	Phosphorus
●	Metals
○	Bacteria
●	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	N/A
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Limitations

Some sites may also be subject to the oil pollution regulations specified in 40 CFR 112 and CWA §331, and required to develop a Spill Prevention Control and Countermeasure (SPCC) plan. Check with federal, state, and local agencies that may also have applicable regulations that must be adhered to.

Design Basis

Address the following elements in a spill control and response plan.

Spill Prevention

Prevention is the first line of defense in protecting storm water runoff from contamination due to spills and leaks:

- Use recycled, reclaimed, or reused materials where possible to reduce the amount of new material needed. Substitute less or nontoxic materials for toxic materials.

- Routinely maintain and check the condition of containers holding hazardous waste, and replace containers that are leaky, corroded, or otherwise deteriorating.
- Label all containers according to their contents. Educate all employees on how to prevent spills and how to clean up if a spill occurs. All employees should be able to recognize and report illegal dumping incidents.

Spill Control and Containment

Identify potential spill source locations such as loading and unloading areas, materials storage areas, processing areas, and waste disposal areas. Containment methods include diking, curbing, and drip pans. If a spill occurs, adequately control and contain the spill to prevent contaminating surface water or ground water.

Containment diking consists of temporary or permanent berms or retaining walls designed to hold spills. Diking is one of the best protective measures against storm water pollution because it surrounds the area of concern and keeps spill materials separated from the storm water outside of the diked area (BMP 69: Diversion Dike and BMP 70: Temporary Berms).

Diking is commonly used for controlling large spills or releases from liquid storage and transfer areas because it is an effective containment method around tank truck loading and unloading areas. The size of a containment dike system for tank truck loading and unloading operations should be capable of holding a volume equal to any single tank truck compartment plus some amount of freeboard to ensure that discharge from the secondary containment area will not occur.

Materials used to construct the dike should be strong enough to safely hold spilled materials. The materials used usually depend on what is available on site and the substance to be contained. Dikes may be made of earth (i.e., soil or clay), concrete, synthetic materials (liners), metal, or other impervious materials. Containment dikes may need to be designed with impervious materials to prevent leaking or pollution of storm water, surface water, and ground water supplies.

In general, strong acids and bases may react with metal containers, concrete, and some plastics. Where spills may consist of these substances, consider other alternatives. More reactive organic chemicals may also need to be contained with special liners. If uncertain about the suitability of certain dike construction materials, refer to the Material Safety Data Sheet (MSDS) for the chemical being contained.

Curbing, like containment diking, is a barrier that surrounds an area of concern and prevents spills or leaks from being released to the environment by routing runoff to treatment or control areas. The terms *curbing* and *diking* are sometimes used interchangeably, but curbing is usually small scale and cannot contain large spills like diking. Common materials used for curbing include earth, concrete, synthetic materials, metal, or other impenetrable materials. Asphalt is also a common material used in curbing. Curbing is inexpensive, easy to install, and provides excellent control of run-on. As with diking, materials spilled within a curbed area can be collected for proper disposal and/or recycling.

When using curbing for runoff control, protect the curb by limiting traffic and installing reinforced curbs in areas of concern. Materials spilled within a curbed area can be tracked outside of that area when personnel and equipment leave the area. This tracking can be minimized by grading within the curbing to direct the spilled materials to a downslope side of the curbed area, keeping the materials away from personnel and equipment that pass through the area. It will also allow the materials to accumulate in one area and make cleanup much easier. Manual or mechanical methods, such as those provided by sump systems, can be used to remove accumulated material from a curbed area.

Drip pans are used to contain very small volumes of leaks, drips, and spills. Drip pans can be depressions in concrete, asphalt, or other impenetrable materials or they can be made of metals, plastic, or any material that does not react with the dripped chemicals. Empty or discarded containers may be used as drip pans. Drip pans catch material or chemical drips that can be cleaned up easily or recycled before contacting storm water. Drip pans can be a temporary or permanent measure.

Use drip pans at any site where valves and piping are present and the potential exists for small-volume leakage and dripping. Although leaks and drips should be repaired and eliminated as part of preventive maintenance programs, drip pans provide a temporary solution where repair or replacement is delayed. In addition, drip pans provide a safeguard when positioned beneath areas where leaks and drips may occur. Drip pans are inexpensive, easy to install, and simple to operate. They allow for reuse or recycling of the collected material.

When using drip pans, consider local weather conditions, the location of the drip pans, materials used for the drip pans, and how the pans will be cleaned. Drip pans should be inspected and cleaned frequently, so place them in areas that are easy to reach. Avoid placing drip pans in precarious positions such as next to walkways or on uneven surfaces. Drip pans in these locations are easily overturned and may present a safety or environmental hazard.

Weather is also an important factor. Heavy winds and rainfall can move or damage drip pans because the pans are small and lightweight. Secure the pans by installing or anchoring them to platforms, place behind wind blocks, or tie the pans down.

Cleanup and Disposal

Clean up spills or contaminated surfaces immediately using dry cleanup measures where possible and eliminating the source of the spill to prevent discharge or further discharge. Adequate supplies should be available at all times to handle spills, leaks, and disposal of used liquids from fueling and maintenance of equipment or vehicles. When cleaning up spills, follow MSDS guidelines to prevent unintentional chemical reactions.

If spilled materials are hazardous, the cleanup materials are also hazardous and must be disposed of properly. If the spill is large, a Hazmat team or private spill cleanup company may be necessary depending on permit requirements.

Reporting

Keep a record of any spills, including the date and time of the incident, causes, duration, response procedures, and persons notified. If a spill occurs, and it is not contained by the on-site containment methods, report it to the proper authorities. Federal regulations require that oil spills into a navigable water or adjoining shoreline above a certain threshold must be reported to the National Response Center at (800) 424-8802. Oil spills must be reported in the following cases:

- Violate applicable water quality standards.
- Cause a film or *sheen* upon, or discolor, the surface of the water or adjoining shorelines.
- Cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

Spills should also be reported to local agencies, such as the fire department, if necessary to assist with cleanup.

Construction Guidelines

Spill prevention and containment measures should be employed as long as hazardous materials are stored on site. Key spill response personnel should be identified before the project starts, and all employees and subcontractors should be trained on spill prevention, response, and cleanup procedures.

Maintenance

Update the spill prevention and control plan when changes occur in staffing, to the site, or where the materials are stored. Regular inspections should be conducted to ensure proper procedures are posted and cleanup equipment is available. Guidelines for maintaining spill containment measures are provided below:

Containment dikes should be inspected during or after significant storms or spills to check for washouts or overflows. Regular testing is recommended to ensure that the dikes can hold spills. Soil dikes may need to be inspected on a more frequent basis.

Changes in vegetation, inability of the structure to retain storm water, dike erosion, or soggy areas indicate problems with the dike’s structure. Damaged areas should be patched and stabilized immediately, where necessary. Earthen dikes may require special maintenance of vegetation, such as mowing and irrigation.

When evaluating the performance of the containment system, pay attention to the overflow system because it is often the source of uncontrolled leaks. If overflow systems do not exist, accumulated storm water should be released periodically. Polluted storm water should be treated before release. Mechanical parts (e.g., pumps) or manual systems (e.g., slide gates and stopcock valves) may require regular cleaning and maintenance.

Curbing is sized to contain small spill volumes, and frequent maintenance is needed to prevent overflow of any spilled materials. Inspect all curbed areas regularly and clean clogging debris. Repair the curb by patching or replacing it as needed to ensure effective functioning. Conduct inspections before forecasted rainfall events and immediately after storm events. If spilled or leaked materials are observed, start cleanup immediately to allow space for future spills. Prompt cleanup of spilled materials will prevent dilution by rainwater, which can adversely affect recycling opportunities.

Drip pan effectiveness depends on site operators paying attention and emptying the pans when they are nearly full. Because of their small holding capacities, drip pans easily overflow if not emptied. Recycling efforts can be affected if storm water accumulates in drip pans and dilutes the spilled material. Ensure clearly specified and easy to follow practices for reuse, recycle, and/or disposal of pans, especially the disposal of hazardous materials. Consider dumping the drip pan contents into a nearby larger-volume storage container and periodically recycling the contents of the storage container.

Frequent inspection of the drip pans is necessary due to the possibility of leaks in the pan itself. Check for random leaking of piping or valves and for irregular, slow drips that may increase in volume. Conduct inspections before forecasted rainfall events to remove accumulated materials. Empty accumulations immediately after each storm event.

Additional Resources

CASQA (California Stormwater Quality Association). 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org.*

EPA (US Environmental Protection Agency). 2014. *Spill Prevention and Control Plan*. Water: Best Management Practices. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu*.

BMP 47: Construction Equipment Washing and Maintenance

Description

A good construction vehicle and equipment washing and maintenance facility prevents the discharge of pollutants from these operations to surface water or ground water. A typical vehicle/equipment washing and maintenance system is a lined or paved, depressed area that collects the water used in washing trucks, cars, or other construction vehicles/equipment and drains the wastewater into a collection or treatment system (Figure 117).

Ideally, vehicle maintenance should not occur on active construction sites. However, if it must occur, the following practices should be used to minimize or eliminate pollutant discharge.

Figure 117. Vehicle and equipment wash area (CALTRANS 2003).

Primary BMP Functions and Controls

☒ Construction ☐ Permanent
☐ Erosion Control ☒ Sediment Control
☐ Source Control ☐ Flood Control
☐ Filtration ☐ Infiltration

Typical Effectiveness for Targeted Pollutants

● Sediment
● Phosphorus
◖ Metals
○ Bacteria
◖ Hydrocarbons
○ Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Slope	5%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Applicability

Use vehicle washing and maintenance BMPs on all sites where vehicle and equipment cleaning and maintenance are performed. BMPs are particularly important on projects where the soil is silty or a heavy clay, and it is likely that dirt and mud will be transported off site. It is also important for projects taking place during the rainy season and in areas where water is expected to be encountered (high ground water table) during project construction.

Limitations

Limitations depend on the method chosen for disposing of vehicle washwater. If washwater is discharged to a sediment pond on site, sufficient acreage is required. If washwater is discharged to off-site sanitary sewer systems or hazardous waste disposal facilities, the cost of connection or disposal could be a limitation. Discharge of treated washwater to waters of the state (including canals, rivers, ponds, streams, lakes, and ground water) may require pretreatment to remove turbidity or separate oils, as well as federal, state, or local permits.

Design Basis

Washing vehicles generates liquid, semisolid, and solid wastes. These wastes should be contained on site and treated before discharged off site. A stabilized construction entrance (BMP 41) should be installed at the vehicle wash/maintenance area to reduce off-site tracking of mud, dirt, and rocks.

Wash Location and Design

Vehicle washing on site should be located within a structure or building equipped with appropriate disposal facilities. If this is not available, locate outside vehicle wash stations away from storm drain inlets, drainage facilities, and watercourses, and divert site drainage away from the wash area. Vehicle washing and maintenance should be conducted in disturbed areas (staging areas) but should not be conducted in a cut or fill area until grading has been performed or where a high volume of construction traffic exists. Avoid highly erodible soils or frequently wet areas.

Outdoor vehicle wash areas should be lined or paved with concrete or asphalt and have a berm to contain runoff and prevent run-on. It should also be equipped with a sump for collecting and disposing of washwater.

Clearly mark the wash areas with signage and educate employees and subcontractors on proper washing procedures. Include the location of the washing facilities in the SWPPP.

Wash Practices

Use the smallest amount of water and no, or a minimal amount of, detergents if possible. Use a positive shut-off valve and a high-pressure spray to conserve water. Water alone can remove most dirt adequately, but if detergents must be used, they should not contain phosphates. Use biodegradable products that are free of halogenated solvents.

Washwater Discharge

On-site washwater can be contained for evaporative drying with any residual waste disposed of properly. Washwater can also be discharged to surface water if it is permitted and pretreated. Treatment is required for all discharges to waters of the state because they can be contaminated with degreasers, hydrofluoric acid, hydrochloric acid, nitric acid, phosphoric acid, oil, hydraulic fluids, lubrication, and engine cleaning solvents. Contact the local permitting authority to determine proper treatment and disposal methods.

Other discharge options for vehicle washwater include the following:

- Lagoon—A pond-like structure that uses physical, chemical, and biological processes to treat wastewater. They are easy to install and require low maintenance. Safety is a concern, so the area must be fenced from the public.
- Land application system—A method of reusing wastewater by applying it to land for irrigation and to assimilate it into the soil structure. Land application systems require large land area and may need to be permitted.
- Filtering and recycling washwater—A good conservation measure that includes using a sediment basin with a turbidity curtain. Monitoring of the operation could be intensive.

- Municipal wastewater treatment plant—Available only in areas where a municipal wastewater treatment plant exists and the operation is capable of handling the load. This is the best option for limiting liability on larger construction projects. Vehicle and equipment washing activities should be reviewed to determine if oil and sediment controls are needed to comply with any applicable sanitary sewer discharge limits.

Vehicle Maintenance

Vehicle maintenance or repairs should not be conducted in the wash area. Designate a special paved area for vehicle repair.

Properly maintaining and inspecting vehicles and equipment can prevent hazardous chemical leaks. A spill prevention and cleanup plan (BMP 46) should be in place if a hazardous spill or leak occurs.

Properly dispose of any hazardous waste from vehicle maintenance activities, including used oil, antifreeze, solvents, and other automotive-related chemicals (BMP 48).

Construction Guidelines

Vehicle sediment controls including vehicle and equipment washing areas should be installed as the first step in clearing and grading. The location and design should follow the design guidelines listed above.

Maintenance

Ensure the system controls are working as designed and make any repairs as necessary (e.g., repairs to berms or conveyance to any off-site disposal facility). Inspect local roads, sidewalks, and other paved surfaces adjacent to the site daily and sweep up or vacuum accumulated sediment.

Additional Resources

CALTRANS (California Department of Transportation, Division of Construction). 2003. *Construction Site Best Management Practice Manual*. Sacramento, CA.

EPA (US Environmental Protection Agency). 2014. *Vehicle Maintenance and Washing Areas at Construction Sites*. WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities. *https://www.epa.gov/sites/production/files/2017-02/documents/watersense-at-work_final_508c3.pdf*.

BMP 48: Hazardous Materials Management

Description

Good hazardous materials management prevents or reduces pollutant discharge to storm water from hazardous materials by reducing waste generation, properly using materials and disposing of waste, and training employees, contractors, subcontractors, and owners (Figure 118).

Figure 118. Inspector checking hazardous material containers (WV DEP 2015).

In a typical construction activity, hazardous materials and wastes can be discovered during construction (e.g., grading or digging), removed during demolition, or produced by construction activities (e.g., spent materials such as paints and degreasers). Hazardous materials on construction, industrial, commercial, or residential sites can include the following:

- Petroleum products
- Asphalt products
- Concrete curing compounds
- Roofing tar
- Acids
- Palliatives
- Septic waste
- Asbestos
- Stains
- Wood preservatives
- Pesticides
- Paints
- Solvents
- Gasoline
- Cleaners
- Waxes
- Any material listed in 40 CFR 110, 117, 261, or 203.

Primary BMP Functions and Controls

☒ Construction	☒ Permanent
☐ Erosion Control	☐ Sediment Control
☒ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

○	Sediment
◖	Phosphorus
◖	Metals
◖	Bacteria
●	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Medium
Ease of Implementation	Medium
Freeze/Thaw Resistance	N/A
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Applicability

Proper hazardous materials management should be used on all sites and properties with hazardous materials present.

Meeting the recommendations provided in this BMP is not a substitute for complying with local, state, and federal regulations for storing, handling, transporting, and disposing of hazardous materials and wastes. Complying with applicable regulations protects human health and the environment from hazardous waste, reduces liability, and prevents unnecessary schedule interruptions (i.e., project or facility shut down due to environmental investigations/enforcement actions).

Applicable and related BMPs include BMP 15: Oil and Water Separators, BMP 46: Spill Prevention and Control, BMP 47: Construction Equipment Washing and Maintenance, BMP 49: Concrete Waste Management, BMP 50: Sanitary and Septic Waste Management, BMP 77: Outdoor Storage, BMP 83: Vehicle and Equipment Refueling, and BMP 84: Vehicle and Equipment Cleaning, Maintenance, and Repair.

Limitations

Hazardous waste that cannot be reused or recycled must be disposed of according to local, state, or federal regulation and by a licensed hazardous waste hauler. Depending on the type and quantity of waste, this requirement may be costly.

Design Basis

Hazardous materials management includes a wide variety of activities, such as reducing waste generation, properly using materials and disposing of waste, and training.

Reduce Hazardous Materials

The best method to prevent contamination from hazardous materials is to reduce the amount of hazardous materials present on a site. These BMPs can be applied to all sites to use less or eliminate hazardous materials when possible and to substitute materials with less toxic substances.

Industrial Sites

Starting a waste reduction program for industrial sites can be economically beneficial because it reduces raw material purchases and lowers waste disposal fees. Reducing the amount of industrial waste generated on site can be accomplished with the following source controls:

- Plan and sequence production.
- Assess process activities by collecting process-specific information, setting pollution prevention targets, and developing, screening, and selecting waste reduction options for further study.
- Modify processes or equipment to generate less waste.
- Implement a material tracking system and usage inventory to increase awareness about material use and reduce waste generation.
- Implement closed loop recycling.

Material Use

Use hazardous materials properly to prevent accidental spills and contamination of storm water runoff. The following guidelines apply to all sites:

- Follow manufacturers' directions in the use of all materials, including application rate and amounts.

- Maintain a clean and orderly work environment.
- Do not mix products together unless specifically recommended.
- Use the entire product before disposing of the container.
- Do not remove original product label from its container.
- Use ground cloths and drip pans under any work outdoors that involves hazardous materials such as oil-based paints, stains, rust removers, masonry cleaners, and others with warning labels. BMP 46: Spill Prevention and Control provides more information.
- If possible, move activities using hazardous materials indoors if adequate ventilation can be provided.
- Never apply pesticides when rain is expected.
- When using hazardous materials, place the container inside a tub or bucket to minimize spills.

Material Storage

Hazardous materials should always be properly stored and labeled. BMP 46: Spill Prevention and Control and BMP 77: Outdoor Storage provide additional information.

- Identify all chemical substances present.
- Label all containers with substance name, hazards, handling, first-aid information, and special instructions.
- Ensure an adequate number of containers with lids or covers is available.
- Protect hazardous waste storage areas:
  - Store the material indoors.
  - Cover outdoor storage areas with a roof.
  - Protect the material with a covering.
  - Keep containers off the ground.

Construction and Industrial Sites

- Identify, control, and enforce well-sited hazardous waste storage areas and disposal/stockpile areas. Locate hazardous waste storage areas away from storm drains and conveyances.
- Locate storage areas away from direct traffic routes.
- Store waste in sealed containers, constructed of suitable materials to prevent leakage and corrosion, and labeled according to applicable Resource Conservation and Recovery Act requirements and all other applicable federal, state, tribal, or local requirements.
- Store all outdoor containers in appropriately sized secondary containment (e.g., spill berms, decks, and spill containment pallets) to prevent spill discharge, or provide a similar, effective means to prevent pollutant discharge from these areas (e.g., storing chemicals in covered area or providing an on-site spill kit).
- Provide labels and signs for the storage area to educate contractors about proper storage and handling and to comply with regulatory requirements. Stack containers according to directions to avoid damage from improper weight distribution.
- Separate hazardous or toxic waste from construction and domestic waste.
- Provide the following engineer safeguards:
  - Overflow protection devices

   - Secondary containment in case of leaks or spills.
   - Protective guards around tanks and storage areas.
   - An impervious barrier such as a liner, concrete pad, or berm.

Households

- Store hazardous materials out of the reach of children. Never transfer or store hazardous materials in food or beverage containers that could be misinterpreted by a child as food or a drink.
- Put *Mr. Yuck* stickers on hazardous household products and teach children to leave them alone. The stickers are available at Idaho CareLine 211 or (800) 926-2588.

Waste Disposal

Hazardous waste and their containers should be disposed of properly according to local, state, and federal regulations. Never dump products labeled as poisonous, corrosive, caustic, flammable, inflammable, volatile, explosive, or dangerous, or with warnings or cautions outdoors, in a storm drain, or down sinks, toilets, or drains. Section 3.10.7 “Construction Disposal Alternatives” provides a quick reference on disposal alternatives for specific construction wastes.

- Arrange for waste collection before containers overflow (additional containers and more frequent pickups will be needed during the demolition phase of a construction project).
- Ensure waste is disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility.
- Properly dispose of rainwater in secondary containment areas that may have mixed with hazardous waste.
- Recycle material such as used oil- or water-based paint when practical.
- Latex paints are not hazardous wastes but are not accepted in liquid form at the landfill. Leave latex paint uncovered in a protected place until it is dry and dispose of it with solid waste. Use kitty litter to quickly absorb the liquid, which allows the dry paint to be disposed of with solid waste.

Education and Training

Carelessness and poor judgment often result in problems associated with using and disposing of hazardous materials. Be fully aware of all the hazards at the site to decrease the potential for mishandling wastes that can contaminate storm water. Incorporating employee training (BMP 91) into waste management activities is strongly recommended. Best practices for construction and industrial sites include the following:

- Assign hazardous material inventory to a limited number of trained personnel. Have dedicated personnel keep an up-to-date inventory of all hazardous materials and wastes.
- Provide initial and annual training for employees on the hazards of and proper-handling procedures for hazardous wastes.
- Properly educate employees and subcontract personnel on the following:
   - Hazardous waste storage and disposal procedures.
   - Potential dangers to human health and the environment.
   - On-site safety procedures for hazardous materials.

- Ensure a dedicated construction supervisor oversees all handling of hazardous materials on site.

Maintenance

Regular maintenance of hazardous materials systems is important:

- Check containers with hazardous materials frequently for signs of leakage or damage.
- Replace leaking and/or deteriorating containers. Signs include the following:
  - External corrosion and structural failure
  - Installation problems
  - Evidence of spills or overfills
- Immediately clean up any liquid or dry material spills. Report spills to the proper authorities as required.
- Regularly collect and properly remove hazardous waste and materials from the site.

Additional Resources

CASQA (California Stormwater Quality Association). 2004. *California Stormwater Best Management Practices Handbook, New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org.*

Idaho Careline (State of Idaho, Department of Health and Welfare Careline). 2018. *2-1-1 CareLine: Poison Prevention*. *http://healthandwelfare.idaho.gov/Health/InjuryPrevention/Poison/tabid/1389/Default.aspx*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

BMP 49: Concrete Waste Management

Description

Concrete waste management prevents pollutant discharge to storm water from concrete waste by conducting off-site washout, performing on-site washout in a designated area, and training employees and subcontractors on proper management techniques (Figure 119).

Concrete washwater typically contains toxic metals and is caustic and corrosive with a high pH around 12 (EPA 2012a).

Figure 119. Hay bale temporary washout pit (*On Site Washout*).

Applicability

This BMP applies to all project sites that will generate concrete washwater or liquid concrete waste from on-site concrete mixing or concrete delivery. This includes sites with concrete pours for features such as foundations, footings, curbs, sidewalks, floors, piles, and for projects that generate cementitious (i.e., properties of cement) washwater and solids from materials such as mortar, plaster, stucco, and grout.

Check local permitting requirements and regulations for concrete waste management to ensure compliance.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☐ Erosion Control	☐ Sediment Control
☒ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

○	Sediment
○	Phosphorus
●	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	ABCD
Min. Ground Water Separation	3 feet
Min. Bedrock Separation	N/A

Limitations

Off-site washout of concrete wastes may not always be possible. On-site washout facilities should be lined or a waterproof containment system should be used if shallow ground water is present to prevent ground water contamination.

Washout areas that are lined with plastic can make it difficult to recycle or reuse hardened concrete because the lining becomes bound up with the concrete.

Using aboveground hay bale washout pits may not be feasible for concrete pumping trucks with low hanging hoppers.

Design Basis

Washing out concrete trucks should be completed at an approved off-site location if possible or in designated on-site areas only. Do not wash out concrete trucks into storm drains, open ditches, streets, or streams. Several types of washout containment systems can be used, and all concrete washout water and solids should be recycled or reused. The approach to the concrete washout areas should be stabilized with gravel (BMP 41) or a paved construction road.

Site Selection

Locate concrete washout areas at least 50 feet from storm drains, open ditches, or water bodies. The washout site should not be located in an area where shallow ground water may be present, such as near natural drainages, springs, or wetlands. Washouts should be located at least 400 feet away from any natural drainage pathway or water body and at least 1,000 feet from wells or drinking water sources.

Place washouts in a location accessible to concrete trucks and where the majority of the concrete will be poured. On large sites with extensive concrete work, use multiple locations to make it more convenient and increase compliance with the BMP guidelines. Provide clear signage at the concrete washout area.

Washout Containers

A washout pit can be constructed either above or below grade. Above grade pits can be constructed with hay bales lined with a polyethylene liner. Below grade pits can be constructed by excavating an area, berming around three sides of the pit, and lining the pit with plastic. A minimum length and width of 10 feet is recommended, although a larger size may be needed to contain the anticipated waste based on the estimated concrete volume to be used. The polyethylene lining should be impermeable with a 16-mil minimum thickness.

Prefabricated concrete washout containers made of vinyl or metal are available from several different vendors. The containers are usually portable, reusable, and easier to install than hay bale washout pits or excavated pits.

Washout boxes or buckets with pumps can be mounted on the back of ready mix concrete trucks. The boxes or buckets are used to capture water from washing the chute after a pour is completed, and the washwater and solids can be returned to the ready mix plant for recycling.

Construction Guidelines

The following practices will reduce storm water pollution from concrete wastes:

- Avoid mixing excess amounts of fresh concrete or cement on site.
- Avoid dumping excess concrete in nondesignated dumping areas.
- Wash out wastes into the temporary pit where the concrete can set, broken up, and disposed of properly.
- When washing concrete to remove fine particles and expose the aggregate, drain the water to a bermed or level area.

- Avoid washing sweepings from exposed aggregate concrete into the street or storm drain. Instead, collect and return sweepings to an aggregate base stockpile or dispose of in the trash.
- Train employees and subcontractors in proper concrete waste management.

After construction is completed, remove concrete waste from the washout pit, and restore and reclaim the area.

Maintenance

Inspect concrete washout facilities daily and after heavy rains to check for leaks and damage to the facility.

If using a temporary pit, dispose of the hardened concrete on a regular basis. Washout pits should be cleaned or additional facilities should be constructed when the washout is 75% full, or there is less than 4 inches of freeboard for an aboveground facility or 1 foot of freeboard for a belowgrade facility.

Inspect the plastic lining of temporary pits to ensure it has not been damaged. Reline as necessary.

Before heavy rains, lower the liquid level in the washout container or cover the container to avoid overflow during the storm.

Additional Resources

EPA (US Environmental Protection Agency. 2012. *Concrete Washout*. Stormwater Best Management Practice. *http://www.epa.gov/npdes/pubs/concretewashout.pdf*

BMP 50: Sanitary and Septic Waste Management

Description

Proper sanitary and septic waste management prevents the pollutant discharge to storm water from sanitary and septic waste by providing convenient, well-maintained septic waste facilities, and arranging for regular service and disposal (Figure 120). Portable sanitary facilities are self-contained units consisting of gravity fed holding tanks that temporarily store human waste.

This BMP does not cover permanent developments that will have permanent sanitary sewer facilities with proper on-site or off-site disposal according to local regulations.

Figure 120. Portable sanitary facility (ITD 2014).

Applicability

Portable sanitary facilities are often needed to supplement permanent facilities at special events or on construction sites. Per OSHA requirements, construction sites that do not have sanitary sewer service available shall be provided with a toilet facility, unless the crew is mobile and has transportation readily available to a nearby toilet facility.

Limitations

Access to the septic waste facility must be provided so that they can be regularly serviced. A sufficient number of units should be provided to accommodate all personnel on site.

Design Basis

Sanitary and septic wastes for portable and permanent facilities should be disposed of according to state and local requirements. The following guidance applies to placing, operating, and disposing of portable and temporary sanitary systems.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☐ Erosion Control	☐ Sediment Control
☒ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

○	Sediment
○	Phosphorus
○	Metals
●	Bacteria
○	Hydrocarbons
●	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Easy
Ease of Installation	Easy
Freeze/Thaw Resistance	N/A
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	N/A
NRCS Soil Group	N/A
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Portable Sanitary Facilities

- Locate portable sanitary facilities in a convenient location but away from high traffic areas. If site conditions allow, place facilities at least 50 feet from a drainage facility or watercourse.
- Ensure that a licensed sanitary and septic waste hauler maintains sanitary and septic facilities and keeps them in good working order. A list of permitted septic tank pumpers is available at: *https://www.deq.idaho.gov/water-quality/wastewater/septic-and-septage/*.
- Avoid using biocides, such as formaldehyde, to prevent odor. Use nonformaldehyde, biological treatments to breakdown wastes and minimize odor.
- Stake or secure portable units to a fixed object to prevent overturning, especially in high wind areas.
- Under section 4.1.2(6) of the Americans with Disabilities Act Accessibility Guidelines, at least 5% of single-user portable toilets clustered at a single location must be accessible.
- Always treat and dispose of portable toilet waste according to state and local requirements. Municipal sewage treatment plants are an acceptable disposal option for untreated portable toilet wastes.
- Do not discharge or bury untreated wastewater.
- Dispose of sewage from recreational vehicles (RVs) at approved facilities, which include wastewater treatment plants, RV parks, dealers or storage facilities, or recreational sites. A list of RV dump stations in Idaho is provided at *http://www.rvdumps.com/idaho/*.

Temporary Septic Systems

- If using an on-site disposal system such as a temporary septic system, comply with local health agency requirements.
- On-site disposal systems must be designed per DEQ's *Technical Guidance Manual for Individual and Subsurface Sewage Disposal Systemshttps://www.deq.idaho.gov/water-quality/wastewater/septic-and-septage/.* If discharging to a centralized sanitary sewer system, contact the local wastewater treatment plant for permitting and other requirements. Ensure that temporary septic systems treat wastes to required levels before discharging.
- Ensure that temporary sanitary facilities discharging to a sanitary sewer system are properly connected to help eliminate illicit discharges.

Maintenance

- Inspect facilities weekly before forecasted rain events and daily during periods of extended rain.
- Contact service contractors immediately if leaks are detected.
- Arrange for regular waste collection for portable facilities.

Additional Resources

CASQA (California Stormwater Quality Association). 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org*

DEQ (Idaho Department of Environmental Quality). 2018. *Technical Guidance Manual for Individual and Subsurface Sewage Disposal Systems*. Boise, ID: DEQ. *https://www.deq.idaho.gov/water-quality/wastewater/septic-and-septage/*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

BMP 52: Mulching

Description

Figure 122. Wood chips dispensed on the side of a road to help slow runoff.

Mulching is a temporary soil stabilization or erosion control practice where materials such as straw, grass, grass hay, compost, or wood chips or fibers are placed on or incorporated into the soil surface. Hydraulic mulching, or hydromulching, is a process that combines mulching materials with a tacking agent and is applied in slurry with water to temporarily stabilize bare slopes or other bare areas. Hydromulching is an economical way to protect slopes from erosion (Figure 122).

In addition to stabilizing soils, mulching can reduce the velocity of storm water runoff over an area. When used together with seeding or planting, mulching aids in plant growth by holding the seed, fertilizers, and topsoil in place, helping to retain moisture, and insulating against extreme temperatures.

Primary BMP Functions and Controls

☒Construction	☐Permanent
☒Erosion Control	☒Sediment Control
☐Source Control	☐Flood Control
☐Filtration	☐Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
◖	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Easy
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	2 acres
Max. Upstream Slope (conventional)	50%
Max. Upstream Slope (hydromulch)	15%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Applications

Mulching protects the soil surface from splash erosion. It retards runoff, traps sediment, and creates more favorable conditions to assist germination and early plant development. The following mulches are suitable for use at construction sites:

- Vegetative materials—wheat straw, rye straw, barley straw, and grass hay
- Wood products—wood cellulose fibers, wood chips, bark, and sawdust
- Other organic materials—leaves, peat, manure, and compost
- Rock products—gravel and crushed stone
- Fabricated mulch—jute, burlap, coconut (coir), excelsior, and Kraft paper string

Mulch is an immediate, effective, and inexpensive means of controlling dust and erosion and aids revegetation of construction sites. It protects exposed soils subject to heavy erosion, retains moisture (minimizing watering needs), and requires no removal as most of mulching materials deteriorate naturally.

Mulch is often used alone in areas where temporary seeding cannot be used because of the season or climate. It may be used with other treatments for increased effectiveness. Use of mulch may or may not require a binder, netting, or tacking agent to hold the mulch in place. On steep slopes and critical areas, such as waterways, mulch matting is used with netting or can be anchored to hold it in place.

To aid in establishing vegetation, mulch seeded and planted areas where slopes are steeper than 2:1, where runoff is flowing across the area, or when seedlings need protection from bad weather. If the mulching effect is to be maintained longer than 3 months, the preferred mulch is vegetative material. Wheat straw is the most preferred vegetative material, followed by rye straw, barley straw, or grass hay.

Wood chips are suitable for areas that will not be closely mowed and around ornamental plantings. Chips decompose slowly and do not require tacking. Wood chips can be very inexpensive if they are obtained from trees cleared on the site. Chips should not be used on slopes greater than 6% because they tend to wash down slopes.

Bark mulch is suitable for areas planted with grasses that will not be closely mowed. The bark may be applied mechanically or by hand.

Crushed stone and gravel mulches are appropriate for dust control and soil protection on low-use dirt roads, driveways, and other areas of light vehicular activity within the construction site.

Hydromulching is an effective way to increase water retention (reducing erosion) from 6 months up to 1 year. Beyond 1 year, the effectiveness drops off. Hydraulic mulching can be applied to areas that are within about 200 feet of a road or that can otherwise be reached by truck. Small roadside slopes and large, relatively flat areas are well adapted to this method. When adequate moisture exists, the slurry can be combined with seed and fertilizer to initiate stabilization and revegetation in a single application. Mulch usually lasts about 1 year. The growing vegetation is needed to provide continued stabilization.

Limitations

Disadvantages of mulch include the following:

- It may delay germination of some seeds because cover reduces the soil surface temperature.
- Mulch can be easily blown or washed away by runoff if not secured or incorporated. Lightweight mulch, such as straw, requires matting, crimping, or other methods to hold it in place.
- Some mulch materials, such as wood chips, may absorb nutrients necessary for plant growth.
- Straw mulch provides organic matter as it breaks down and is incorporated into the soil. If applications are too heavy, however, soil nutrient levels (especially nitrogen) may decline during decomposition. Prescribed application rates of the straw mulch and specified fertilizer should be strictly followed. Using a fertilizer low in phosphorus is recommended.
- Synthetic spray-on materials are not recommended except for temporary dust/erosion control or for steep, rocky slopes where other mulches and mechanical methods cannot be effectively applied. The synthetic mulches may create impervious surfaces and can have adverse effects on water quality.

- Avoid applying mulch as the only control on long slopes. Break up concentrated flows on these slopes using methods recommended in other BMPs.
- Hydromulching loses effectiveness after 1 year.
- Hydromulching is only suited for physically stable slopes (at natural angle of repose, or less).
- Avoid hydromulching on long uninterrupted slopes. Break up concentrated flows with other BMPs, such as BMP 59: Gradient Terracing or BMP 60: Check Dams.

Design Basis

Stone and Gravel

- After the gravel or stone is applied, construction traffic may move over it. Areas that become compacted or depressed should be remulched to the same level as the remaining area to prevent flows from the site from becoming channelized into these depressions.
- After activities are completed on site, the gravel or stone mulch may be left in place during revegetation operations.
- When used for driveways or dirt roads, a filter blanket should be placed under the gravel.

Straw

- Straw mulch forms a loose layer when applied over a loose soil surface. To protect the mulch from wind drifting and water damage, stabilize it by covering with netting, such as jute, or by spraying it with a tacking agent. Straw mulch should cover the entire seeded area or exposed slope. The mulch should extend into existing vegetation or stabilized areas on all sides to prevent wind or water damage, which may start at the edges of the mulched area
- Apply straw fibers to form a uniform cover of loose straw through which 20% or less of the original ground surface can be seen. No large clumps of unscattered straw should exist after application.
- On small slopes, straw mulch should be applied by hand broadcasting to a uniform depth of 2 to 3 inches. On larger slopes, straw can be blown onto the slope to achieve a uniform cover of 2 to 3 inches.

Wood Chips

- Due to bacterial action during decomposition, nutrient concentrations in the soil may be depressed under a layer of wood chips. Applications should not exceed the specified thickness that would cause a marked decline in some soil nutrients for longer periods.
- When using wood chips to mulch revegetation projects, the specified application of fertilizer should be increased approximately 25% to replenish soil nutrients lost due to breakdown of wood chips.

Mulch Effectiveness

- Crushed stone and gravel mulches retain their effectiveness indefinitely if properly applied and protected from compacting traffic. Sediment generation is reduced 70% to 90%, and nutrient generation is reduced 50% to 70%.

- Straw mulches and hydromulches initially have a high sediment and nutrient reduction, but breakdown of the organic fibers decreases their effectiveness with time. Sediment and nutrient reduction estimates are shown in Table 22.
- Wood chips deteriorate more slowly than wood fiber and, therefore, retain their effectiveness longer. Sediment and nutrient reduction estimates for wood chips is shown in Table 22.

Table 22. Estimated removal efficiencies of mulches.

Age of Mulch	Wood Chips		Hydromulch		Straw (without vegetation)	
	Sediment Reduction (%)	Nutrient Reduction (%)	Sediment Reduction (%)	Nutrient Reduction (%)	Sediment Reduction (%)	Nutrient Reduction (%)
0–2 months	90–95	60–80	70–80	50–70	90–95	60–80
2 months–1 year	90–95	60–80	70–80	50–70	70–90	50–70
1–2 years	80–90	50–70	40–60	20–50	40–60	20–50
More than 2 years	50–60	30–50	10–30	0–10	10–30	0–10

Construction Guidelines

Seeding (temporary or permanent) can take place before or concurrently with mulching. Other surface runoff control measures should be installed before seeding and mulching. If seed is applied before mulch, mulch should be applied to seeded areas immediately after seeding.

Mulches should not be applied when free surface water is present but may be applied to damp ground.

The choice of materials for mulching will be based on the type of soil to be protected, site conditions, season, and economics.

Straw Mulch

The straw should be stabilized to prevent it from being damaged by water or wind (blown away). Use one of the following methods to apply straw mulch:

- Hand punching can be used on small sites, sites with rock and stone on the surface, sites with slopes that are steeper than 3:1, or sites that have been wattled. Take care not to damage wattling or planted vegetation. Use a spade or shovel to punch the straw into the slope until all areas have straw standing perpendicularly to the slope and embedded at least 4 inches into the slope. The straw bunches should resemble the tufts of a toothbrush.
- Roller punching can be used on large, gently sloping sites without significant outcroppings of rock and stone. Do not use roller punching on sites that have been wattled (unless adequate space exists between lines of wattling) or on planted sites. A roller equipped with straight studs not less than 6 inches, from 4 to 6 inches wide, and approximately 3/4-inch thick will best accomplish the desired effect. Studs should stand approximately 8 inches apart and should be staggered. All corners should be rounded to prevent withdrawing the straw from the soil. Vegetative planting may be conducted following roller punching.
- Crimper punching involves specially designed straw-crimping rollers, which are suitable for use wherever roller punching can be used. The crimpers consist of serrated disk blades,

set 4 to 8 inches apart, which force straw mulch into the soil. Crimping should be done in two directions with the final pass conducted across the slope rather than up and down it.
- Tacking agents may be used on any type of site but are best used only on very stony or rocky soils or small, steep slopes. Apply 28.5 cubic feet per acre (ft^3/ac) of the tacking agent or its equivalent over the straw mulch. Agents that are neutral or nearly neutral in color and have demonstrated effectiveness for the soils and climate of the application area are acceptable.
- Matting may be used on large, steep areas that cannot be punched with a roller. Jute or wood excelsior on plastic netting should be applied over unpunched straw (BMP 54: Matting).

Hydromulching

- Wood fiber may be dyed to aid in uniform placement. Dyes should not stain concrete or painted surfaces nor injure plant or animal life when applied at the manufacturer's recommended rate.
- Application of the slurry should proceed until a uniform cover is achieved. The applicator should not be directed at one location for too long or the applied water will cause erosion.
- The hydraulic mulching machine should be equipped with a gear-driven pump and a paddle agitator. Agitation by recirculation from the pump is not acceptable. Agitation should be sufficient to produce homogeneous slurry of tacking agent and mulch (and seed fertilizer, if used).
- Application rates according to the manufacturer's recommendation for each site situation should be used.

Maintenance

Inspect all mulched areas periodically according to the inspection interval prescribed in the project site storm water plan and after runoff-producing storm events. Inspect for damage due to wind, water, or human disturbance. Repair damaged areas of the mulch immediately. If hydromulching, repair damaged areas at the original specifications. Reseed or replant such areas, if necessary, before replacing the mulch cover. Straw mulch and other organic products do not have to be removed when the vegetation becomes established.

Additional Resources

EPA (US Environmental Protection Agency). 2014. "Mulching." *Stormwater Best Management Practices: Compost Blankets*. https://www3.epa.gov/npdes/pubs/compostblankets.pdf

BMP 53: Geotextile

Description

Geotextiles are porous fabrics made by weaving or bonding fibers from synthetic materials such as polypropylene, polyester, polyethylene, nylon, PVC, glass, or mixtures of these materials.

Geotextiles stabilize disturbed soil areas and protect soils from wind or water erosion by providing a continuous sheet over the exposed surface and reducing raindrop impact (Figure 123). The fabrics protect new vegetation and aid in vegetation growth and establishment by preventing topsoil loss and retarding evaporation of soil moisture. Geotextiles can also provide material separation for riprap (BMP 56) or subgrade reinforcement.

Matting (BMP 54) or netting made of biodegradable materials (e.g., jute, wood fiber, straw, coconut, paper, or cotton) used for these purposes is less durable.

Figure 123. Geotextile channel lining (ITD 2014).

Primary BMP Functions and Controls

☒ Construction ☒ Permanent
☒ Erosion Control ☐ Sediment Control
☐ Source Control ☐ Flood Control
☐ Filtration ☐ Infiltration

Typical Effectiveness for Targeted Pollutants

● Sediment
○ Nitrogen
○ Phosphorus
◖ Metals
○ Bacteria
○ Hydrocarbons
○ Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	100 acres
Max. Slope	50%
NRCS Soil Group	ABCD
Min. Ground Water Separation	NA
Min. Bedrock Separation	NA

Applicability

Geotextiles can be used on disturbed slopes and within channels, ditches, and swales. They are especially applicable for steep slopes, high flows, off-season planting, or if other factors prevent the use of organic matting. Use geotextiles along streambanks to establish bioengineered revetments where rock or riprap revetments are not appropriate. Geotextile advantages include the following:

- Ease and convenience.
- Quick and effective protection against erosion problems.
- A wide variety of geotextile products are available to match specific needs.
- Synthetic geotextiles may be removed and reused if economically feasible.
- Better resistance to high-flow situations than organic matting.

Limitations

- Effectiveness may be reduced drastically if the fabric is not properly selected, designed, or installed.
- Many synthetic geotextiles are sensitive to light and should be protected from direct sunlight before installation.
- Geotextiles that are not biodegradable should not be used where their presence or appearance is aesthetically unacceptable.
- Geotextiles should not be placed on 50% slopes if they are to be covered with overlying material.
- While geotextiles are affordable, their costs are usually higher than other erosion control techniques. Focus using geotextiles in areas where other erosion control techniques are ineffective (e.g., steep slopes, channels, periods where planting and seeding cannot take place).
- Geotextiles are not well suited in excessively rocky sites where a vegetated cover is unlikely or areas where the final vegetation will be mowed (staples and netting catch in mowers).

Design Basis

Geotextile fabrics are typically either woven or nonwoven polypropylene material. Nonwoven fabrics resemble felt whereas woven fabrics consist of two or more strands of material interlaced at right angles. The fabrics are available in various thicknesses, tensile strengths, permittivity, and ultraviolet stability; the proper material selection depends on the application. Products are available for up to 50% slopes. Typically, woven fabrics are preferred where high strength properties are needed; nonwoven fabrics are preferred where water transmission is needed. Use woven monofilament geotextiles where both strength and filtration are important. For erosion control applications, geotextiles should have the characteristics shown in Table 23.

Table 23. Recommended geotextile properties (CASQA 2004a).

Property	Minimum Value	Testing Method
Thickness	0.06 inches	—
Tensile strength	150 pounds (warp) 80 pounds (fill)	ASTM D 4632
Permittivity	0.07 sec-1	ASTM D 4491
Ultraviolet stability	70%	ASTM D 4355

Some synthetic geotextiles persist a very long time and should be considered a permanent measure. Others remain intact for less than 1 year. Those types designed to help establish vegetation will eventually photo-degrade or decompose. If a short-term degradable product is needed, see BMP 54: Matting.

Anchorage requirements depend on slope, soils, and expected runoff flow rates. General recommendations for anchorage are as follows:

- Anchor the fabric with U-shaped wire staples (minimum 8 gauge), metal geotextile stake pins (0.20 inch diameter with 1.5-inch steel washer), or triangular wooded stakes driven perpendicularly into the slope face. All anchors should be a minimum of 6 inches long (up to 18 inches recommended in loose soils) and have sufficient penetration to resist pullout.

- Anchor spacing should be denser for steeper slopes. Steep slopes (1:1 to 2:1 H:V) should have a minimum of 2 anchors per square yard. Moderate slopes (2:1 to 3:1 H:V) should have a minimum of 1.5 staples per square yard. Check manufacturer's recommendations for staple patterns and density.

Anchorage can be selected using static analysis for a horizontal anchoring system as provided in Equation 30, Equation 31, and Equation 32. Figure 124 provides a cross-sectional diagram of a horizontally anchored geotextile system.

$$T_{GMallow} = \sigma_{allow} * t$$

Equation 30. Allowable geomembrane tension.

$$\sigma_{allow} = \frac{\sigma_{ult}}{FS}$$

Equation 31. Allowable geomembrane stress used to determine factor of safety.

$$T_{ATallow} = \frac{\gamma * d * L * (\tan\delta_U + \tan\delta_L)}{\cos\beta - \sin\beta * \tan\delta_L}$$

Equation 32. Allowable anchor trench tension.

Where

σ_{allow} = allowable geomembrane stress

t = geomembrane thickness

σ_{ult} = ultimate geomembrane stress (e.g., yield or break)

$T_{ATallow}$ = allowable anchor trench tension

d = thickness of the cover soil

L = embedment length

δ_L = (flexible membrane liners)/soil friction angle (below geomembrane)

δ_U = cover soil and geomembrane friction angle (above geomembrane)

β = side slope angle

FS = factor of safety

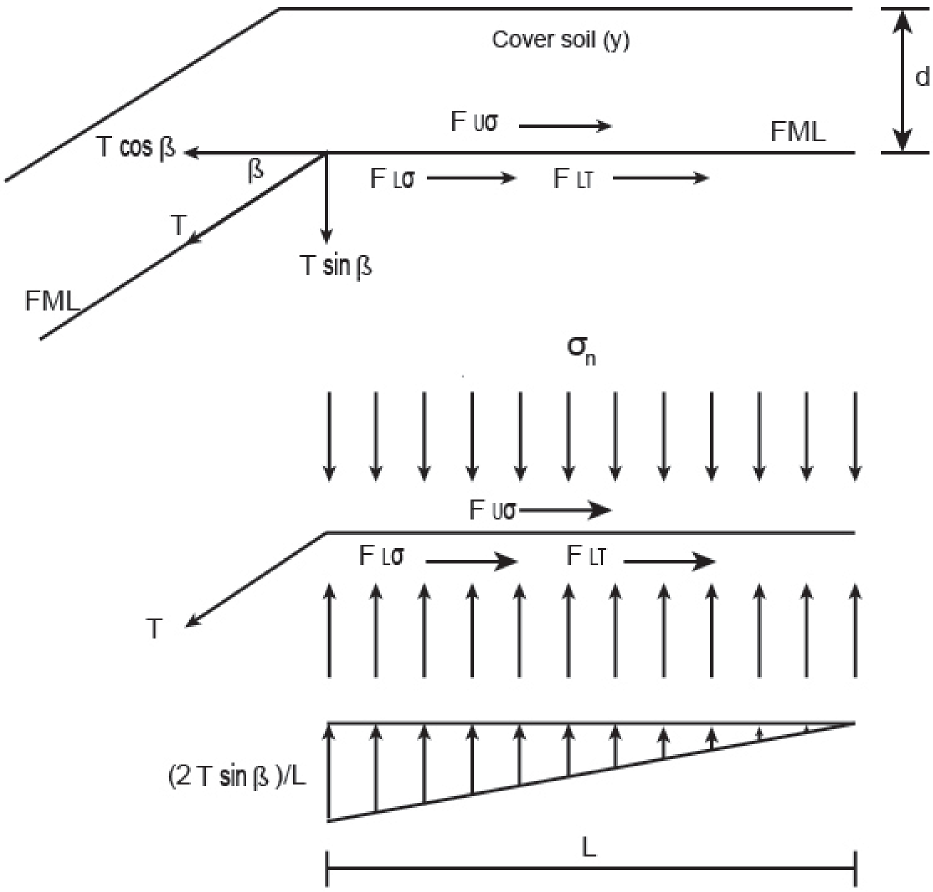


Figure 124. Cross-sectional diagram of a horizontally anchored geotextile system.

Construction Guidelines

When applying a geotextile to an exposed surface, anchor it into place to provide a continuous cover. Follow the manufacturer's recommendations for installation on slopes and within channels (Figure 125). After the fabric is placed, avoid driving equipment over the fabric, especially if wet soil conditions exist. Use the following guidelines for installation:

- The soil should be reasonably smooth. Fill and compact any rills and gullies. Remove protruding rocks and other obstructions.
- Apply the individual rolls up and down the slope, from the top to the bottom—never along the contour.
- Overlap the sides of the rolls at least 4 inches and ensure at least a 3-foot overlap when an uphill roll joins a downhill roll. The uphill roll should overlie the downhill roll.
- Extend the fabric beyond the edge of the mulched or seeded area at least 1 foot at the sides and 3 feet at the top and bottom of the area. If existing vegetation or structures mark the boundaries of the area, the fabric should continue into the stable vegetated area or to the edge of the structure.
- At the top of the area, bury the end of each roll in a trench at least 8 inches deep. Backfill and tamp the trench.

- Ensure the fabric makes uniform contact with the slope face underneath. No *bridging* of rills or gullies should be allowed.
- When using fabric designed for seeding or revegetation, follow the manufacturer's guidelines for proper seedbed preparation, seed application, and/or planting.

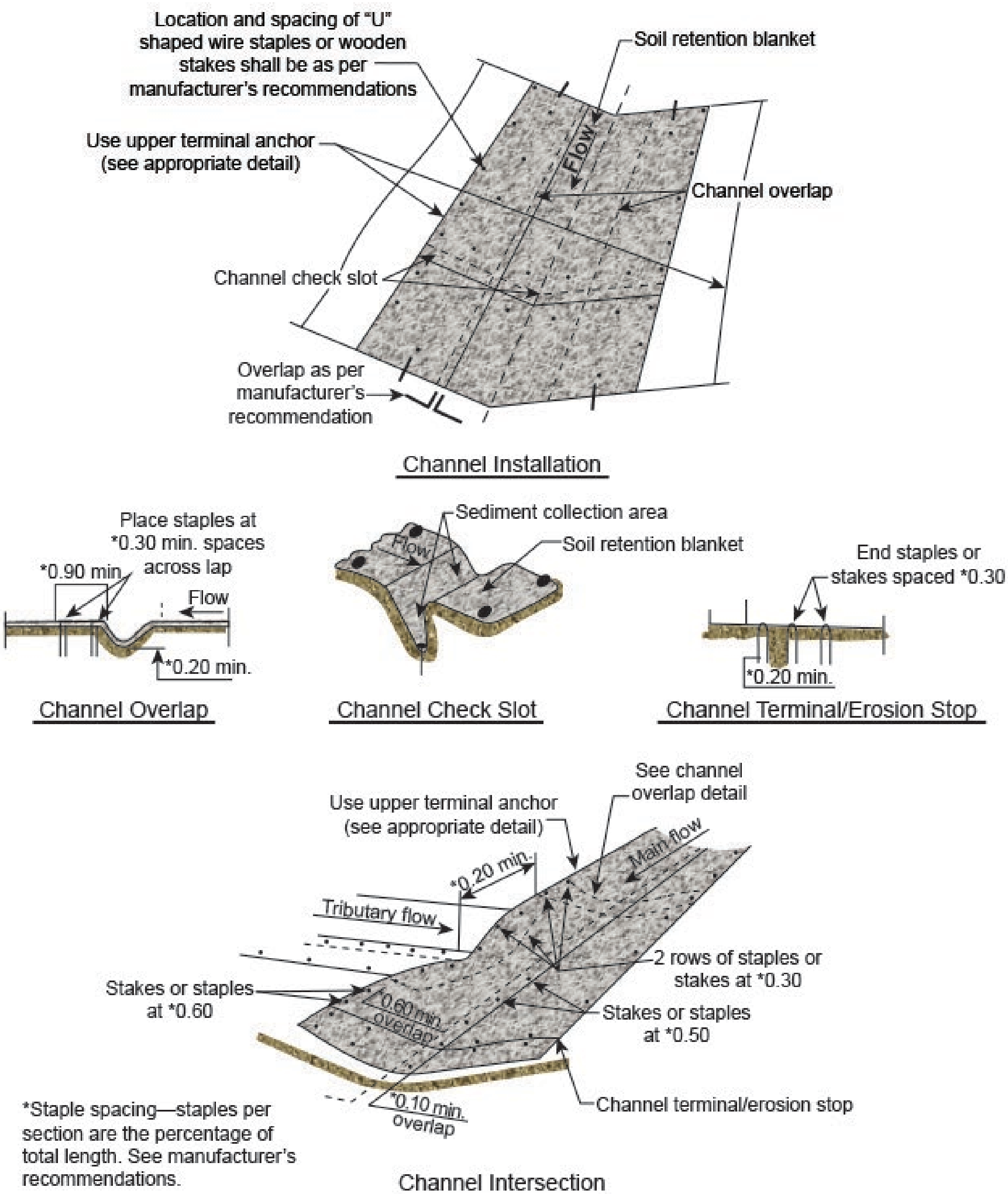


Figure 125. Channel installation.

Maintenance

Inspect weekly or monthly during drier periods and within 24 hours after each runoff-producing storm. To ensure proper functioning, complete one inspection during the first runoff-producing event after installation. Check that the fabric is uniformly in contact with the soil, the lap joints are secure, and staples are flush with the ground. If fabric sheeting is damaged or missing, replace it immediately to restore full protection. Inspect sheeting to ensure that channelization and erosion are not occurring underneath fabric (sediment outwash is the most visible sign).

Products used for temporary control may be removed and reused if it is done without leaving the area susceptible to erosion and the fabric is suitable for reuse.

Additional Resources

CASQA (California Stormwater Quality Association). 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

BMP 54: Matting

Description

Matting is a porous net or fibrous sheet laid over the ground surface for slope stabilization and erosion control or used to hold mulch in place and protect it against wind or water damage. Matting may be used to stabilize channels and swales until vegetative cover becomes established. Matting and netting are sometimes classified as geotextiles (BMP 53); in this catalog, matting is considered to be biodegradable materials made from straw, coconut (coir), jute, wood fiber (excelsior), paper, and/or cotton (Figure 126). Some of these organic materials may be held in place by plastic netting.

Figure 126. Jute matting applied over a steep slope in Jackson Hole, Wyoming.

Applicability

While a variety of biodegradable matting materials may be used for erosion control, the main types include woven (jute), wood fibers, and plastic-bonded. Applications for these matting types are listed below.

Jute matting is a heavy fiber net that is generally purchased in rolls and is stapled/anchored to slopes to provide a uniform covering. This covering protects mulches, provides additional water-holding capacity, and aids in moderating environmental fluctuations near the ground surface (as does mulch).

Jute matting can be applied over straw, grass hay, wood fiber, or manure mulches when wind or water damage would occur without a protective net. Matting is the best single method for protecting the integrity of a mulched area. It may be applied alone as an alternative to straw or wood fiber mulches on flat sites for dust control and seed germination enhancement but should not be applied alone where runoff quantities are significant.

Wood fiber (excelsior) matting is made by bonding wood excelsior fibers to a paper or plastic reinforcing net. The matting is purchased in rolls and stapled to slopes to provide a uniform covering

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
◖	Metals
○	Bacteria
◖	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	100 acres
Max. Upstream Slope	100%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	2 feet

to protect mulches, provide enhanced water-holding capacity, and aid in moderating environmental fluctuations near the ground surface.

Plastic netting (photo/biodegradable) is a monolithic plastic cloth-like material used primarily to hold straw and other materials in place. Plastic netting is more durable than jute or wood fiber matting. While it is easier to handle and requires less labor, it has no mulch capabilities. Plastic netting alone provides no soil stabilization or erosion control and is best used to hold down mulches until vegetation becomes established.

Matting can be useful in the following circumstances:

- Construction sites becoming temporarily inactive (inactive period greater than 2 weeks and less than 1 year).
- Graded areas receiving permanent revegetation treatment by seeding.
- Bare areas receiving permanent revegetation treatment by seeding.

Limitations

Matting should not be used where overland water flow will exceed 6.5 ft/s. Because of the following characteristics of plastic netting and wood fiber matting, jute matting, straw, or straw-coconut matting are preferred.

Plastic netting does not function as mulch (as does jute matting) because it does not absorb water. When plastic netting is used to anchor straw mulch, it increases the effectiveness of the mulch, but it does not provide direct control of erosion and sedimentation or nutrient generation. Straw mulch rates should be increased 25% when plastic netting is used instead of jute or straw. Plastic netting will degrade over time when exposed to sunlight.

Wood fiber matting is more difficult to put in place than jute and is less predictable in controlling erosion. When properly applied, wood fiber matting can be as effective as jute matting at sediment and nutrient reduction, but it can 10% to 20% less effective when not properly installed.

Biodegradable matting should be chosen to match the expected length of service.

Design Basis

Jute matting should be fiber cloth of a uniform plain weave, undyed and unbleached single jute yarn, 3 to 4 feet wide and weighing an average 0.4 pounds per linear foot of cloth with a tolerance of plus or minus 5%. The matting should have approximately 78 warp ends per width of cloth and 45 weft ends per linear meter of cloth. The yarn should be of a loosely twisted construction having an average twist of not less than 6.3 turns per 4 inches and should not vary in thickness by more than half of its normal diameter.

Wood fiber matting should consist of machine-produced mats of curled wood excelsior, of which 80% have an 8 inches or longer fiber length. The matting should be of consistent thickness with the fiber evenly distributed over the entire area of the blanket (backing). The topside of each blanket should be covered with a 1- x 3-inch weave of twisted Kraft paper or biodegradable plastic mesh that has a high wet strength. Blankets should be fire and smolder resistant and contain no chemical additives. Blankets should be in rolls 3 to 4 feet wide and 130 to 200 feet long.

Plastic netting with mesh opening from 1/10 x 1/10 inches to 1/5 x 1/5 inches should be applied over straw mulch, similar to the method specified below for jute matting.

Effectiveness—Jute matting acts like straw mulch or hydromulch. Sediment reduction is typically 70% to 90% for up to 6 months, 40% to 60% for up to 2 years, and 10% to 30% beyond 2 years. Nutrient reduction is estimated at 50% to 70% for 6 months, 20% to 50% for up to 2 years, and 0% to 10% beyond 2 years.

Due to the difficulty of proper application, wood excelsior matting has a more variable effectiveness than straw, jute, or hydromulch, but when properly applied, it can be as effective. Sediment reduction should range from 50% to 90%, 20% to 60%, and 0% to 30% in 6 months, 2 years, and beyond 2 years, respectively. Nutrient reductions for the same time periods are estimated to be 30% to 70%, 10% to 50%, and 0% to 10%.

Construction Guidelines

The following guidelines apply to all matting and netting installations (Figure 127):

- The soil should be reasonably smooth. Fill and compact any gullies and rills. Rocks, vegetation, or other obstructions that rise above the level of the soil should be removed.
- After site preparation and seeding (if any), roll the netting or matting onto the surface from the top of the slope to the bottom of the slope. Do not install the rolls in a horizontal direction across the slope face; the rolls should follow water flow direction.
- At the top of the area, bury the end of each roll in a trench at least 8 inches deep. Backfill and tamp the trench.
- Overlap the sides of the rolls at least 4 inches and ensure there is at least a 3-foot overlap when an uphill roll joins a downhill roll. The uphill roll should overlie the downhill roll.
- Extend the matting beyond the edge of the mulched or seeded area at least 1 foot at the sides and 3 feet at the top and bottom of the area. If existing vegetation or structures mark the boundaries of the area, the matting should continue into the stable vegetated area or to the edge of the structure.
- Staples should be driven perpendicularly into the slope face. Place them approximately 3 feet apart down the sides and center of the roll and not more than 1 foot apart at the upper end of a roll or at the end overlap of two rolls.
- Staples should be of heavy gauge wire (7/100 inch diameter or greater), bent into a U-shape, with legs at least 6 inches long, and a 1-inch crown. Use longer staples and greater frequency in loose or sandy soil.
- Ensure the matting makes uniform contact with the slope face underneath. No *bridging* of rills or gullies should be allowed.
- If wood fiber matting is to be applied without other mulches, the minimum thickness of mat should be 1.5 inches. If the mat is to be applied over other mulches, the minimum mat thickness should be 0.5 inches.

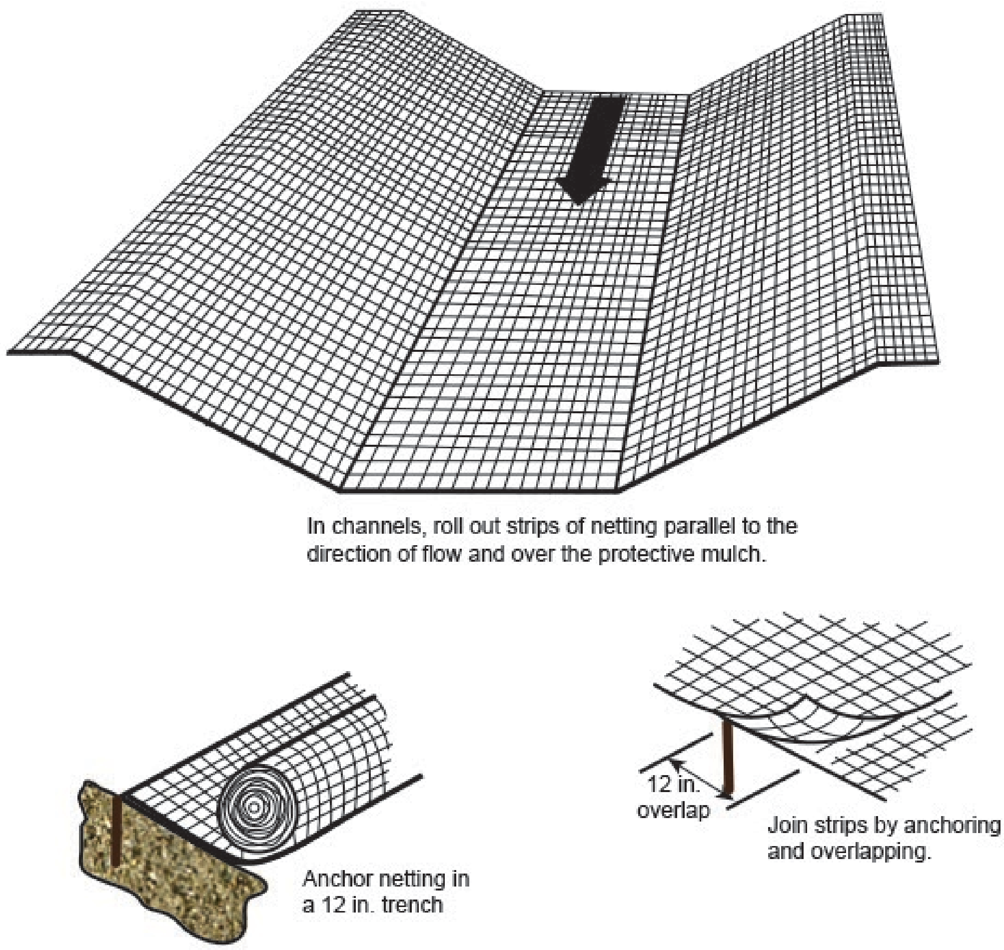


Figure 127. Matting.

Maintenance

Inspect the matting at regular intervals and after each runoff-producing storm event. Repair the matting or netting as necessary to restore complete coverage and full effectiveness. The matting must maintain contact with the group at all times.

Additional Resources

EPA (US Environmental Protection Agency). 2014. *Geotextiles.* Water: Best Management Practices. *https://www.epa.gov/watersense/best-management-practices*

BMP 55: Soil Binders

Description

Disturbed soil is easily eroded by wind or storm water runoff. Soil binders include soil stabilizers applied to disturbed soil to reduce wind and water erosion when construction activities temporarily cease and dust palliatives are used to reduce dust emissions from mechanical and wind forces. Typically dust palliatives do not have the longevity of soil stabilizers (Figure 128).

Figure 128. Soil stabilizer application in Douglas County, Colorado (Colorado UDFCD 2010).

The use of treatment chemicals must comply with federal, state, and local regulations. The type of chemicals used must be approved and documented in the storm water management plan.

Applicability

Soil binders are suitable for use on disturbed soil areas requiring temporary erosion protection on both mild and steep slopes. Binders are often used in areas where work has temporarily stopped but is expected to resume before vegetation can become established. Soil binders are typically used with other BMPs to increase performance, and the treated area should discharge to a sediment basin or other BMP. Apply soil binders to the following:

- Rough-graded soils that will be inactive for a period of time
- Final-graded soils before applying final stabilization (e.g., paving, planting, and mulching)
- Temporary haul roads before placing crushed rock surfacing
- Compacted soil road base
- Construction staging, materials storage, and layout areas
- Soil stockpiles
- Areas that will be mulched

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Fair
Max. Tributary Drainage Area	Unlimited
Max. Upstream Slope	NA
NRCS Soil Group	ABCD
Min. Ground Water Separation	NA
Min. Bedrock Separation	NA

Limitations

- Soil binders should not be directly applied to water or allowed to enter a water body.
- Do not use soil binders on a slope that flows into a water body if it will result in a discharge of the soil binder, unless it passes through a sediment trap or sediment basin.
- Always use soil binders with other BMPs, but not in place of other BMPs, including erosion and sediment controls.
- Site soil type dictates appropriate the soil binder to be used. Be aware that soil binders may not function effectively on silt or clay soils or in highly compacted areas. Follow the manufacturer's recommendations for use with certain soil conditions.
- Some soil binders may not perform well in low relative humidity.
- Certain soil binders may not cure adequately if exposed to low temperatures within 24 hours of application.
- Avoid using soil binders in high vehicle and pedestrian traffic areas because effectiveness is minimized under these conditions.
- Soil binders are temporary and may need reapplication.

Design Basis

General Considerations

- Soil binders should be nontoxic to plant and animal life. Obtain an MSDS from the manufacturer to ensure site runoff is not exposed to pollutants contained within the soil binder.
- Soil binders designated for erosion and sediment control should be *water soluble*, *linear,* or *noncross linked*.
- All areas not being actively worked on should be covered and protected from rainfall. Soil binders should not be the only cover BMP used.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Storm water runoff from soils treated with a soil binder should pass through a sediment control BMP before discharging to surface waters. The type of control BMP suggested varies by the size of the contributing drainage area.
  - When the total drainage area is greater than or equal to 5 acres, soil binder-treated areas should drain to a sediment basin.
  - Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a minimum of three check dams per acre. Maximize the total number of check dams used to achieve the greatest amount of settling before discharging from the site. Space each check dam evenly in the drainage channel.
- On the sites treated with a soil binder, use silt fencing and fiber rolls to limit sediment discharge to sediment traps and sediment basins.

Selecting a Soil Binder

Soil binder selection depends on site conditions (i.e., environmental factors, soil moisture content, and soil texture). Consult the manufacturer for proper soil binder selection. Products should have a manufacturer's certification that it is nontoxic to plant or animal life and nonstaining to concrete or painted surfaces.

Factors to consider when selecting a soil stabilizer or dust palliative product include its suitability to the situation, soil types and surface materials, and frequency of application.

Suitability to situation—Consider where the product will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time stabilization will be needed and if the product will be placed in an area where it will degrade rapidly.

Soil types and surface materials—Fines and moisture content are key properties of surface materials. Consider a soil stabilizer or dust palliative's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials. Soil information can be obtained from the project's geotechnical report or from the NRCS website.

Application Frequency—Application frequency can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the dust palliative has good penetration, low evaporation, and good longevity. Consider that frequent application will also require frequent equipment cleanup.

Several types of soil binders are available: plant-material based (short-lived), plant-material based (long-lived), polymeric emulsion blends, cementitious based, and petroleum based. Plant-material based (short-lived) soil binders should only be used as dust palliatives due to their short-lived nature. Plant materials include guar, psyllium, and starch. Plant-material based (long-lived) includes tall oil pitch/pitch and rosin emulsion, and lignin sulfonate.

Polymeric emulsion blends include acrylic copolymers and polymers; liquid polymers of methacrylates and acrylates; copolymers of sodium acrylates and acrylamides; polyacrylamide and copolymer of acrylamide (PAM); and hyrocolloid polymers. Gypsum is a cementious-based soil binder, and petroleum resin emulsion is a petroleum-based soil binder.

Table 24 and Table 25 provide a summary of the properties of the soil binder types.

Table 24. Soil stabilizer properties for erosion control in nontraffic areas (ITD 2014).

Chemicals	Plant-Material Based (Short-Lived)	Plant-Material Based (Long-Lived)	Polymeric Emulsion Blends	Cementitious-Based Stabilizers
Relative cost	Low	Low	Low	Low
Resistance to leaching	High	High	Low to moderate	Moderate
Resistance to abrasion	Moderate	Low	Moderate to high	Moderate to high
Longevity	Short to medium	Medium	Medium to long	Medium
Minimum curing time before rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with existing vegetation	Good	Poor	Poor	Poor
Mode of degradation	Biodegradable	Biodegradable	Photodegradable/ chemically degradable	Photodegradable/ chemically degradable
Labor intensive	No	No	No	No
Specialized application equipment	Water truck or hydraulic mulcher	Water truck or hydraulic mulcher	Water truck or hydraulic mulcher	Water truck or hydraulic mulcher
Liquid/powder	Powder	Liquid	Liquid/powder	Powder
Surface crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Cleanup	Water	Water	Water	Water
Erosion control application rate	Varies	Varies	Varies	4,500 to 13,500 L/ha

Note: liter per hectare (L/ha)

Table 25. Soil stabilizer properties for erosion control in traffic areas (ITD 2014).

Chemicals	Ligninosulfonate	Tall Oil Pitch Emulsion	Petroleum Resin Emulsion
Relative cost	Moderate	Moderate	Moderate
Resistance to leaching	Low	High	High
Longevity	Medium	Medium to long	Medium
Minimum curing time before rain	24 hours +	30–60 minute (prime coat) 8–24 hours (mixed Into base)	0–4 hours
Mode of degradation	Biodegradable	Biodegradable	Photo/chemically degradable
Labor intensive	No	No	No
Specialized application equipment	Water truck or hydraulic mulcher	Water truck or hydraulic mulcher	Water truck or hydraulic mulcher
Surface crusting	Yes, but dissolves on rewetting	Yes	Yes
Cleanup	Water	Water, before it dries	Water, before it cures

Construction Guidelines

After selecting an appropriate product, prepare the untreated soil surface before applying the soil binder. Proper application ensures the soil binder's total effectiveness. Follow these guidelines when applying soil binders during construction:

- Soil binder application should adhere to all state and local regulations.
- Follow manufacturer's recommendation for application rates and prewetting of the application area.
- The untreated soil surface should contain sufficient moisture to assist the agent in achieving uniform distribution.
- Before application, roughen embankment and fill areas.
- Consider the drying time for the selected product and apply with sufficient time before anticipated rainfall. Generally, soil stabilizers and dust palliatives require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times. Soil stabilizers and dust palliatives shall not be applied during or immediately before rainfall.
- Soil stabilizers and dust palliatives shall not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the air temperature is below 4°C (40°F) during the curing period.
- Some soil binders, when combined with water, are slippery and can be a safety hazard. Take care to prevent spills of soil binder powder onto paved or impervious surfaces. During any application of soil binders, prevent overspray from reaching pavement and creating a safety hazard.
- Avoid overspray onto travel ways, sidewalks, drainage channels, and existing vegetation.
- Do not add soil binders to water discharging from the site.
- Refer to MSDS for worker protection requirements.

Maintenance

Regular inspection and maintenance is important for ensuring the effectiveness of the soil binder. Follow manufacturer's recommendations for reapplication and for maintaining and cleaning equipment after use. The following are additional maintenance guidelines:

- Inspect BMPs before rain events: daily during extended rain events, after rain events, weekly during the rainy season, and at 2-week intervals during the nonrainy season.
- Reapply soil binders according to manufacturer's recommendations or as specified by the supervising erosion control professional.
- Areas where erosion is evident should be repaired and soil binders reapplied as soon as possible.
- While making repairs, exercise care to minimize the damage to protected areas, as any area damaged will require reapplying the soil binders.
- More soil binder applications may be required for steep slopes, silty and clayey soil (NRCS Classification Type "C" and "D" soils), long grades, and high precipitation areas.
- Inspections and maintenance should be recorded in the SWPPP and according to the prescribed schedule.

Additional Resources

EPA (US Environmental Protection Agency). 2014. *Chemical Stabilization*. Water: Best Management Practices *https://www.epa.gov/sites/production/files/2015-11/documents/idde_manualwithappendices_0.pdf*

CASQA (California Stormwater Quality Association). 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org*

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

King County (King County, Washington). 2009. *King County, Washington Surface Water Design Manual.* Seattle, WA: King County, Department of Natural Resources.

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. *http://www.ecy.wa.gov/programs/wq/stormwater/manual.html*

BMP 56: Riprap Slope Protection

Description

Slopes that experience high runoff velocities from concentrated flows can be unstable and cause excessive erosion and sedimentation. Riprap slope protection is created by layers or piles of rock placed over the soil surface. Riprap, when used as slope protection, protects against erosion, stabilizes the slope, and dissipates the energy of surface water flow (Figure 129).

If used along a surface water body such as a river, lake, or stream, permits may be required from Idaho Department of Lands, IDWR, and US Army Corps of Engineers (each agency has local offices throughout the state). These agencies may have specifications for placing riprap so inquire early in the design to facilitate obtaining the permits.

Figure 129. Riprap stabilization of the Salmon River Road, Riggins, Idaho.

Primary BMP Functions and Controls

☐ Construction	☒ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	5 acre
Max. Upstream Slope	40%
NRCS Soil Group	ABCD
Min. Ground Water Separation	NA
Min. Bedrock Separation	NA

Applicability

Riprap slope protection can be used on channel side slopes or bottoms, cut and fill slopes, streambanks, bridge embankments, below dikes or detention pond spillways, or any area where the velocity of flow may cause erosion.

Limitations

The steepness of the slope limits the applicability of riprap since slopes steeper than 1V:2H can cause riprap loss due to erosion and sliding. It may be difficult to remove sediment from riprap without completely removing and replacing the riprap. If used improperly, riprap can increase erosion. In addition, riprap can be more expensive than other stabilization options.

Design Basis

The design of riprap slope protection depends on the soil conditions, site characteristics, and expected flows. When designing riprap slope protection, apply the following guidelines.

Gradation

Rock riprap material should be composed of a well-graded mixture of angular stone size so that 50% of the pieces, by weight, are larger than the D_{50} size as determined using standard testing methods. A well-graded mixture is defined as a mixture that includes a variety of stone sizes so that the voids between the stones are filled. Riprap gradations that fall within the range of D_{100}/D_{50} and D_{50}/D_{20} from 3.0 to 1.5 are acceptable.

Size

Size the riprap so the permissible shear stress of the riprap material is greater than the hydrodynamic force of water flowing in the channel or over the slope. The permissible shear stress (Table 26) indicates the force required to initiate movement of the stone particles (Equation 33–Equation 35).

Table 26. Typical permissible shear stresses for bare soil and stone linings (FHWA 2005).

Lining Category	Lining Type	Permissible Shear Stress (pounds per square foot)
Bare soil[a] Cohesive (PI = 10)	Clayey sands	0.037–0.095
	Inorganic silts	0.027–0.11
	Silty sands	0.024–0.072
Bare soil[a] Cohesive (PI $\geq$ 20)	Clayey sands	0.094
	Inorganic silts	0.083
	Silty sands	0.072
	Inorganic clays	0.14
Bare soil[b] Cohesive (PI $\leq$ 10)	Finer than coarse sand D_{75} < 0.05 inches	0.02
	Fine gravel D_{75} = 0.3 inches	0.12
	Gravel D_{75} = 0.6 inches	0.24
Gravel mulch[c]	Coarse gravel D_{50} = 1 inch	0.4
	Very coarse gravel D_{50} = 2 inches	0.8
Rock riprap[c]	D_{50} = 0.5 feet	2.4
	D_{50} = 1 foot	4.8

a. Based on Equation 33 assuming a soil void ratio of 0.5 (USDA 1987).
b. Based on Equation 34 derived from USDA (1987).
c. Based on Equation 35 Shield's parameter equal to 0.047

$$\tau_{p,soil} = (c_1 PI^2 + c_2 PI + c_3)(c_4 + c_5 e)^2 c_6$$

Equation 33. Permissible soil shear stress for cohesive soils.

Where:

$\boldsymbol{\tau_{p,soil}}$ = soil permissible shear stress (lb/ft^2)

PI = plasticity index

e = void ratio

$c_1, c_2, c_3, c_4, c_5, c_6$ = coefficients (Table 27)

Table 27. Coefficients for permissible soil shear stress (USDA 1987).

ASTM Soil Classification	Applicable Range	C_1	C_2	C_3	C_4	C_5	C_6 (SI)	C_6 (CU)
GM	$10 \leq PI \leq 20$	1.07	14.3	47.7	1.42	-0.61	4.8×10^{-3}	10^{-4}
	$20 \leq PI$			0.076	1.42	-0.61	48.	1.0
GC	$10 \leq PI \leq 20$	0.0477	2.86	42.9	1.42	-0.61	4.8×10^{-2}	10^{-3}
	$20 \leq PI$			0.119	1.42	-0.61	48.	1.0
SM	$10 \leq PI \leq 20$	1.07	7.15	11.9	1.42	-0.61	4.8×10^{-3}	10^{-4}
	$20 \leq PI$			0.058	1.42	-0.61	48.	1.0
SC	$10 \leq PI \leq 20$	1.07	14.3	47.7	1.42	-0.61	4.8×10^{-3}	10^{-4}
	$20 \leq PI$			0.076	1.42	-0.61	48.	1.0
ML	$10 \leq PI \leq 20$	1.07	7.15	11.9	1.48	-0.57	4.8×10^{-3}	10^{-4}
	$20 \leq PI$			0.058	1.48	-0.57	48.	1.0
CL	$10 \leq PI \leq 20$	1.07	14.3	47.7	1.48	-0.57	4.8×10^{-3}	10^{-4}
	$20 < PI$			0.076	1.48	-0.57	48.	1.0
MH	$10 \leq PI \leq 20$	0.0477	1.43	10.7	1.38	-0.373	4.8×10^{-2}	10^{-3}
	$20 \leq PI$			0.058	1.38	-0.373	48.	1.0
CH	$20 \leq PI$	—	—	0.097	1.38	-0.373	48.	1.0

Notes: GM—silty gravels, gravel-sand silt mixtures; GC—clayey gravels, gravel-sand-clay mixtures; SM—silty sands, sand-silt mixtures; SC—clayey sands, sand-clay mixtures; ML—inorganic silts, very fine sands, rock flour, silty or clayey fine sands; CL—inorganic clays of low-to-medium plasticity, gravelly clays, sandy clays, silty clays, lean clays; MH—inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts; CH—inorganic clays of high plasticity, fat clays

$$\tau_{p,soil} = \alpha D_{75}$$

Equation 34. Permissible soil shear stress for course-grained noncohesive soils.

Where:

$\boldsymbol{\tau_{p,soil}}$ = soil permissible shear stress (lb/ft^2)

D_{75} = soil size where 75% of the material is finer (in.)

α = unit conversion constant, 0.75 (SI), 0.4 (CU)

$$\boldsymbol{\tau_p = F_*(\gamma_s - \gamma)D_{50}}$$

Equation 35. Permissible shear stress for riprap and gravel linings.

Where:

τ_p = permissible shear stress (lb/ft^2)

F_* = Shield's parameter, dimensionless

γ_s = specific weight of the stone (lb/ft^2)

γ = specific weight of the water (62.4 lb/ft^2)

D_{50}= mean riprap size (ft)

The maximum shear stress on a channel bottom can be calculated using Equation 36.

$$\tau = \gamma ds$$ **Equation 36. Shear stress at the bottom of a channel.**

Where

τ = maximum shear stress at channel bottom (lb/ft^2)
γ= unit weight of water, 62.4 lb/ft^3
d = maximum flow depth (ft)
s = channel gradient (ft/ft)

The maximum shear on the side of a channel is generally less than that on the channel bottom and is given by Equation 37:

$$\tau_s = K_1\tau$$ **Equation 37. Shear stress at the side of a channel.**

Where

τ_s = side shear stress (lb/ft^2)
τ = maximum shear stress at channel bottom (lb/ft^2)
K_1= ratio of channel side shear to bottom shear stress

For trapezoidal and triangular channels, where Z is the horizontal dimension (1:Z, V:H) Equation 38 may be applied for K_1:

K_1 = 0.77	for Z ≤ 1.5
K_1 = 0.066Z 0.67	for 1.5 < Z < 5
K_1 = 1.0	for 5 ≤ Z

Equation 38. Ratio values for side shear to bottom shear stress.

Thickness

The thickness of the riprap layer varies depending on the application but in no case should it be less than 6 inches. For smaller rock sizes where D_{50} is 15 inches or less, a thickness of 1.5 to 2 times D_{100} is recommended. For D_{50} greater than 15 inches, a thickness of 1.2 to 1 times D_{100} can be used. Table 28 lists some examples of riprap sizes and thicknesses for various unit shear stresses.

Table 28. Example rock riprap sizes and thickness.

Unit Shear Stress (pounds per square foot)	D_{50} (inches)	D_{100} (inches)	Minimum Blanket Thickness (inches)
0.67	2	4	6
2.00	6	9	14
3.00	9	14	20
4.00	12	18	27
5.00	15	22	32
6.00	18	27	32
7.80	21	32	38
8.00	24	36	43

Stone Quality

Riprap should consist of field stone or rough unhewn quarry stone. The stone must be hard and *angular* (to create an interlocking stone blanket) and of a quality that will not disintegrate with exposure to water, weathering, or freeze/thaw cycles. The specific gravity of the individual stones should be at least 2.5 to prevent scour and mobilization of the material. Table 29 lists common rock types and their specific gravities. Note that although talc and sandstone meet the specific gravity requirement, these materials should not be used in riprap construction because of water solubility and scouring concerns. Use best judgment when selecting riprap material.

Table 29. Common rock types and associated specific gravity and density (EDUMine 2018).

Rock Type	Specific Gravity	Ton/yd^3
Basalt	2.8–3.0	2.11–2.36
Granite	2.6–2.7	2.19–2.28
Quartzite	2.6–2.8	2.19–2.36
Gneiss	2.6–2.9	2.19–2.44
Dolomite	2.50–2.60	2.36–2.44
Talc	2.6–2.8	2.19–2.36
Sandstone	2.2–2.8	1.85–2.36

Filter

A filter is a layer of material placed between the riprap and the underlying soil to prevent soil movement into and through the riprap. The need for a filter depends on the characteristics of the native material underlying the riprap, but it is needed in most cases.

Filters can be either gravel or a geosynthetic fabric. Geosynthetic fabrics can be woven or nonwoven monofilament yarns and should have adequate permeability to prevent uplift pressures from forming (Table 30). Other basic requirements include a thickness of 10–60 mils, grab strength of 90–120 pounds, and conform to ASTM D-1777 and ASTM D5034 and D5035.

Table 30. Maximum apparent opening size for geotextile filters (FHWA 1998).

Soil Type	Maximum Apparent Opening Size for Geotextile Filters (millimeters)
Noncohesive, less than 15% passing the 0.075 mm (US #200) sieve	0.43
Noncohesive, 15% to 50% passing the 0.075 mm (US #200) sieve	0.25
Noncohesive, more that 50% passing the 0.075 mm (US #200) sieve	0.22
Cohesive, plasticity index greater than 7	0.30

Gravel filter blankets should be designed by comparing particle sizes of the riprap material and the underlying base material using Equation 39, Equation 40, and Equation 41 (FHWA 2005). The recommended minimum filter thickness is 6 inches.

$$\frac{D_{15\ UPPER}}{D_{85\ LOWER}} < 5$$

Equation 39. Lower particle size ratio.

$$5 < \frac{D_{15\ UPPER}}{D_{15\ LOWER}} < 40$$

Equation 40. Medium particle size ratio.

$$\frac{D_{50\ UPPER}}{D_{50\ LOWER}} < 40$$

Equation 41. Upper particle size ratio.

In the equations above, *upper* refers to the overlying material, and *lower* refers to the underlying material. These relationships must hold between the filter blanket and base material and between the riprap and filter blanket.

Placement

Riprap placement shall follow immediately after filter placement. Place riprap so it forms a dense, well-graded mass of stone with minimum voids. Riprap shall be placed at its full thickness in one lift.

In a channel, place riprap so it extends to the maximum flow depth, or to a point where vegetation will satisfactorily control erosion. Ensure riprap extends to five times the bottom width upstream and downstream at the beginning and ending of the curve and the entire curved section.

On slopes, key the toe of the riprap in at the base. The toe should be excavated to 2 feet deep. The design thickness of the riprap shall be extended to a minimum of 3 feet horizontally from the slope. The finished grade of the riprap should blend with the surrounding area. Figure 130 and Figure 131 show cross sections of riprap placed in channels and on channel side slopes.

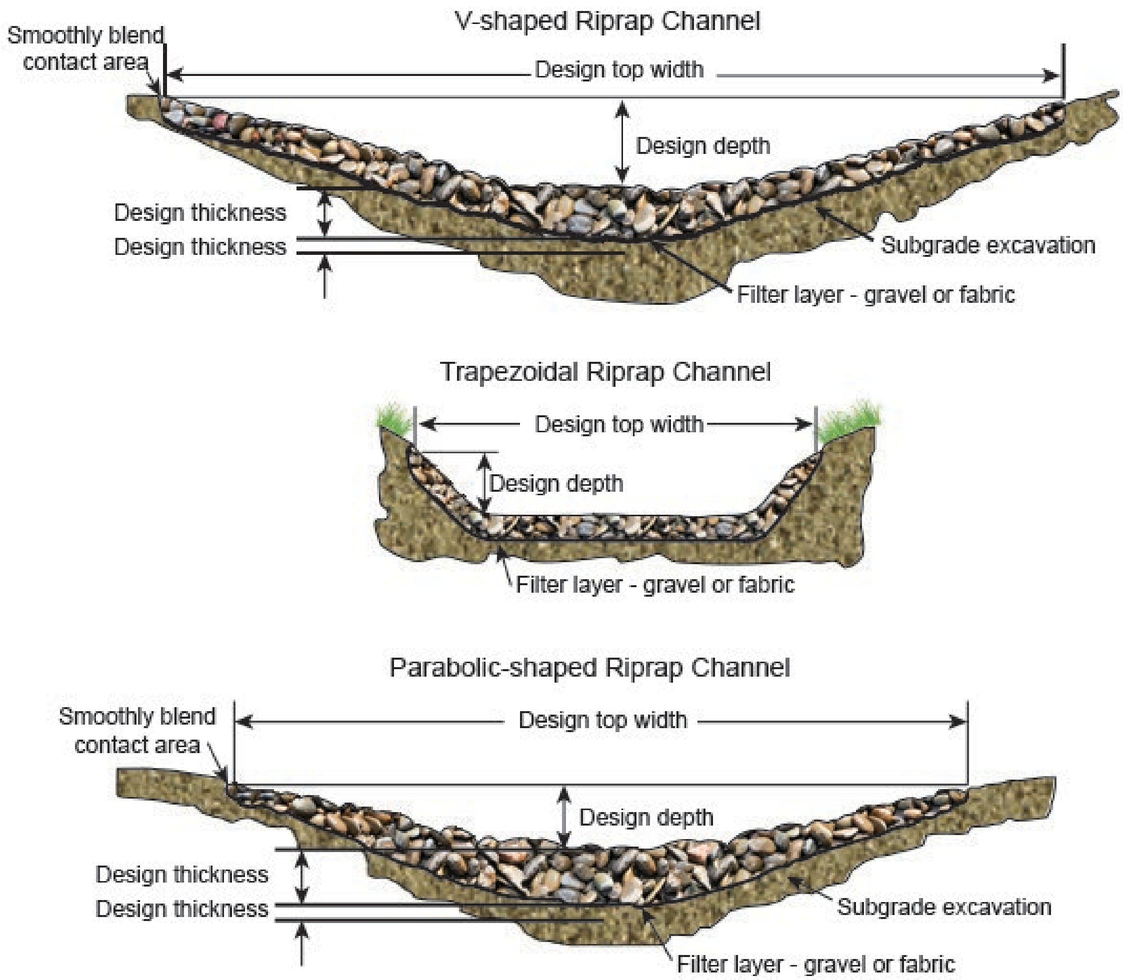


Figure 130. Riprap channel cross sections.

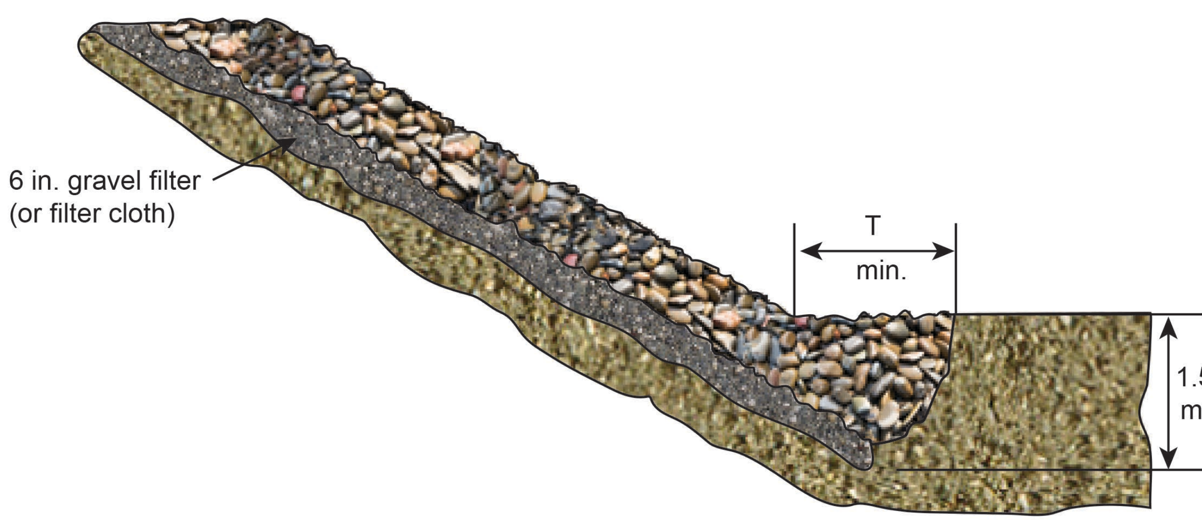


Figure 131. Riprap on channel side slope.

Grouted Riprap

Grouted riprap consists of a stone bed with voids filled with grout or concrete to form a veneer of cementitious-bonded aggregate armor. Grouting riprap is an option if the required stone sizes are not available for a conventional riprap installation or in areas of high shear stress or nonuniform flow conditions, such as at transitions in channel shape or at energy dissipation structures.

Grouted riprap should consist of stone with less than 5% passing a 2-inch sieve and have qualities similar to nongrouted riprap. The median rock size should not exceed 0.67 times the blanket thickness. Figure 132 illustrates the relationship between design velocity and recommended riprap blanket thickness for grouted installations.

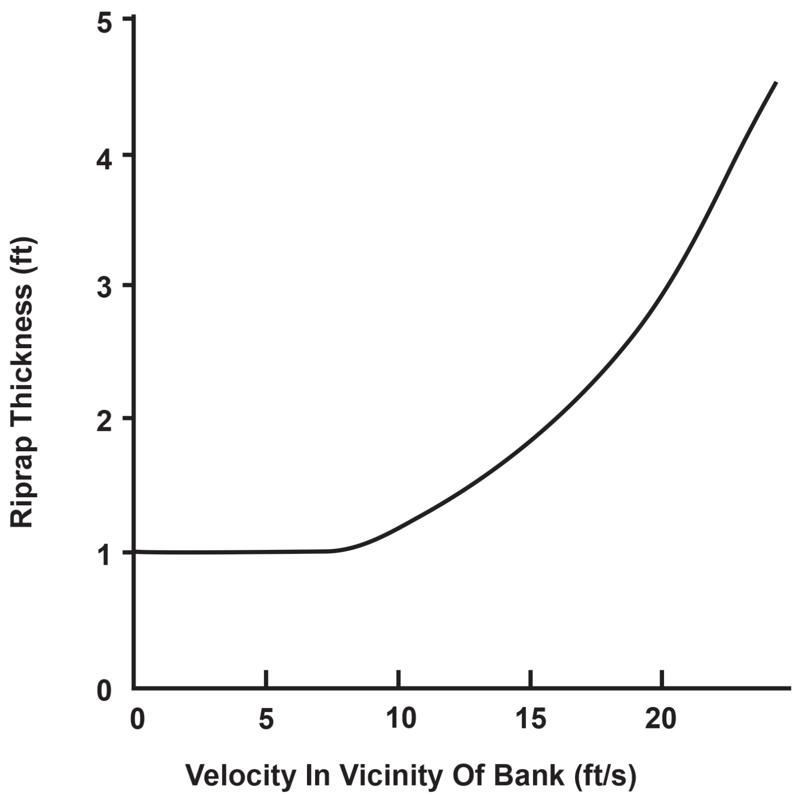


Figure 132. Grouted riprap thickness as a function of flow velocity (UDOT 2004).

Grouted riprap is a rigid revetment and will not conform to changes in the bank geometry due to settlement. Special attention should be placed on edge treatment, foundation design, and mechanisms for hydrostatic pressure relief to avoid failure from undermining or lining breakup. To form a firm foundation, the bank should be free of all trees and debris and tamped or lightly compacted to provide sufficient bearing capacity to support the dry weight of the revetment alone or the submerged weight of the revetment plus the weight of the water in the wedge above the revetment for design conditions, whichever is greater. Pressure relief should be provided using weep holes that extend through the grout surface to the interface with the gravel underdrain layer. Recommended edge treatments and weep holes are illustrated in Figure 133.

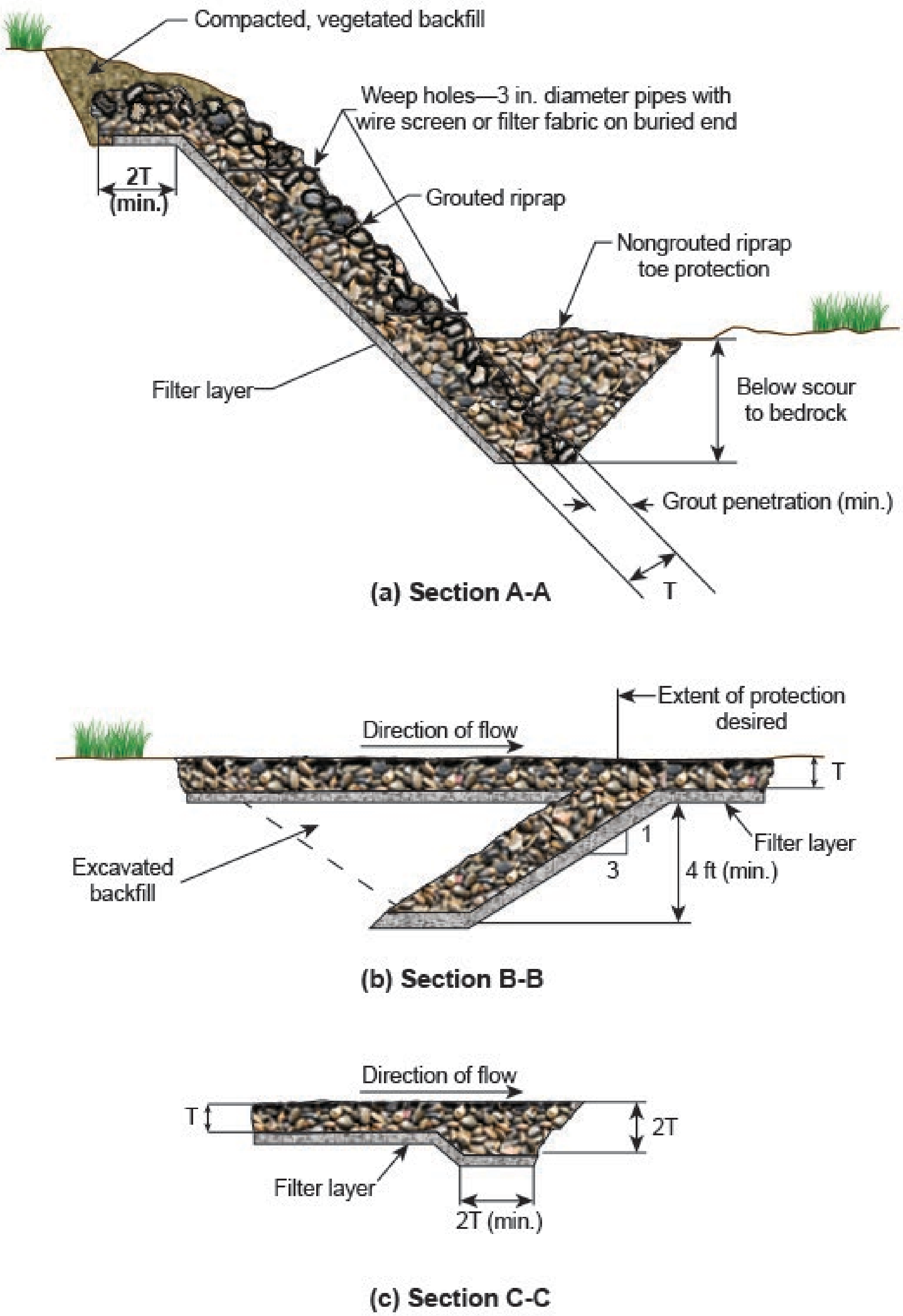


Figure 133. Grouted riprap cross section (top), upstream end treatment (middle), and downstream end treatment (bottom).

Construction Guidelines

- The subgrade for the filter and riprap should be prepared to the final grades. Any fill required in the subgrade should be compacted to a density approximately equal to that of the surrounding undisturbed material.
- Geosynthetic fabric should be protected from punching, cutting, or tearing. Any damage other than an occasional small hole should be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps whether for repairs or for joining two pieces of cloth should be a minimum of 1 foot.
- Riprap stone should be placed by equipment and constructed to the full course thickness in one operation to avoid displacement of underlying materials.
- The stone for riprap should be delivered and placed in a manner that ensures it is reasonably homogenous with the smaller stones and spalls filling the voids between the larger stones.
- Take care when placing riprap to prevent damage to the filter fabric. A combination of hand or equipment placement may be necessary depending on size and location of the riprap.
- Grout strength of 2,000 to 2,500 psi is recommended for grouted riprap installations.
- Underwater placement of grouted riprap should be avoided.
- Rock should be wet immediately before commencing grouting operations for grouted riprap installation.
- Complete construction of the riprap protection before allowing erosive flows to pass over the protected surface.

Maintenance

Once riprap has been installed, the maintenance needs are relatively low. Inspect after heavy storms and high flows for scouring and any dislodged stones. Repair all damage promptly.

Additional Resources

CASQA (California Stormwater Quality Association). 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org*

FHWA (US Department of Transportation Federal Highway Administration). 2005. *Design of Roadside Channels with Flexible Linings*. Hydraulic Engineering Circular-15 (HEC-15). Publication No. FHWA-NHI-05-114. *http://www.fhwa.dot.gov/engineering/hydraulics/library_arc.cfm?pub_number=15&id=32*

Hazra and ODOT (Hazra Engineering Company and Oregon Department of Transportation, Geo/Environmental Section). 2005. *ODOT Erosion Control Manual: Guidelines for Developing and Implementing Erosion and Sediment Controls.*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

UDOT (Utah Department of Transportation). 2004. *UDOT Manual of Instruction—Roadway Drainage, Bank Protection.* *http://www.udot.utah.gov/main/uconowner.gf?n=200403161050503*

BMP 58: Slope Roughening

Description

Figure 137. Exposed soil temporarily stabilized by roughening the surface (*North Idaho Hydroseeding*).

Exposed disturbed soil is highly susceptible to wind and water erosion. Slope roughening by tracking, scarifying, imprinting, or tilling a disturbed area roughens the soil surface to create horizontal grooves, furrows, depressions, crimped mulch, or small steps running parallel to the contour (Figure 137).

Slope roughening reduces the speed of runoff, increases infiltration rates, and traps sediment, as well as establishes vegetative cover by providing stable and level areas where seedlings can take hold and grow. Leaving the slope in a roughened condition controls erosion and provides suitable rooting areas for plant seedlings better than a finely graded slope.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	1 acre
Max. Upstream Slope	20%
NRCS Soil Group	BCD
Min. Ground Water Separation	5 feet
Min. Bedrock Separation	3 feet

Applicability

Slope roughening is simple, inexpensive, and immediate short-term erosion control for bare soil where vegetative cover is not planned or not yet established. The practice is appropriate for all slopes including altered slopes, temporary stockpiles, sediment basins, berms, and swales.

Applied with appropriate machinery, this measure is used before permanent seeding/planting (BMP 32: Landscaping). All slopes steeper than 3:1 and greater than 5 feet in vertical height require roughening and may require terracing, grooving, or furrowing before seeding (BMP 59: Gradient Terracing).

Limitations

Site and soil conditions may limit the use of slope roughening. This BMP is limited to slopes in medium to highly cohesive soils or in soft rock that can be excavated without ripping. The method is not applicable in NRCS Type A soils such as sands, moraines, and other depositional soils. Slope angle on the site should be gentle enough to permit access to heavy equipment.

This BMP is not a stand-alone measure and should be implemented with other BMPs, such as mulching (BMP 52), perimeter controls (BMP 64 or BMP 65), or sediment basins (BMP 66). Consider the type of BMP that follows soil roughening as some BMPs are not designed for installation over roughened surfaces. For example, do not use erosion control matting (BMP 54) with soil roughening because the *bridging* effect suspends the blanket above the seed bed.

Slope roughening is a temporary measure because the serrations have limited effectiveness in more than a gentle rain. If the roughening is washed away in a heavy storm, the surface must be reroughened and reseeded.

Tracking with heavy equipment will compact soils, which is not desirable in areas that will be revegetated. Scarifying, tilling, or ripping (BMP 46: Minimize Soil Compaction) are better surface roughening techniques in locations where revegetation is planned.

Design Basis

Different methods can be used to roughen the slope surface, including stair-step grading, grooving (using disks, spring harrows, or teeth on a front-end loader), contour furrowing, and tracking (driving a crawler tractor up and down a slope, leaving the cleat imprints perpendicular to the slope). Figure 138 shows tracking and contour furrows. Selecting an appropriate method depends on the slope's grade, mowing requirements after vegetative cover is established, whether the slope was formed by cutting or filling, and type of equipment available.

Slopes Steeper than 2:1

Any slope steeper than 2:1 should be terraced or stair-step graded, with benches wide enough to retain sediment eroded from the slope above (BMP 59: Gradient Terracing).

Slopes between 3:1 and 2:1

Cut slopes with a gradient steeper than 3:1 but flatter than 2:1 should be stair-step graded or groove cut (Figure 139). Stair-step grading works well with soils containing large amounts of small rock. Each step catches material discarded from above and provides a level site where vegetation can grow. Stairs should be wide enough to work with standard earth-moving equipment. Any equipment that can be safely operated on the slope, including those described above, can perform grooving. Grooves should not be less than 3 inches deep or more than 16 inches apart.

Fill slopes with a gradient steeper than 3:1 but flatter than 2:1 should consist of properly compacted lifts no greater than 8 inches deep. The slope face should consist of loose, uncompacted fill 4 to 6 inches deep that can be left rough or can be grooved as described above, if necessary.

Avoid excessive compacting of the soil surface, especially when tracking, as soil compaction inhibits vegetation growth and causes higher runoff speed. Limit roughening with tracked machinery on soils that do not compact easily, and avoid tracking on clay soils.

Slopes Flatter than 3:1

Any cut or filled slope that will be mowed should have a gradient flatter than 3:1. Such a slope can be roughened with shallow grooves parallel to the slope contour by using normal tilling. Grooves should be close together (less than 10 inches and not less than 1 inch deep).

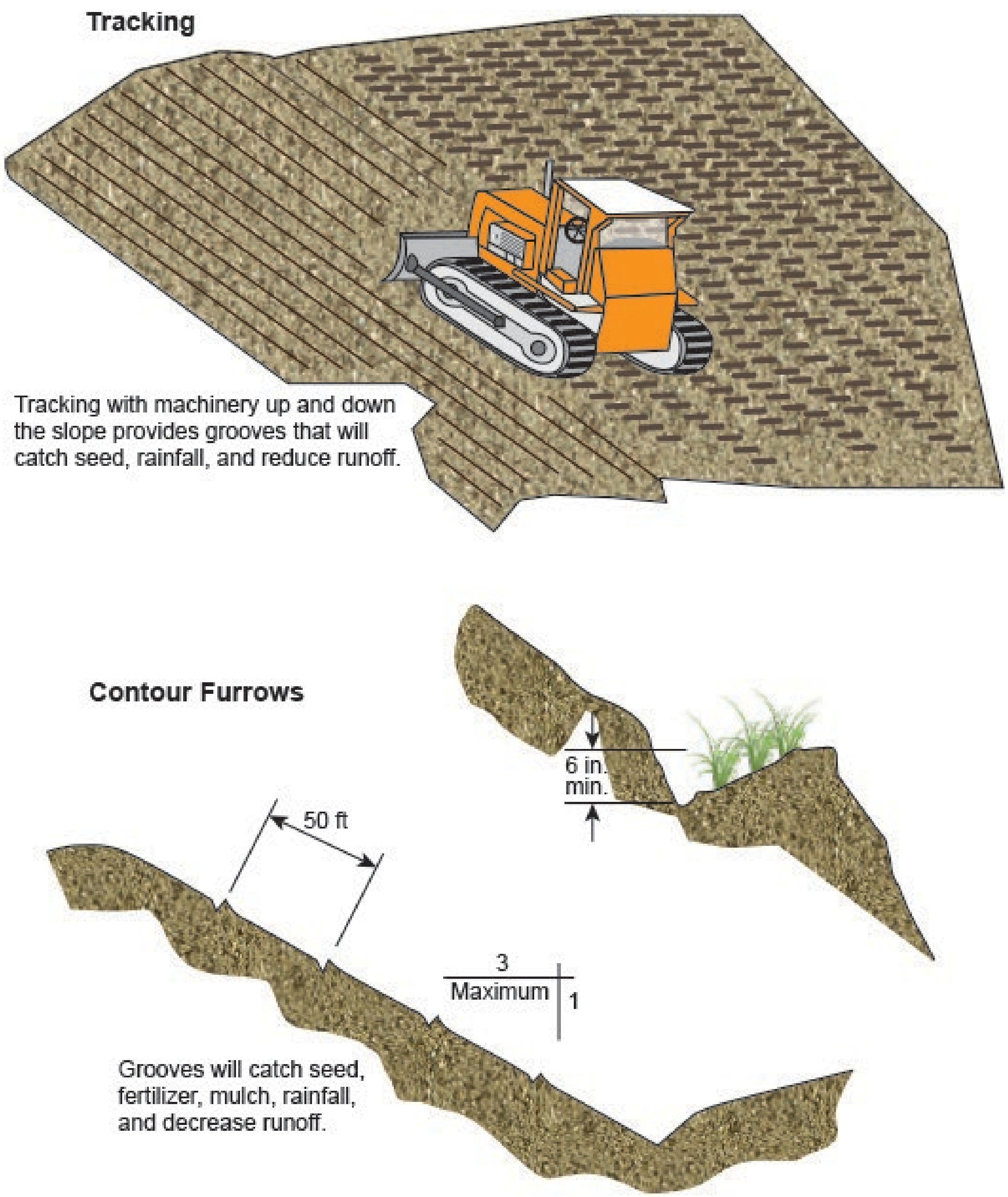


Figure 138. Contour furrow diagram (King County 2009).

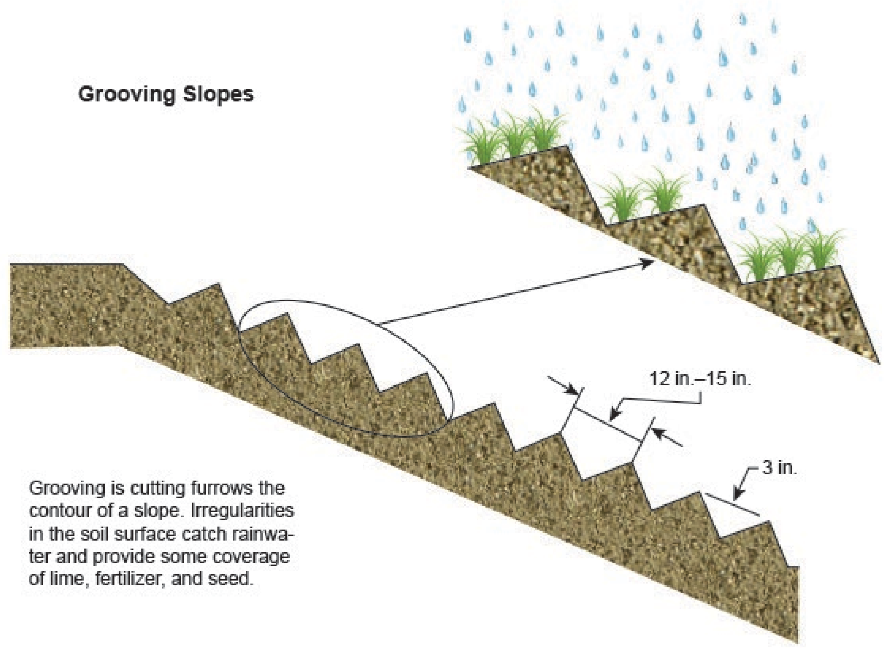


Figure 139. Grooving slope diagram.

Construction Guidelines

While fill slopes can be constructed with a roughened surface, cut slopes that have been smooth graded must be roughened as a subsequent operation. Before slope roughening, BMPs such as seeding, sodding, planting (BMP 32: Landscaping), and temporary mulching (BMP 52: Mulching) may be used to stabilize an area. For steeper slopes and slopes that will be left roughened for longer periods of time, a combination of surface roughening and vegetative stabilization (BMP 8: Vegetation Restoration) can be used.

Timing of Work

Surface roughening should be applied immediately after grading activities have ceased (temporarily or permanently) in an area. To slow erosion, complete slope or surface roughening as soon as possible after the vegetation has been removed from the slope. The roughened areas should be seeded quickly, preferably within 7 days after serration/roughening if weather conditions or water availability permits. For material that ravels or sloughs readily, delay the revegetation effort until at least 30 days after slope serration (BMP 36: Construction Timing).

Equipment

Various types of heavy equipment may be successfully used for slope roughening:

- A front-end loader equipped with disks, harrows, or teeth can make grooves across the slope.
- Driving a crawler tractor up and down the slope will make cleat imprints perpendicular to the slope.
- A dozer, equipped with a special blade containing a series of square grooves and positioned at the same angle as the cut, can serrate the slope along the contours.

Methods

- Minimally compact fill slopes constructed with highly erodible soils or soils containing high clay content before establishing a roughened surface. Avoid excessive compaction, which causes reduced infiltration rates and suppresses vegetation rooting.
- Roughen soils with sand textural components with tracked machinery as these soils are less likely to become unduly compacted.
- Make the grooves or depressions approximately horizontal (or parallel the slope toe if its profile grade is less than 2%).
- Excavate each series of grooves in the opposite direction from the preceding series to minimize buildup of loose material at the ends of the steps or cuts.
- Remove loose material collected at the ends of steps and blend the ends into the natural ground surface.
- If rocks are encountered that are too hard to rip, blend the grooves into the rock.
- For soil roughening adjacent to roadways, remove materials that fall into the ditch line or roadway along with rock fragments larger than one-third the shelf width.
- Construct a slope bench at the bottom of the slope face.

Maintenance

- Inspect the slopes periodically for damage from surface runoff and seepage, and inspect after each runoff-producing storm.
- Prohibit vehicles and equipment from driving over roughened slopes. Tire tracks may smooth out the roughening and increase soil compaction.
- Repair damage caused by construction-related activities as soon as possible.
- If rills appear (small watercourses with steep sides and usually less than 4 inches deep), fill immediately and promptly regrade the slope so it is adequately protected.

Additional Resources

CASQA California Stormwater Quality Association. 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org*

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

EPA (US Environmental Protection Agency). 2014. *Soil Roughening.* Water: Best Management Practices. *http://water.epa.gov/polwaste/npdes/swbmp/Soil-Roughening.cfm*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

King County Department of Natural Resources and Parks. (2009). *King County Washington Surface Water Design Manual*, King County, WA.

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. *http://www.ecy.wa.gov/programs/wq/stormwater/manual.html*

BMP 59: Gradient Terracing

Description

Steep slopes have higher potential for eroding and contributing sediment to storm water runoff. Gradient terracing is the practice of grading a steep slope into a series of relatively large, flat sections separated by terraces placed at regular intervals (Figure 140). The terraces shorten the flow lengths of storm water runoff, reduce its velocity, and prevent the formation of rills and gullies. Gradient terraces further reduce erosion damage by capturing surface runoff and directing it to a stable outlet at a nonerosive velocity.

Figure 140. Terraces incorporated into the grading plan (ITD 2014).

Gradient terracing practices involve displacing larger amounts of soil than slope roughening (BMP 58) and features larger interval placement between steps (up to 20 feet wide for terracing versus +/- 1 foot for soil roughening).

Primary BMP Functions and Controls

☐ Construction ☒ Permanent
☒ Erosion Control ☒ Sediment Control
☐ Source Control ☒ Flood Control
☐ Filtration ☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖ Sediment
○ Nitrogen
○ Phosphorus
○ Metals
○ Bacteria
○ Hydrocarbons
○ Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Medium
Ease of Installation	Medium
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	10 acres
Max. Upstream Slope	5%
NRCS Soil Group	BCD
Min. Ground Water Separation	8 feet
Min. Bedrock Separation	6 feet

Applicability

Gradient terraces are generally used as a permanent control and are suitable for use on long, steep (4V:1H or steeper) slopes with an existing erosion problem or where water erosion may become an issue.

Limitations

Gradient terraces should not be constructed in areas with sandy or rocky soils, noncohesive or highly erodible soils, or decomposing rock including moraines and other depositional materials. Do not use terraces where a rockfall potential exists or where soft-rock laminations in thin layers are oriented so that the strike is approximately parallel to the slope face and the dip approximates the staked slope line.

Terraces and benches may cause sloughing if too much water infiltrates the soil; these are effective only where suitable runoff outlets will be available.

Gradient terraces may significantly increase cut and fill costs.

Design Basis

Terrace type, number, and spacing depend on the slope, slope length, and other factors. Gradient terraces should be designed and installed according to a professionally prepared grading plan based on a site-specific topographic survey. In general, the following guidelines should be addressed when laying out gradient terraces (Figure 141 and Figure 142):

- Begin the upper most terrace immediately below the top of the cut or fill slope with terraces continuing to the toe of the slope.
- Slopes of 2:1 or steeper may require a stair-step approach with terraces, or benches, at sufficient width to retain sediment from the slope above.
- Outlets should direct the runoff from the terrace system to a point where the outflow will not cause erosion or other damage. Acceptable outlets include grassed waterways, vegetated areas, or tile outlets.
- The design elevation of the water surface of the terrace should not be lower than the junction of the outlet area when both are operating at design flow.
- The terrace should have enough capacity to handle the peak runoff expected from a 2-year, 24-hour design storm without overtopping.
- The maximum vertical spacing of gradient terraces can be determined by the following method (Washington State Department of Ecology 2012) (Equation 42):

  $$VI = 0.8s + y$$ **Equation 42. Maximum vertical spacing.**

  Where

  VI = vertical interval in feet

  s = land rise per 100 feet, expressed in feet

  y = soil and cover variable

  Values of *y* range from 1.0–4.0 and are influenced by soil erodibility and cover practices. The lower values are applicable to erosive soils where little to no residue is left on the surface. The higher values apply only to erosion-resistant soils where a large amount of residue (1.5 tons of straw/acre equivalent) is on the surface.
- Vertical spacing may be increased by as much as 0.5 feet or 10%, whichever is greater, to provide better alignment or location, avoid obstacles, adjust for equipment size, or reach a satisfactory outlet. The drainage area above the terrace should not exceed the area that would be drained by a terrace with normal spacing.
- Terraces can be constructed with linings to carry water to the outlet and can be used with a dike or similar measure above the terrace to divert run-on from reaching the terraced slope.
- If permanent, establish vegetation on the terraces as soon as practicable (BMP 31: Topsoiling and BMP 32: Landscaping).
- If the terraces are a temporary measure, properly vegetate the slope when it is constructed to final grade.
- Wide terraces with large runoff area can be used with pipe slope drains (BMP 57) to control runoff.

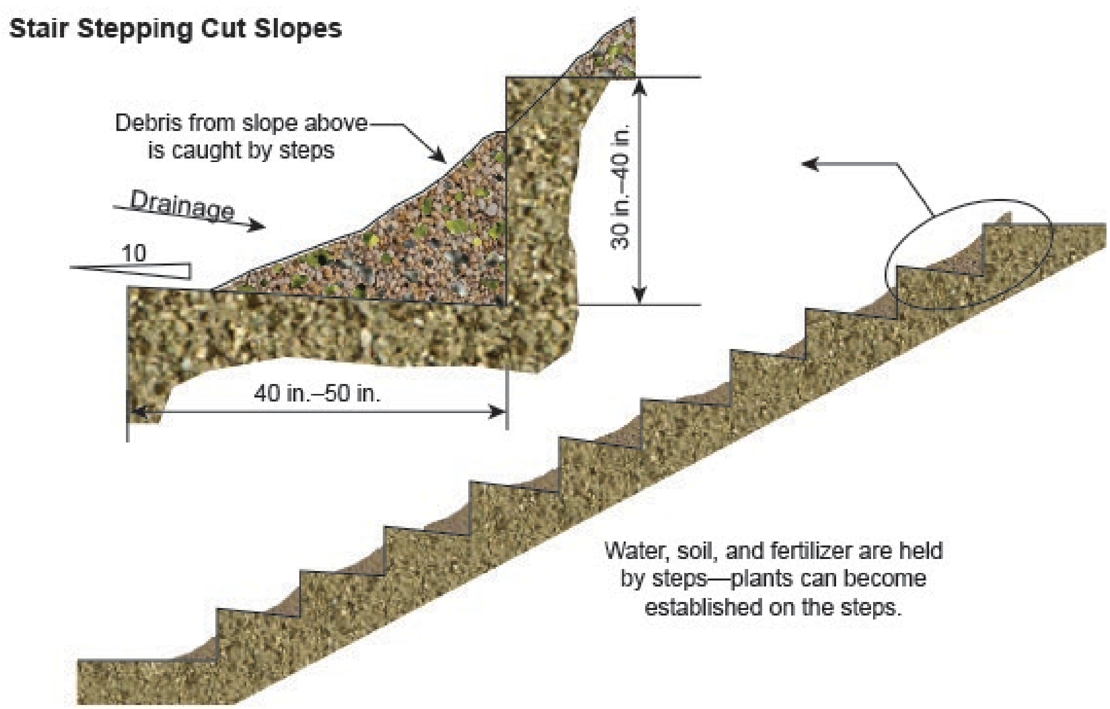


Figure 141. Stair-stepping slopes diagram.

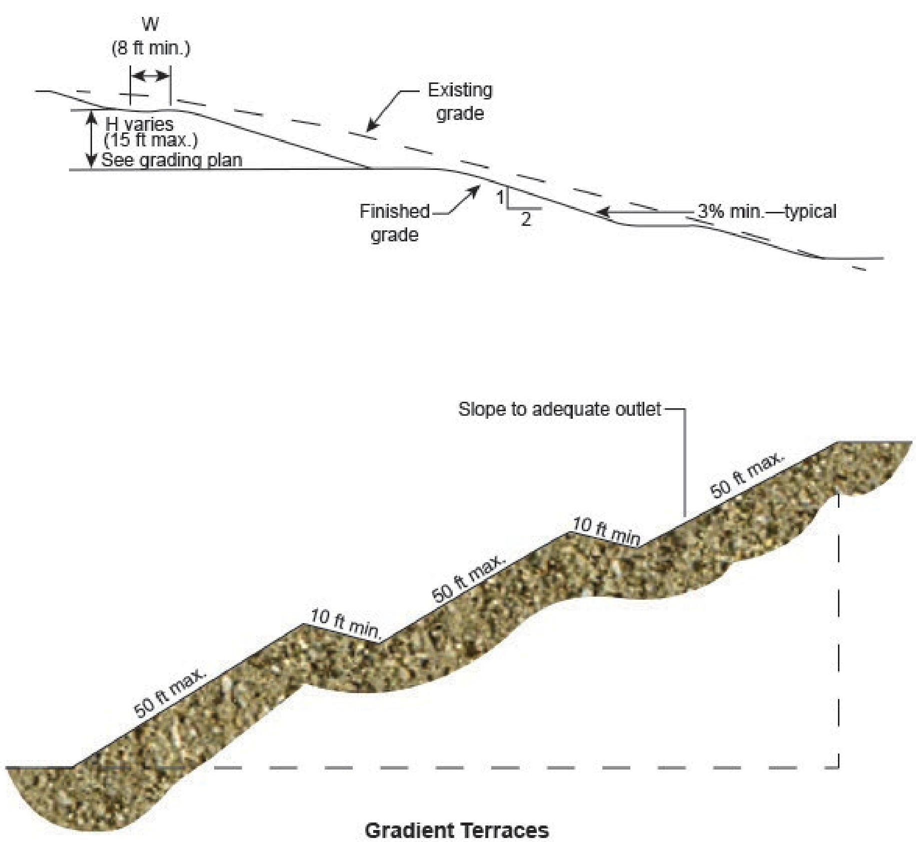


Figure 142. Graded terracing.

Construction Guidelines

When constructing gradient terraces, follow the criteria below:

- Complete construction of gradient terraces using equipment that is capable of meeting the specification established in the construction plans.
- Drain gradient terraces to a stabilized area or appropriate BMP.
- Remove loose material collecting at terrace outlets and blend terrace ends back into the natural surface.

Maintenance

- Inspect the gradient terraces regularly during project construction and inspect them after any major storm.
- If used as a permanent BMP, inspect at least once a year after project completion and major storms.
- Evaluate whether the terrace is functioning effectively as a runoff collection and diversion device, and note whether other stabilization measures (including vegetation) are performing effectively.
- Take prompt action as needed to ensure proper drainage and slope stability.

Additional Resources

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

EPA (US Environmental Protection Agency). 2016. *Gradient Terraces*. Water: Best Management Practices. *http://water.epa.gov/polwaste/npdes/swbmp/Gradient-Terraces.cfm*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. *http://www.ecy.wa.gov/programs/wq/stormwater/manual.html*

BMP 60: Check Dams

Description

Check dams are used to capture sediment, reduce or prevent excessive bank and bottom erosion, and reduce runoff velocity. These small dams are constructed across open channels, swales, or drainageways. Typically constructed out of rock and gravel, logs, treated lumber, sandbags, or manufactured barriers, check dams may be temporary or permanent (Figure 143).

Figure 143. A rock check dam reduces runoff velocity.

Applicability

Check dams are often used in natural or constructed channels or swales where adequate vegetation cannot be quickly established. Temporary check dams are used during construction to slow runoff velocities, capture sediment, and prevent erosion. Permanent check dams can reduce runoff velocities and reduce or prevent erosion in open channels, swales, and drainage ways. Permanent check dams can be used with biofiltration swales (BMP 9) to reduce velocities and enhance filtration.

Primary BMP Functions and Controls

☒ Construction ☒ Permanent
☐ Erosion Control ☒ Sediment Control
☐ Source Control ☒ Flood Control
☐ Filtration ☐ Infiltration

Typical Effectiveness for Targeted Pollutants

● Sediment
○ Phosphorus
◖ Metals
○ Bacteria
◖ Hydrocarbons
○ Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Medium
Ease of Installation	Medium
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	4 acres
Max. Slope	50%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	2 feet

Limitations

Never place check dams in live flowing streams unless approved by appropriate local, state, and/or federal authorities. Check dams should not be used as stand-alone trapping devices.

Design Basis

- Drainage area to the check dam should be between 1 and 4 acres.
- Check dams should be spaced so that the toe of each upstream dam is never higher than the top of the next downstream check dam. Excavating a sump immediately upstream from the check dam may improve its effectiveness.

- Maximum toe to crest height should be 2 feet. The center of the dam should be at least 6 inches lower than either edge to form a weir for the outfall.
- The check dam should be as much as 20 inches wider than the banks of the channel to prevent undercutting as overflow water reenters the channel.
- When installing a series of check dams in a channel, provide outlet stabilization below the lowest check dam (where the risk of erosion is greatest) and consider the use of channel linings or protection such as matting or riprap where significant erosion or prolonged submergence may occur.
- Materials (Figure 144 and Figure 145):
  - Stone—2 to 16 inches in diameter
  - Logs—6 to 8 inches in diameter
  - Sandbags filled with pea gravel
  - Filter fabric meeting the standard specifications (BMP 65: Silt Fence)
- Logs should be driven into the ground a minimum of 28 inches.

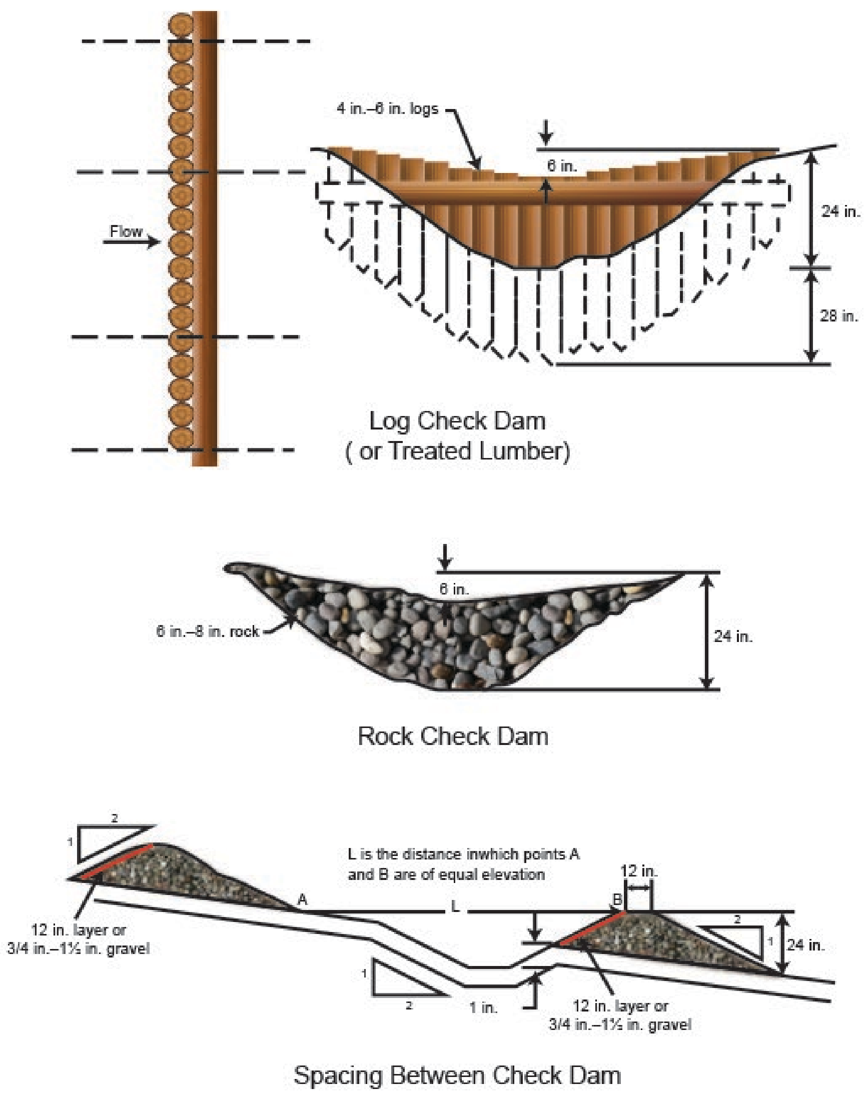


Figure 144. Log and rock check dams.

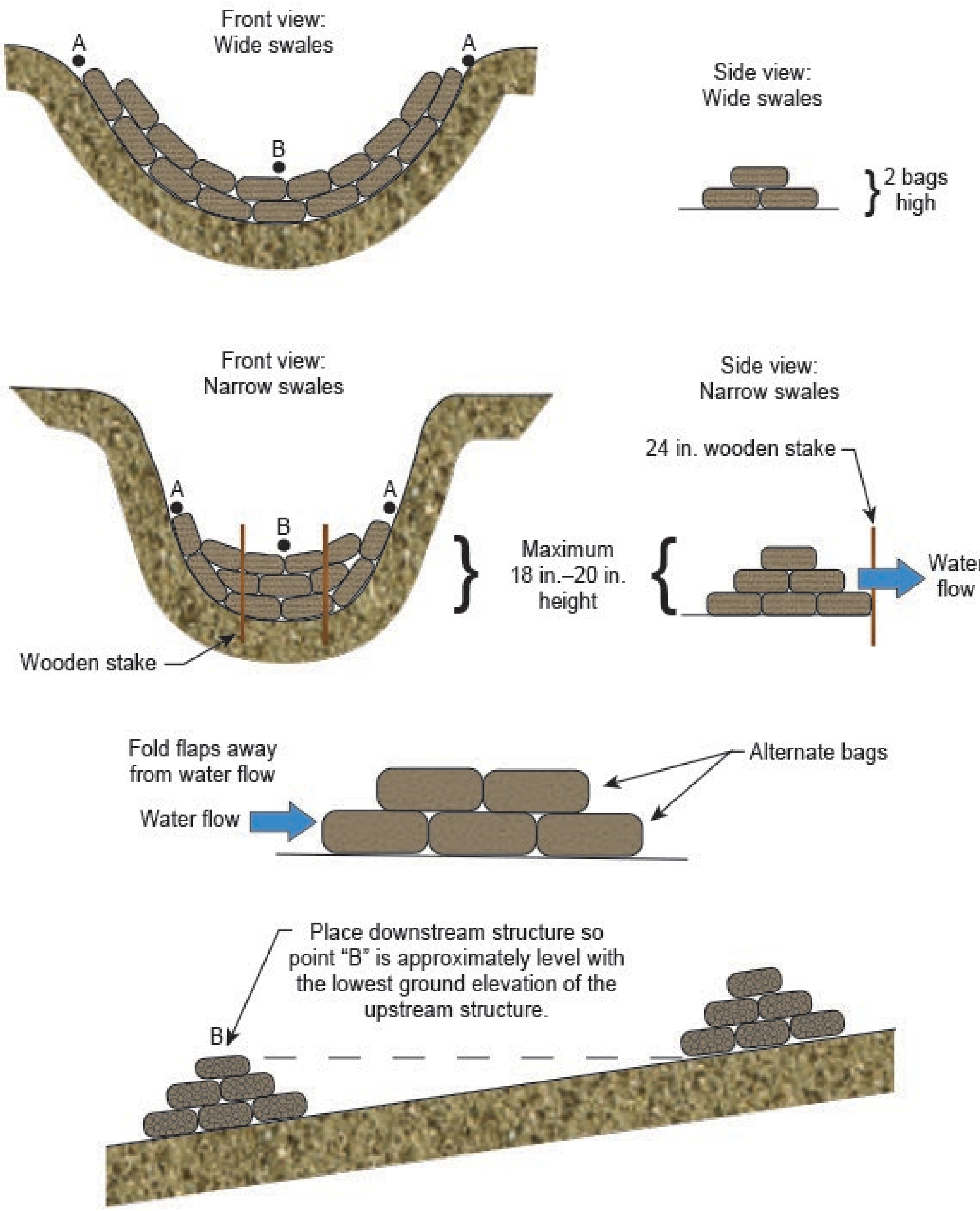


Figure 145. Bag check dam.

Construction Guidelines

Rock check dams—Place the stones on filter fabric either by hand or by using appropriate machinery; do not dump stones in place. Keep the side slopes 2:1 or flatter. Line the upstream side of the dam with a layer of 3/4 to 1-1/2-inch gravel; 12 inches deep is an option for additional channel protection.

Log check dams—Firmly embedded the logs in the ground. Filter cloth may be attached to the upstream side of the dam to retard flow and trap additional sediment. If a filter cloth is used, securely staple it to the top of the dam and adequately anchor in the streambed.

Bag check dams—Ensure all bags are securely sealed. Place the bags by hand or use appropriate machinery to place them in an interlocking pattern.

Manufactured barriers—An array of three-dimensional manufactured barriers is also available: triangular and burrito-shaped, prefilled and fillable on site, reusable and disposable, and temporary and permanent. Triangular silt dikes are temporary, reusable barriers consisting of a triangular urethane foam core covered by permeable, woven geotextile fabric. Usually from 16 to 20 inches wide at the base and 8 to 10 inches high, a silt dike is used at the toe of a slope to contain sediment from runoff or perpendicular to the flow of water in a drainage ditch.

The flexibility of the materials in manufactured barriers allows conformity to many channel configurations:

- Fasten to soil with staples or to rock and pavement with adhesives.
- Build temporary sediment ponds, diversion ditches, concrete wash-out facilities, curbing, water bars, level spreaders, and berms.

Riprap may be necessary on the downstream side of the dam to protect the channel from scour.

Maintenance

- Inspect the check dams regularly and after every runoff-producing storm to ensure structural integrity. Repair as needed to ensure the BMP is in good working order.
- Remove accumulated debris, trash, and leaves. Remove sediment from behind the dam when the depth reaches of one-half the original height of the dam (measure at this center).
- Dispose of all materials properly so pollution problems are not increased at the disposal site.
- Restore stone as necessary so the dams maintain the correct height.
- On bag dams, inspect the sandbag fabric for signs of deterioration.
- Ensure that contributing drainage area has been completely stabilized before removing a temporary check dam.

Additional Resources

EPA (US Environmental Protection Agency). 2014. *Check Dams*. Water: Best Management Practices. *http://water.epa.gov/polwaste/npdes/swbmp/Check-Dams.cfm*

BMP 61: Channel Liners

Description

Channel liners are flexible materials used to line the bottom and/or banks of ditches or channels to prevent and/or reduce erosion, and, to some degree, to capture sediment. Materials include biodegradable matting, geocells, geotextile turf reinforcement mats, riprap, or gabion revet mattresses (Figure 146).

Figure 146. Geocells can be filled with soil and vegetation, rock, or concrete.

Applicability

Channel liners can be used where natural soils or vegetated stabilized soils are not adequate to prevent channel erosion. Channel liners are often used as a temporary stabilization measure until a permanent BMP is installed or established. Geotextiles and matting are especially suited for areas where it may be difficult or expensive to haul riprap.

Limitations

Never use channel liners within waters of the United States unless permits have been obtained from the appropriate state and federal authorities. Any stream alteration should follow the "Stream Channel Alteration Rules" (IDAPA 37.03.07) *https://adminrules.idaho.gov/rules/current/37/370307.pdf*.

Matting may not be suitable for use in ditches or channels with steep side slopes or where the soils are not conducive to proper placement of the matting or lining, depending on manufacturer's specifications. Some geotextile netting may snag fish gills and are not appropriate in streams with important fish habitat.

Riprap and revet mattresses may not be as aesthetically pleasing as more natural channel stabilization methods. These liners can also negatively affect aquatic habitat.

Primary BMP Functions and Controls

☒ Construction	☒ Permanent
☒ Erosion Control	☐ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Medium
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	Varies
Max. Upstream Slope	Varies
NRCS Soil Group	N/A
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Design Basis

Stable inlets and outlets should be designed and constructed before construction of channel liners. In general, channel liners should be installed on side slopes of 3:1 or flatter and in channels with a low-flow velocity. Riprap can be used on steeper slopes, up to 1:1, and revet mattress and geocells can be used on slopes up to 1.5:1 (Figure 147). The selection of channel-lining material depends on the velocity and shear stress in the channel. Table 32 includes guidance on material selection based on channel velocity.

Table 32. Channel lining and allowable velocity (adapted from ITD 2014).

Channel Type	Velocity (feet per second)	
	Low	Maximum
Unlined earthen ditch	1.0	2.0
Riprap lining	3.2	9.8
Vegetation	2.0	3.9
Revet mattress lining	2.0	14.8
Jute or turf reinforcement mat[a]	1.0	3.3
Geocells[a]	1.0	19.7

a. For more information, refer to the design characteristics of individual products being considered. If individual products are identified in the specification, three products or approved equals should be specified.

The boundary shear stress for a shallow channel where the hydraulic radius is approximated by the flow depth can be calculated using Equation 43:

$$\tau = \gamma\, d\, s$$

Equation 43. Boundary shear stress for shallow channel.

Where

τ = shear stress (lb/ft^2)
γ = unit weight of water, 62.4 lb/ft^3
d = flow depth (ft)
s = channel gradient (ft/ft)

Table 33 provides guidance on selecting riprap size (d_{50} and d_{max}) and thickness based on channel shear stress. Refer to manufacturer's information for selecting erosion control matting or geocells based on shear stress.

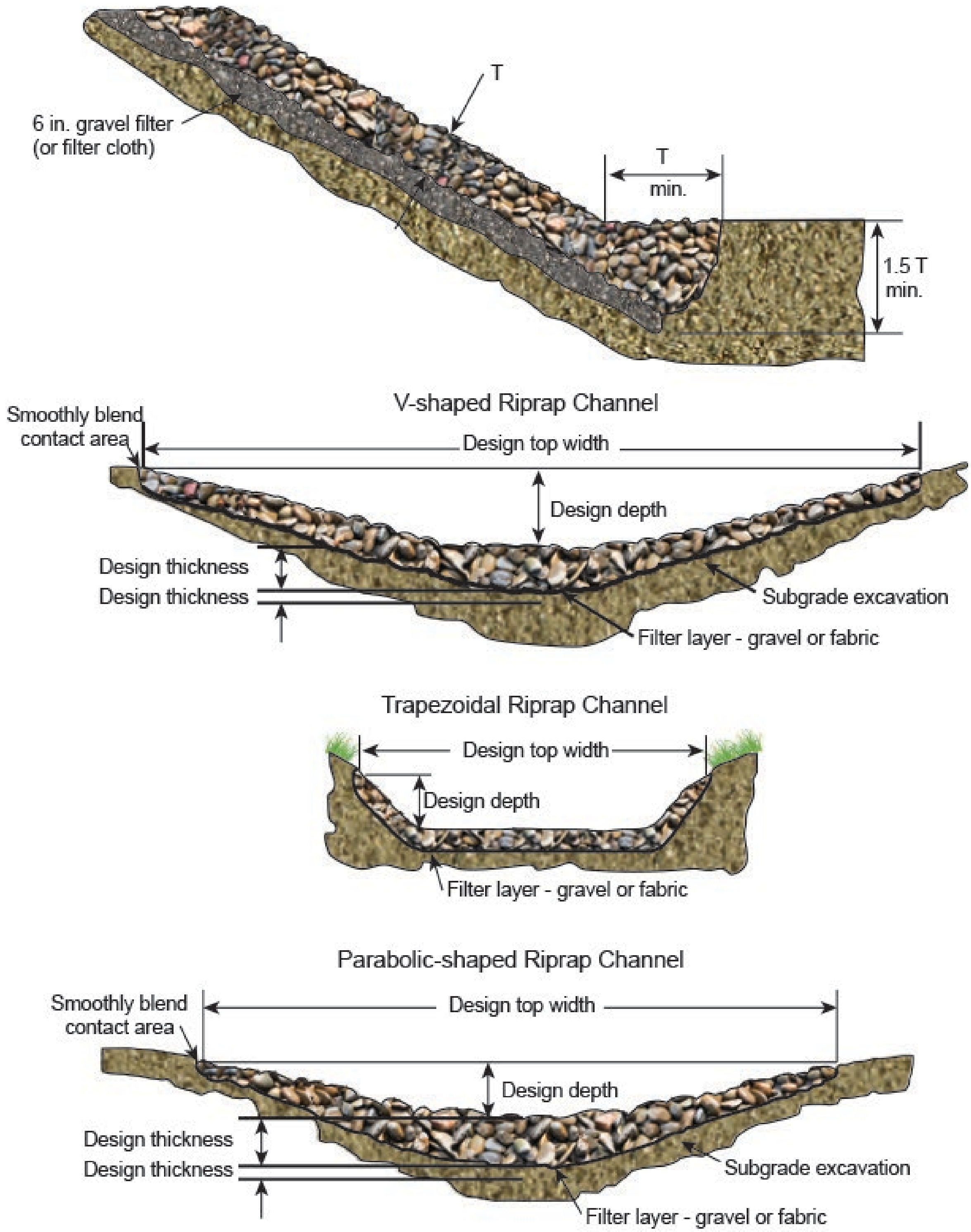


Figure 147. Riprap channel lining.

Table 33. Rock riprap sizes and thickness.

Unit shear stress (pounds per square feet)	d_{50} (inches)	d_{max} (inches)	Minimum blanket thickness (inches)
0.67	2	4	6
2.00	6	9	14
3.00	9	14	20
4.00	12	18	27
5.00	15	22	32
6.00	18	27	32
7.80	21	32	38
8.00	24	36	43

Place riprap and gabion revetments on top of either a stone filter or a geotextile filter fabric to prevent soil movement into or through the riprap. The stone should be keyed in at the bottom of the slope and the filter should be keyed at the top of the bank. Gabion baskets should be constructed of noncorrosive material with a high tensile strength, especially when installed in waters with high corrosivity potential (Figure 148).

In channels with sensitive habitat, the channel design should maintain low flows within the channel, and the riprap size and placement thickness should not cause the stream to go effectively dry. Consult a design professional to determine the channel’s proper width-to-depth ratio.

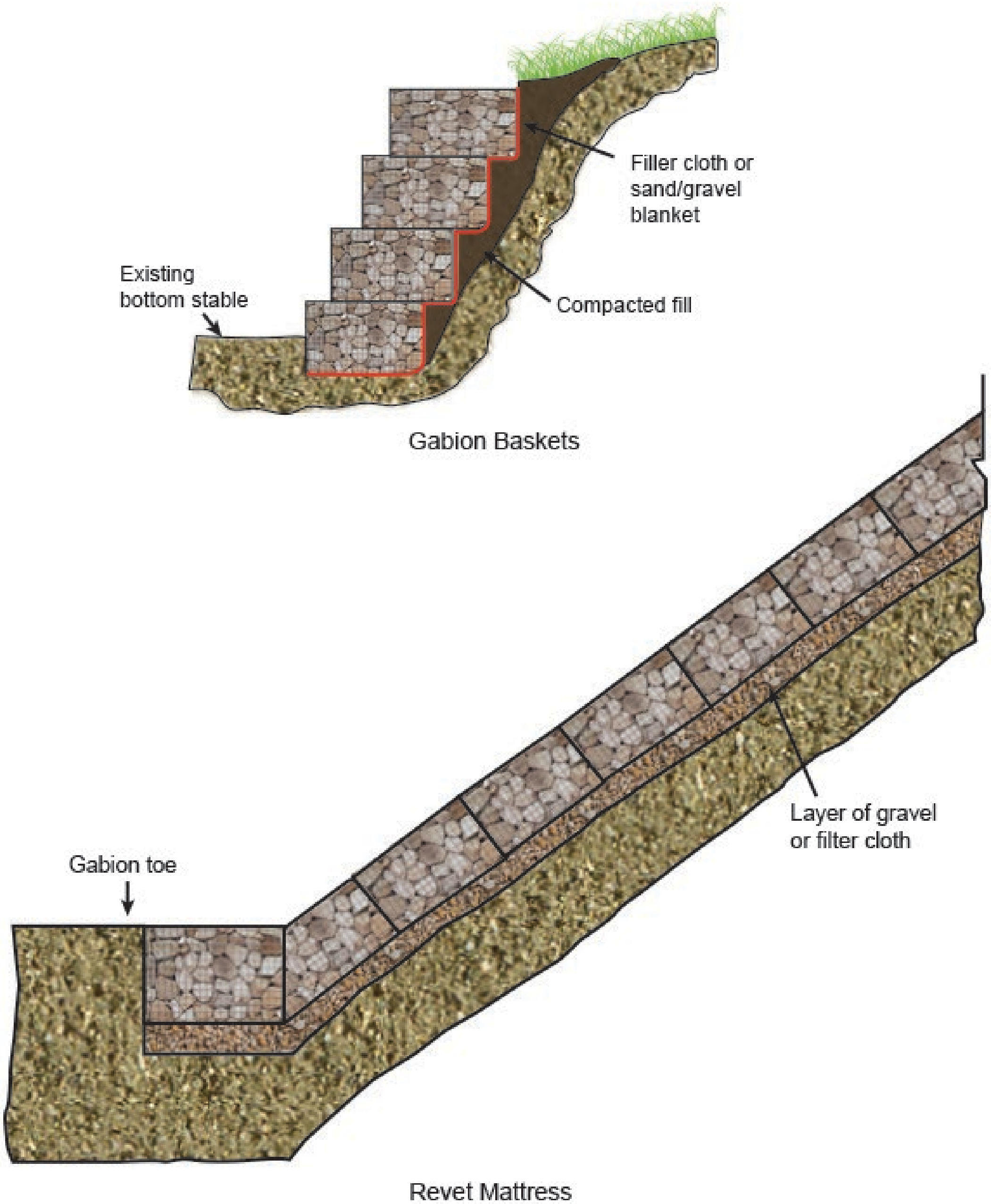


Figure 148. Gabion basket and revet mattress.

Construction Guidelines

For turf reinforcement mats, biodegradable mats, and geocells, follow manufacturer's installation recommendations and the following general guidelines:

- Site preparation—Shape, grade, and compact the bottom and banks as required for a smooth fit. Remove rocks, clods, sticks, and other materials that prevent positive contact with the soil surface. Complete contact of channel liner with the soil surface is critical to keeping water flowing over, not under, the liner.
- Side ditches or channels—Treat in the same manner as the main ditch or channel.
- Channel liner applications—Start at the upstream end of the channel and continue down grade.
- Channel liner overlap—Overlap at least 3 feet of the end of the upstream liner with the top of the next lower liner. Bury the top end of the lower liner at least 6 inches deep. Securely anchor both the top and bottom liner in the area of the overlap. Bury the outer edges of the channel liner in a trench at least 1 foot and properly anchor.
- Make field adjustments as necessary to ensure proper performance.

Install riprap and revet mattress immediately after the area is disturbed and prepare for stone placement. For riprap, the field or quarry stone used should be hard, angular, and resistant to water and weathering.

Maintenance

Make corrections based on weekly erosion control inspections.

After channel lining is installed, ensure all of the liner is in contact with the soil in all places, and critical areas are securely anchored. Inspect channel liners periodically and following each storm event or snowmelt. Repair as necessary. If vegetation is not growing through a mat as designed, reseed as necessary.

Additional Resources

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

BMP 62: Temporary Stream Crossing

Description

A temporary stream crossing provides a safe and stable means for construction vehicles to cross streams or watercourses without moving sediment into streams, damaging the streambed or channel, or causing flooding. A bridge or culvert allows construction vehicles temporary access across a stream or watercourse (Figure 149).

Figure 149. Temporary stream crossing using culverts (Ohio EPA 2014).

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☐ Erosion Control	☒ Sediment Control
☐ Source Control	☒ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
◖	Metals
○	Bacteria
◖	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$$
Maintenance Requirements	Easy
Ease of Installation	Hard
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	5 acres
Max. Upstream Slope	25%
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	6 feet

Applicability

A temporary stream crossing is used when heavy equipment must be moved from one side of a stream channel to another, or where light-duty construction vehicles have to cross the stream channel frequently for a short time period. Temporary stream crossings should be installed only when it is necessary to cross a stream and alternative routes to access the site are not feasible or a permanent crossing is not feasible or not yet constructed.

The specific vehicle loads and conditions of the stream will dictate the type of stream crossing that is appropriate.

Bridges are the preferred method to cross a stream as they provide the least obstruction to flows and fish migration.

Culverts are relatively easy to construct; a pipe (or pipes) can be placed in the channel and covered with aggregate. Temporary culverts can result in disturbance to the channel during construction and removal.

Limitations

- Temporary bridges may be expensive to install.
- Culverts cause greater disturbance during installation and removal. In sensitive stream systems, these impacts may not be justifiable.

- Always attempt to minimize or eliminate the need to cross streams. Temporary stream crossings are a direct source of pollution so make every effort to use an alternate method such as a longer detour. When it is necessary to cross a stream, a well-planned approach minimizes damage to the streambank and reduces erosion.

Using stream crossing measures below the high-water mark of a stream or other water body considered a water of the United States should be carefully evaluated for local, state, and federal permit requirements. All necessary permits must be obtained before commencing work within the water body.

Design Basis

In-stream excavation should be limited to what is necessary to install the temporary bridge or culvert as described below:

General

- Locate the temporary crossing where the least soil disturbance will occur in the existing waterway banks. When possible, locate the crossing at the point receiving minimal surface runoff.
- Locate culverts and bridges so a direct line of approach exists at both the entrance and exit. Do not allow abrupt bends at the entrance or exit unless suitable erosion protection is provided.
- Align the centerline of both roadway approaches with the crossing alignment centerline at a minimum distance of 50 feet from each bank of the waterway being crossed. If physical or right-of-way restraints preclude the 50 feet minimum, provide a shorter distance. All fill materials associated with the roadway approach should be clean rock (nonerodible) and limited to a maximum height of 2 feet above the existing floodplain elevation.
- Construct a water diverting structure such as a swale (across the roadway on both roadway approaches) 50 feet (maximum) on either side of the waterway crossing. This structure will prevent roadway surface runoff from directly entering the waterway. Measure the 50 feet from the top of the waterway bank. Design the diverting structure according to the BMP fact sheet in this catalog for the individual design standard chosen. If the roadway approach is constructed with a reverse grade away from the waterway, a diverting structure is not required.
- Ensure all crossings are as narrow as practical to provide safe passage of equipment and minimize the impact to the streambank and riparian vegetation.
- Remove all temporary crossings within 14 calendar days after the structure is no longer needed.

Materials

- Use only clean rock (3/4 inch to 4 inches). Do not use erodible fill, such as earth or soil materials, for construction within the waterway channel.
- Use filter cloth, consisting of either woven or nonwoven plastic, polypropylene, or nylon, to distribute the load, retain fines, increase drainage of the aggregate, and reduce mixing of the aggregate with the subgrade soil. Filter cloths should be used as required by the specific method.

Considerations for Choosing a Specific Type of Crossing

- Select a design that least disrupts the existing terrain of the stream reach. Consider the effort required to restore the area after the temporary crossing is removed.
- Locate the temporary crossing where the least soil disturbance will occur in the existing waterway banks. When possible locate the crossing at the point receiving minimal surface runoff.
- Consider that the physical constraints of a site may prevent selecting one or more of the standard stream crossings.
- Consider that the time of year may prevent selecting one or more of the standard stream crossings due to fish spawning or migration restrictions.
- Consider vehicular loads, traffic patterns, and crossing frequency when choosing a specific type of stream crossing.
- Keep in mind that crossings require various amounts of maintenance and bridges require the least maintenance.
- Consider that ease of removal and subsequent damage to the waterway are factors in the stream crossings chosen.

Temporary Bridge

- As the preferred method for waterway crossings, temporary bridge construction causes the least disturbance to the waterway bed and banks when compared to culverts or fords (Figure 150).
- Temporary bridges pose the least potential for creating barriers to aquatic migration. The construction of a temporary bridge or culvert should not cause a significant water level difference between the upstream and downstream water surface elevations.
- Most bridges can be quickly removed and reused.

Temporary Culvert

- A temporary access culvert is consists of a section of circular pipe, pipe arches, or oval pipes of reinforced concrete, corrugated metal, or structural plate used to convey flowing water through the crossing (Figure 151).
- Select culvert material and depth of cover based on the expected construction load.
- Temporary culverts are used when the channel is too wide for normal bridge construction, or the anticipated load may prove unsafe for single-span bridges.
- The length of the temporary culvert should extend a minimum of 1 foot beyond a stable side slope from the road crossing.
- Temporary culverts can be salvaged and reused.

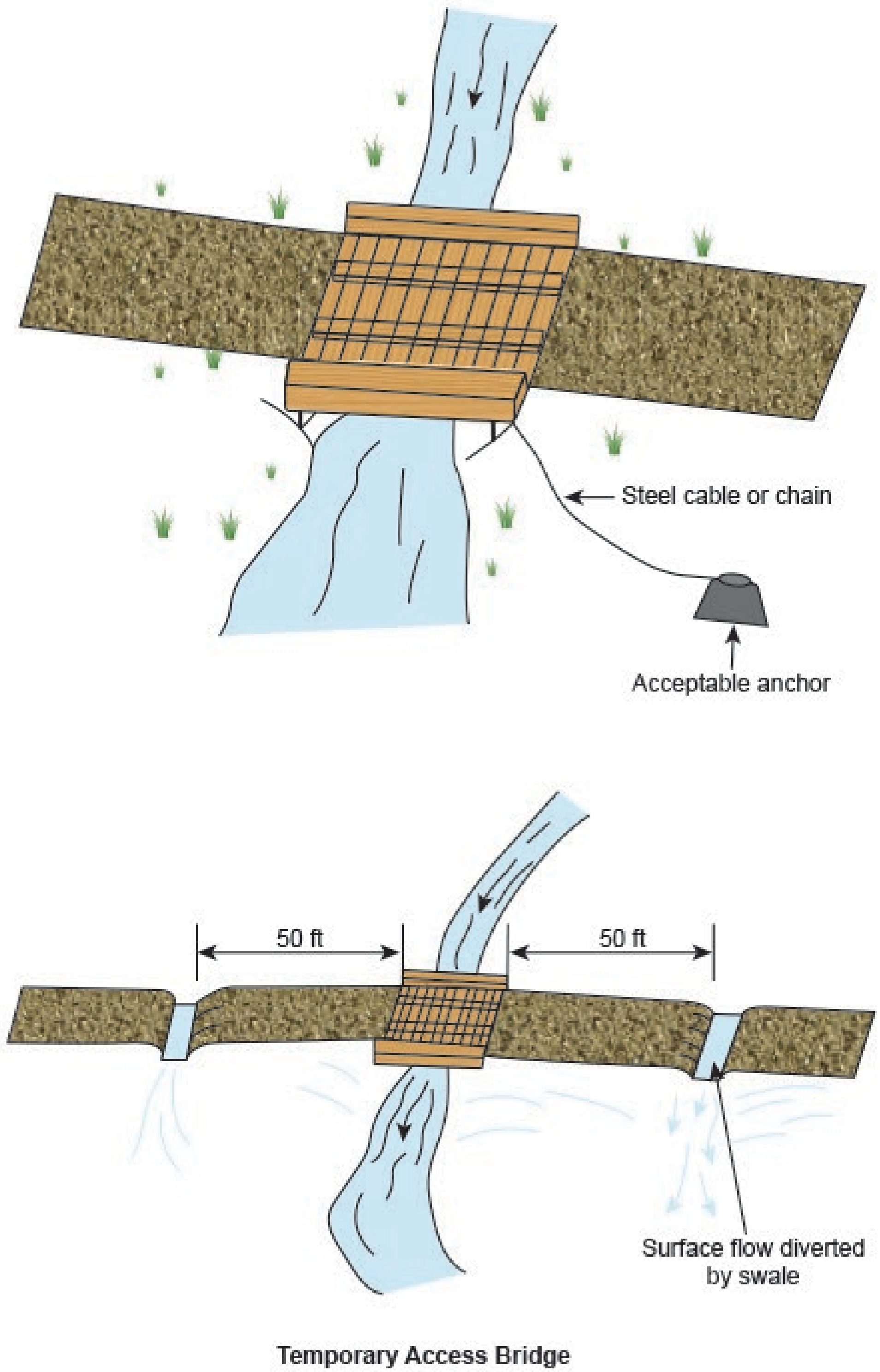


Figure 150. Temporary access bridge.

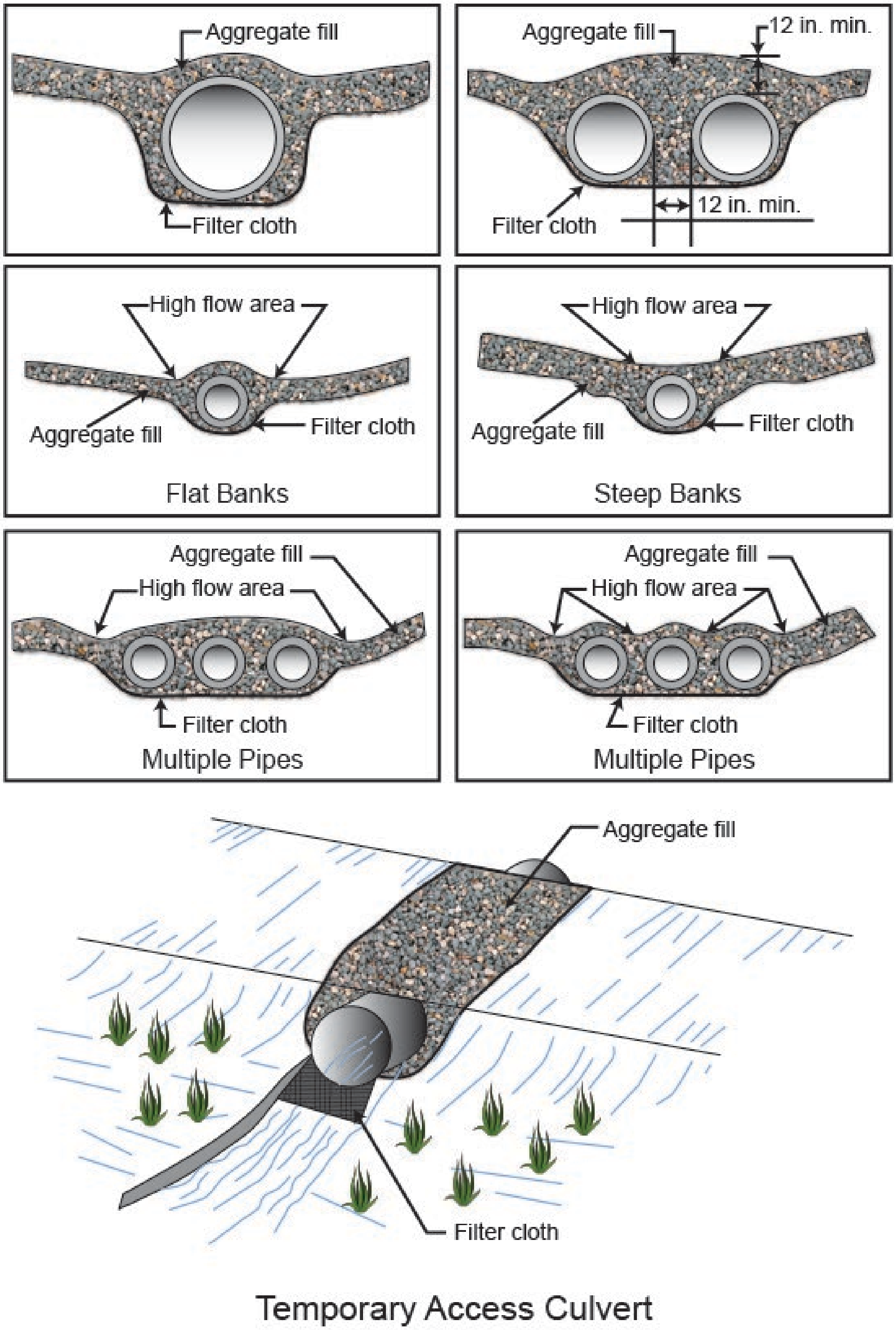


Figure 151. Temporary access culvert.

Construction Guidelines

Temporary Bridge

- Construction, use, or removal of a temporary access bridge will not normally have any time-of-year restrictions since construction, use, or removal should not affect the stream or its banks.
- Construct a temporary bridge structure at or above bank elevation to prevent entrapping floating materials and debris.
- Place abutments parallel to and on stable banks.
- Construct bridges to span the entire channel. If the channel width exceeds 8 feet (as measured from top-of-bank to top-of-bank), a temporary footing, pier, or bridge support may be constructed within the waterway. One additional footing, pier, or bridge support will be permitted for each additional 8-foot width of the channel. No footing, pier, or bridge support will be permitted within the channel for waterways less than 8-feet wide.
- Stringers should either be logs, sawn timber, prestressed concrete beams, metal beams, or other approved materials.
- Decking materials should be of sufficient strength to support the anticipated load. All decking members should be placed perpendicular to the stringers, butted tightly, and securely fastened to the stringers. Butt decking materials tightly to prevent any soil material tracked onto the bridge from falling into the waterway below.
- Run planking (optional) should be securely fastened to the length of the span. Provided one run plank for each track of the equipment wheels. Although run planks are optional, they may be necessary to properly distribute loads.
- Install curbs or fenders along the outer sides of the deck. Curbs or fenders are an option to provide additional safety.
- Securely anchor bridges at only one end using steel cable or chain. Anchoring at only one end prevents channel obstruction if floodwaters float the bridge. Acceptable anchors are large trees, large boulders, or driven steel anchors. Anchoring should be sufficient to prevent the bridge from floating downstream and possibly causing an obstruction to the flow.
- Stabilize all areas disturbed during installation within 14 calendar days of the disturbance.

Temporary Culvert

- All culverts must be strong enough to support the maximum expected loads.
- The size of the culvert pipe should be the largest pipe diameter that will fit into the existing channel without major excavation of the waterway channel or without major approach fills. If a channel width exceeds 3 feet, additional pipes may be used until the cross-sectional area of the pipes is greater than 60% of the cross-sectional area of the existing channel. The minimum culvert size used is a 12-inch diameter pipe.
- The culvert should extend a minimum of 1 foot beyond the upstream and downstream toe of the aggregate placed around the culvert. The culvert should never exceed 40 feet in length.
- Place filter cloth the streambed and streambanks before placing the pipe culvert and aggregate. The filter cloth should cover the streambed and extend a minimum 6 inches and

a maximum of 1 foot beyond the end of the culvert and bedding material. Filter cloth reduces settlement and improves crossing stability.
- Install the invert elevation of the culvert on the natural streambed grade to minimize interference with fish migration (free passage of fish).
- Cover the culvert with a minimum of 1 foot of aggregate. If multiple culverts are used, separate them by at least 12 inches of compacted aggregate fill.
- Stabilize all areas disturbed during culvert installation within 14 calendar days of the disturbance.

Maintenance

- Inspections should be performed periodically and after runoff events to ensure that the bridge, culvert, streambed, and the streambanks are in good condition and that sediment is not entering the stream or blocking fish passage or migration.
- Maintenance should be performed, as needed, to ensure that the structure complies with the standards and specifications, including removing and disposing of any trapped sediment or debris. The decking and curbs of bridges should be kept free of sediment. Sediment should be disposed of outside of the floodplain and stabilized. Areas adjacent to the crossing shall maintain vegetative stabilization.
- When the temporary crossing is no longer needed, all structures, including abutments and other bridging materials, should be removed within 14 calendar days. In all cases, the crossing materials should be removed within 1 year of installation or according to permit requirements.
- Final cleanup should consist of removing the temporary crossing from the waterway, removing all construction materials, restoring the original stream channel cross section, and protecting the streambanks from erosion. All removed materials should be stored outside the waterway floodplain.
- Removing the bridge or culvert and cleaning up of the area should be accomplished without construction equipment working in the waterway channel if possible. Otherwise, turbidity curtains (BMP 71) can be used to minimize downstream turbidity caused by bridge or culvert removal.
- All areas disturbed during removal should be stabilized within 14 calendar days of the disturbance.

Additional Resources

EPA (US Environmental Protection Agency). 2014. *Temporary Stream Crossings*. Water: Best Management Practices. *http://water.epa.gov/polwaste/npdes/swbmp/Temporary-Stream-Crossings.cfm*

BMP 63: Biofilter Bags

Description

Biofilter bags are plastic mesh bags filled with wood chips, compost, or similar biological material used as temporary sediment barriers. Biofilter bags detain storm water runoff and allow a slow rate of discharge to pass through the biological material, which allows sediment to settle and filters runoff. The bags may also be used to divert small amounts of runoff around active work areas or direct runoff to a slope drain, sediment trap, or other filtration/sedimentation BMP (Figure 152).

Figure 152. Compost filter socks used to slow and filter runoff.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☒ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Fair
Max. Tributary Drainage Area	NA
Max. Upstream Slope	10%
NRCS Soil Group	ABCD
Min. Ground Water Separation	NA
Min. Bedrock Separation	NA

Applicability

Biofilter bag barriers are an effective temporary measure that can be rapidly deployed at storm drain inlets, across minor swales and ditches, as diversion dikes and berms, along property lines, to reduce energy from concentrated flow, and for other applications where a temporary barrier is needed and structural strength is not required. These barriers are versatile and can be constructed in many combinations to achieve the required structure.

These are common locations to place biofilter bag barriers:

- At the toe of embankment slopes
- As filter cores for log check dams
- In front of silt fences
- As check dams in unlined ditches
- Surrounding inlets along paved streets (BMP 74: Inlet Protection)
- Around temporary stockpile areas
- Parallel and upgradient of roadways to keep sediment from paved areas

Limitations

- Biofilter bags are barriers suitable only where flow rates are low (1 cfs or less).
- The bags have a limited life span and require regular inspections and repair and periodic replacement (approximately every 2–3 months).

- Biofilter bags are easily damaged by construction equipment.
- Without proper staking, biofilter bags will easily fail on slopes.
- Biofilter bags and their accumulated sediment are often not cleaned up properly, which leaves the sediment to wash away with the next rain event.
- If not properly installed, biofilter bags can become buoyant and easily displaced. Like all BMPs, biofilter bags must be properly installed and maintained to be effective.

Design Basis

Biofilter bags come in a variety of sizes, (e.g., 30 x 18 inches and 30 x 9 inches) and may contain between 1 and 2 cubic yards of material each. Design guidelines are as follows (Figure 153):

- A minimum undisturbed buffer zone of 3 feet is needed between the barriers and surface waters to safely remove the barrier and accumulated sediments.
- Embed the biofilter bag barriers to a minimum depth of 6 inches and backfill the entire length of the barrier. Securely anchor each bag with two stakes (2 x 2 inches x 3 feet) or drive in steel drift pins at least 20 inches into the ground.
- Overlap biofilter bags a minimum of 6 inches.
- Place biofilter bags along level contours.
- Place the first barrier row of biofilter bags near the toe of the slope with subsequent spacing continuing upgradient from that point.
- Where multiple slope gradients contribute to the same drainage area, steepness refers to the steepest section contributing to the biofilter bag barrier.
- Space biofilter bag barriers closer on steeper slopes (CASQA 2004a):
  - Slopes between 20:1 and 4:1—Maximum spacing of 20 feet
  - Slopes between 4:1 and 2:1—Maximum spacing of 15 feet
  - Slopes between 2:1 or steeper—Maximum spacing of 10 feet

Construction Guidelines

- Barriers used for sediment control at the toe of slopes should be in place before disturbing the slope. Install these barriers a short distance away from the toe of the slope to increase the effective area but outside of any ditch channel.
- When flows are expected to be high enough to surpass the infiltration capacity of the devices, the center (low point) bags should be wrapped in filter fabric with a 3-foot tail stapled securely and extending from the downgradient side of the barrier to prevent scouring. The ends of the adjacent barriers should tightly overlap one another.
- Any gaps between barriers should be filled with tightly wedged straw.
- For concentrated flow applications, extend the end of the barrier so that the bottoms of the end units are at a higher elevation than the top of the lowest middle unit to ensure that sediment-laden water flows through or over the barrier instead of around the ends.

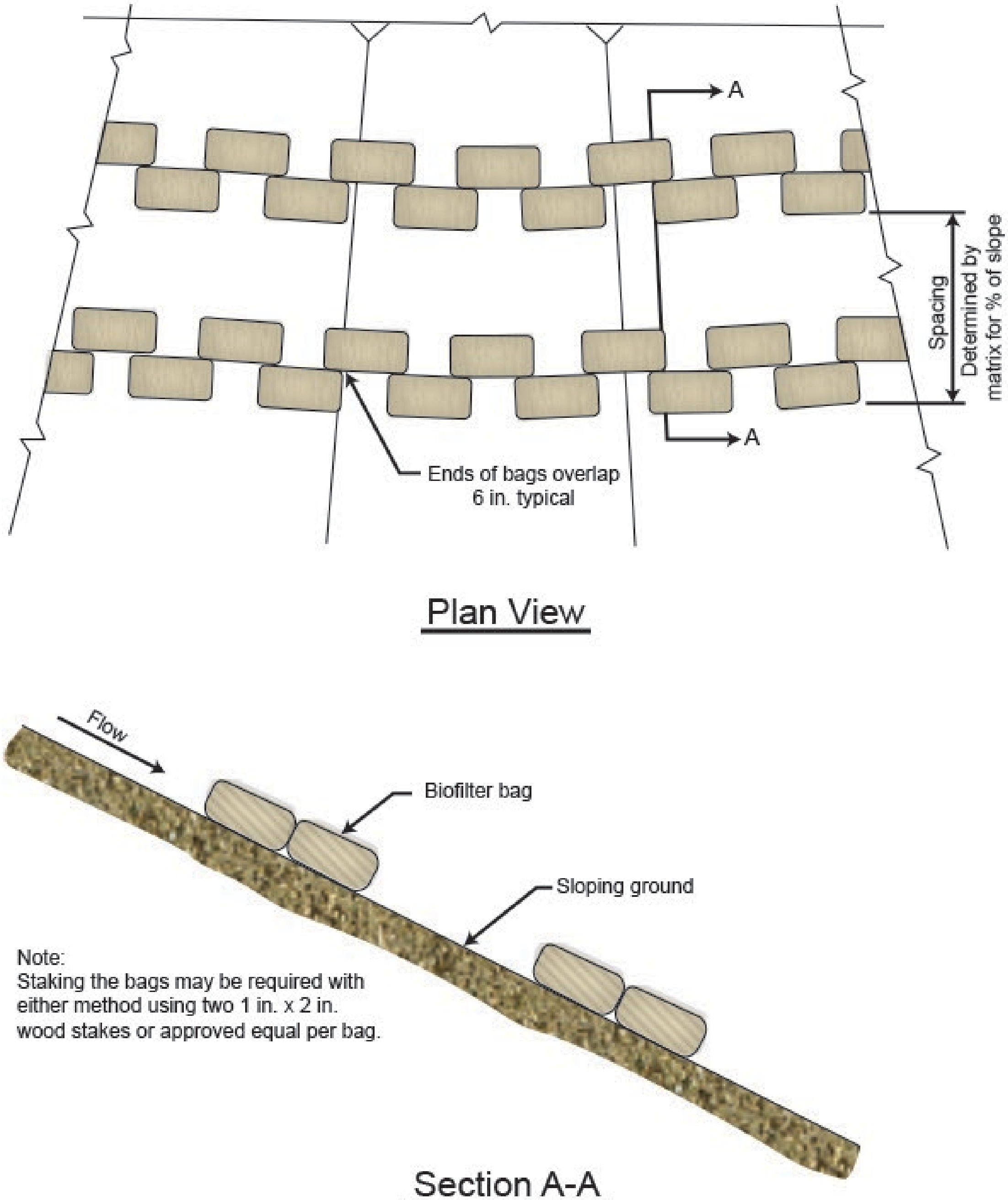


Figure 153. Biofilter bag spacing.

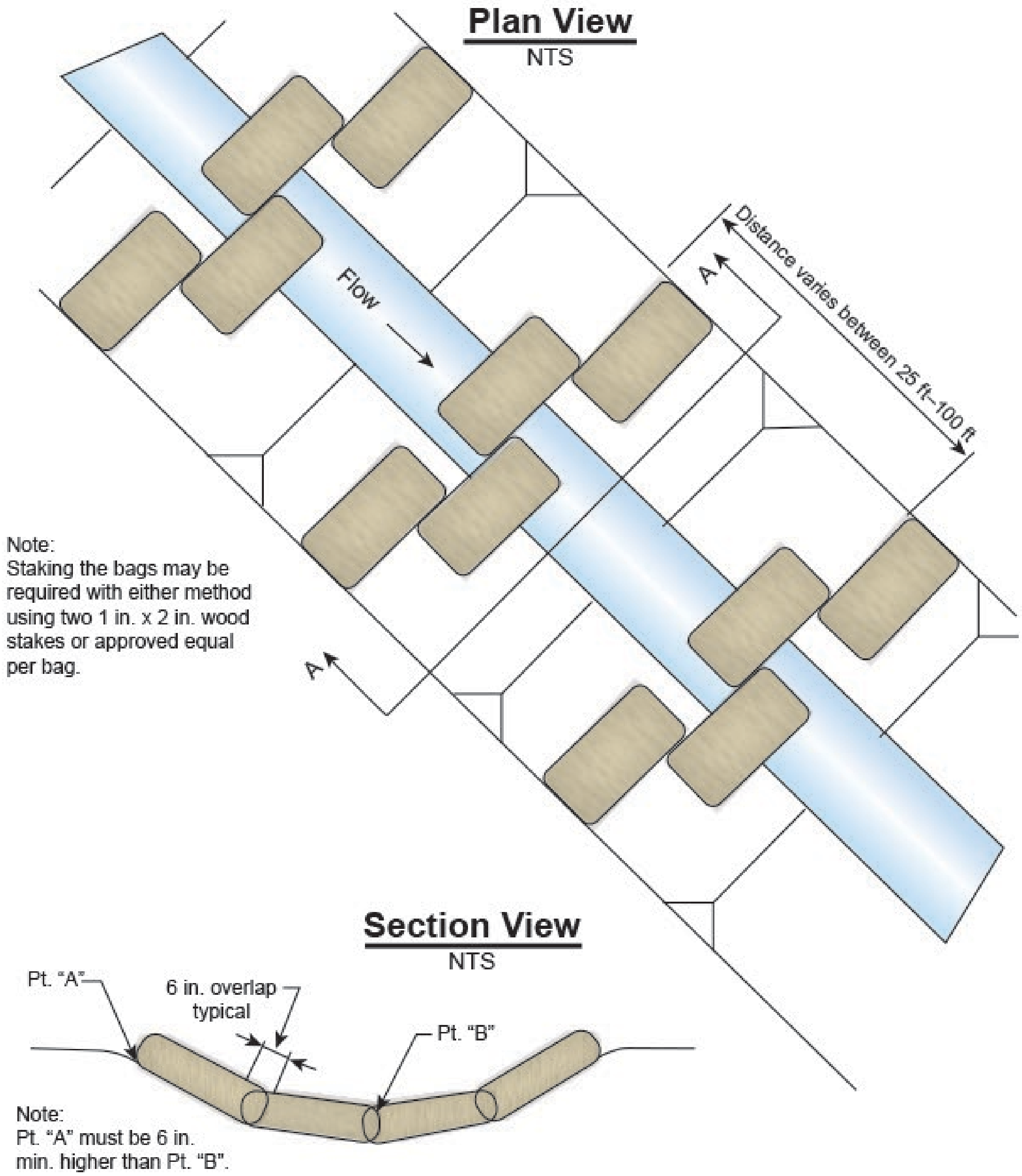


Figure 153. continued. Biofilter bag spacing.

Maintenance

- Perform one inspection during the first runoff-producing event after installation to ensure proper functioning.
- Remove sediment when it reaches one-third of the barrier height.
- Biofilter bags exposed to sunlight must be replaced every 2 to 3 months. Inspect periodically to determine if replacements are needed.
- Immediately repair damaged barriers, undercutting, or end runs.
- If approved, use biofilter bags as landscaping mulch after construction is complete.

- Within 30 days of final site stabilization, remove temporary sediment barriers and any stakes, pins, or rebar used.

Additional Resources

CASQA California Stormwater Quality Association. 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *https://www.casqa.org*

ODEQ (Oregon Department of Environmental Quality). 2013. *Construction Stormwater Best Management Practices Manual: 1200-C NPDES General Permit.* Portland, OR.

BMP 64: Fiber Rolls

Description

A fiber roll (or wattle or sediment control log) consists of straw, flax, rice, coconut, or other biodegradable material wrapped in ultraviolet degradable polypropylene netting or a biodegradable material such as burlap, jute, or coir. Fiber rolls placed at the toe and on the face of slopes intercept runoff and reduce flow velocity, release the runoff as sheet flow, and provide sediment removal from the runoff. By interrupting the slope length, fiber rolls reduce erosion (Figure 154).

Figure 154. Fiber rolls placed along the top of slope in Sandpoint, Idaho.

Applicability

Fiber rolls can be used in small drainage areas and flatter grades due to their low profile. Applications include the following:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches with minimal grades and low velocity flows
- Downslope of exposed soil areas
- Around temporary stockpiles
- As a temporary curb for conveying water to catch basins and pipe slope drains
- For catch-basin inlet protection when they are properly anchored or weighted
- As part of a multilayered perimeter control along a receiving water

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	N/A
Max. Upstream Slope	Varies
NRCS Soil Group	ABCD
Min. Ground Water Separation	N/A
Min. Bedrock Separation	N/A

Limitations

Fiber roll limitations include the following:

- Not effective unless trenched and staked.

- Do not use on slopes subject to creep, slumping, or landslides.
- At the toe of slopes greater than 5:1, install rolls a minimum of 20 inches in diameter or install to achieve the same protection (i.e., stacked smaller diameter fiber rolls).
- Difficult to move once saturated.
- Do not use in traffic crossing areas.
- Limited sediment capture zone and should only be used for small drainage areas.

Design Basis

Fiber rolls should be placed along the contour (perpendicular to the slope or fall line) to avoid concentrating flows. The maximum recommended tributary drainage area per 100 lineal feet of roll is approximately 0.25 acres with a disturbed slope length of up to 150 feet and a tributary slope gradient no steeper than 3:1 (Colorado UDFCD 2010). Longer and steeper slopes require additional measures. Table 34 provides a general guideline for spacing the rolls.

Table 34. Fiber roll installation spacing (EPA 2014b).

Slope (H:V)	Spacing measured along face of slope (feet)
1:1	10
2:1	20
3:1	30
4:1	40

In soft, loamy soils, place the rows closer together and trench into the ground 3 to 5 inches. In hard, rocky soils, place the rows farther apart and trench into the ground 2 to 3 inches. The minimum trench depth should be one-quarter to one-third of the thickness of the fiber roll, and the trench width should be equal to the roll diameter.

Fiber rolls should be securely staked through the center of the roll into the ground with wood stakes (nominal classification of 0.75 x 0.75 inches and minimum length of 24 inches) or with willow cuttings. Place stakes 3 to 4 feet apart and at each end of the roll. Extend the stakes 3 to 5 inches above the top of the roll. Rebar can also be used to stake fiber rolls with the rebar flush with the top of the roll. Rebar is not biodegradable, so remove it after the fiber rolls are no longer needed.

The ends of the fiber roll should be turned up the slope to prevent runoff from going around the roll. If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Secure fiber rolls used along sidewalks or around catch-basin inlets with trenches and/or staking. Alternatively, a roll with gravel, sand, or other ballast material can be used to provide additional weight when staking the roll is not feasible. Place rolls 1 to 1-1/2 feet away from a storm drain inlet (Figure 155 and Figure 156).

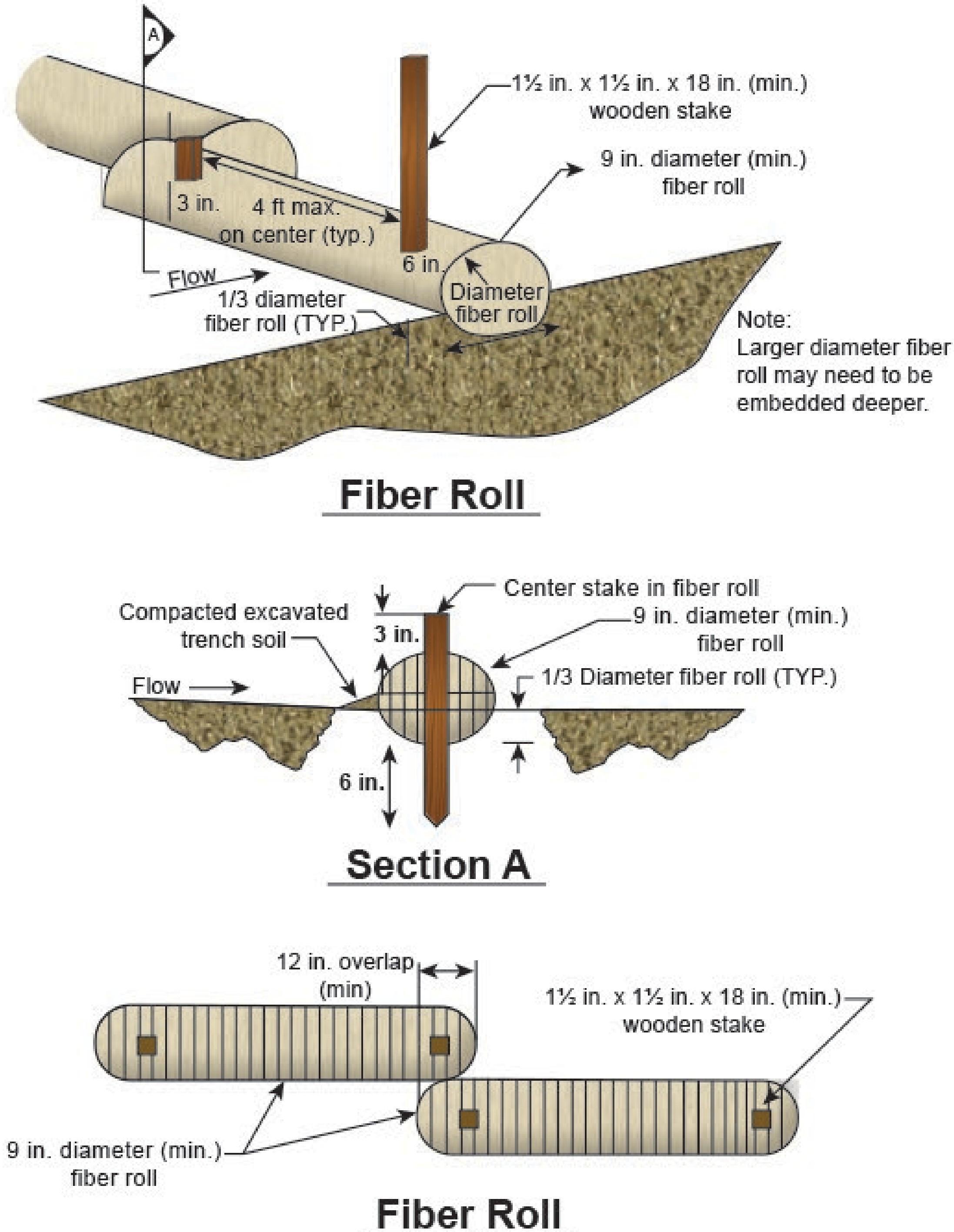
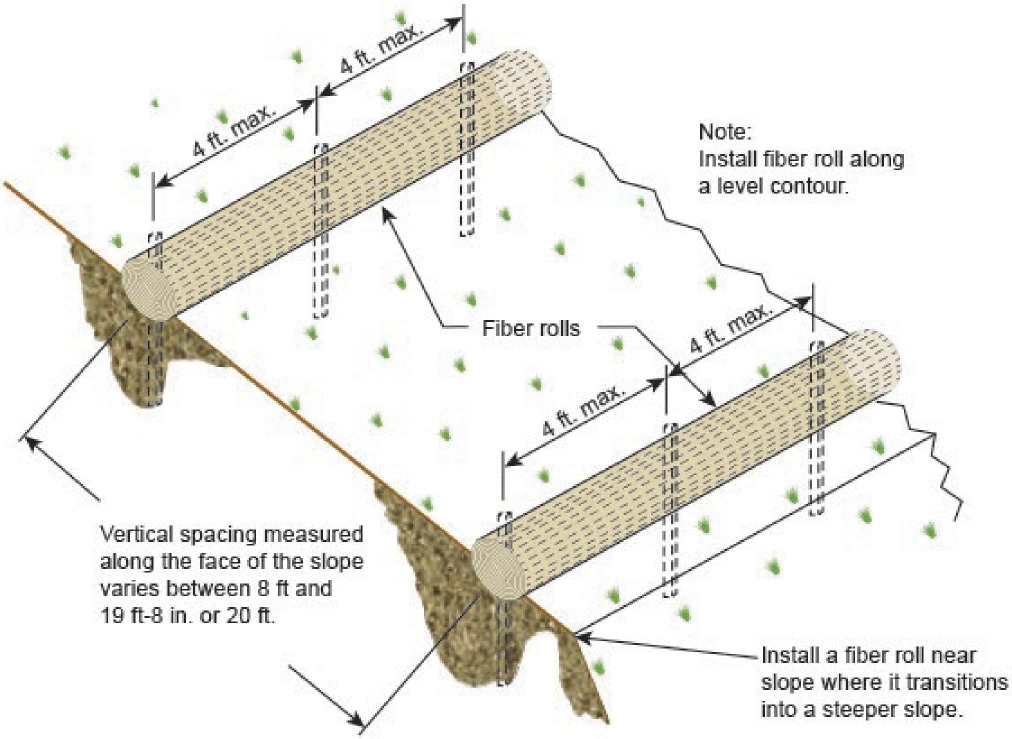
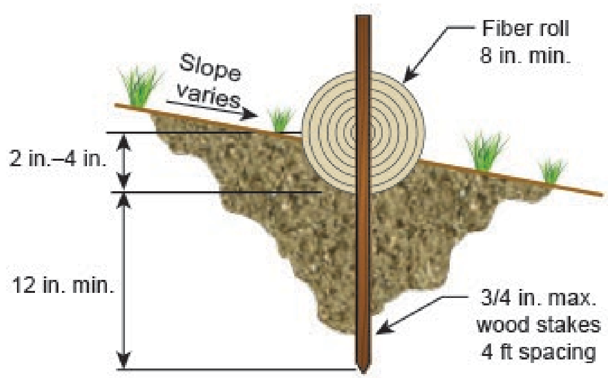


Figure 155. Fiber roll staking, trenching, and joints (Colorado UDFCD 2010).



Typical Fiber Roll Installation

N.T.S.



Entrenchment Detail

N.T.S.

Figure 156. Fiber roll installation.

Construction Guidelines

Use prefabricated fiber rolls 8 to 20 inches in diameter. Install trenches and fiber rolls from the base of the slope and work up. Prepare the slope before installation. Before inserting the wooden stakes, it may be necessary to drive pilot holes using a straight bar through the roll and into the soil.

Maintenance

Fiber rolls should be inspected before forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at 2-week intervals during the nonrainy season.

Repair or replace split, torn, unraveling, crushed, or slumping fiber rolls. Secure and reanchor rolls as necessary.

If the fiber roll is used as a sediment capture device or as an erosion control device to maintain sheet flows, periodically remove accumulated sediment to maintain BMP effectiveness. Sediment should be removed before sediment reaches one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of in appropriate location.

When used for slope protection with erosion control blankets, fiber rolls are typically left in place after construction where they will eventually degrade. If they are used as perimeter control or inlet protection, they are typically removed.

Additional Resources

CALTRANS (California Department of Transportation, Division of Construction). 2003. *Construction Site Best Management Practice Manual*. Sacramento, CA.

EPA (US Environmental Protection Agency). 2014. *Fiber Rolls.* Water: Best Management Practices. *http://water.epa.gov/polwaste/npdes/swbmp/Fiber-Rolls.cfm*

BMP 65: Silt Fence

Description

A silt fence is a temporary sediment barrier created with a porous fabric stretched and attached to supporting posts. Woven wire fence backing is necessary with several types of filter fabric commonly used. The silt fence ponds sediment-laden storm water runoff, and the sediment is retained by settling (Figure 157).

Figure 157. Silt fence (York County Conservation District 2009).

Applicability

Silt fences can be used around the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. The fences should remain in place until the disturbed area is permanently stabilized.

Silt fences can also be used along the toe of fills, on the downhill side of large through-cut areas, along streams, at grade breaks on cut/fill slopes, and above interceptor dikes.

Limitations

Silt fence is a popular BMP choice on construction sites, but to work effectively, it must be properly designed, installed, and maintained.

Do not use silt fences where water concentrates in a ditch, channel, or drainageway or where soil conditions prevent the minimum fabric toe-in depth or minimum depth for installation of support posts. If concentrated flow occurs after installation, place rock berms or other corrective measures in the areas of concentrated flow.

Silt fences should not be used in places where vehicle or equipment crossing is expected.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
◖	Metals
○	Bacteria
○	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	0.25 acres/ 100 lineal feet
Max. Upstream Slope	33%
NRCS Soil Group	ABCD
Min. Ground Water Separation	2 feet
Min. Bedrock Separation	2 feet

Design Basis

Location

Proper placement and design of silt fence is critical to its effectiveness. Silt fence installed along a contour should have a maximum disturbed tributary drainage area of 10,000 ft^2 per 100 feet of fence with a maximum tributary slope length of 150 feet and a tributary slope gradient of 3:1. Longer and steeper slopes require additional measures, such as multiple rows of silt fence or other sediment control. Placement and length should also consider the maximum allowable slope lengths contributing runoff to a silt fence as listed in Table 35.

Table 35. Maximum allowable slope lengths.

Slope Steepness	Maximum Slope Length (feet)
2:1	50
3:1	75
4:1	125
5:1	175
Flatter than 5:1	200

Place the silt fence as close to the contour as possible, with the area below the fence undisturbed or stabilized. Long runs of silt fence should be avoided to limit opportunities for large areas of concentrated water. Extend each end of the silt fence upslope to prevent runoff from going around the end. Multiple J-hooks can be used to break up long runs and provide ministorage areas to pond small amounts of water.

The location and details for silt fence should be shown on the SWPPP map and contain the following minimum requirements:

- Type, size, and spacing of fence posts
- Size of woven wire fences
- Type of filter fabric used
- Method of anchoring the filter fabric
- Method of fastening the filter fabric to the fencing support

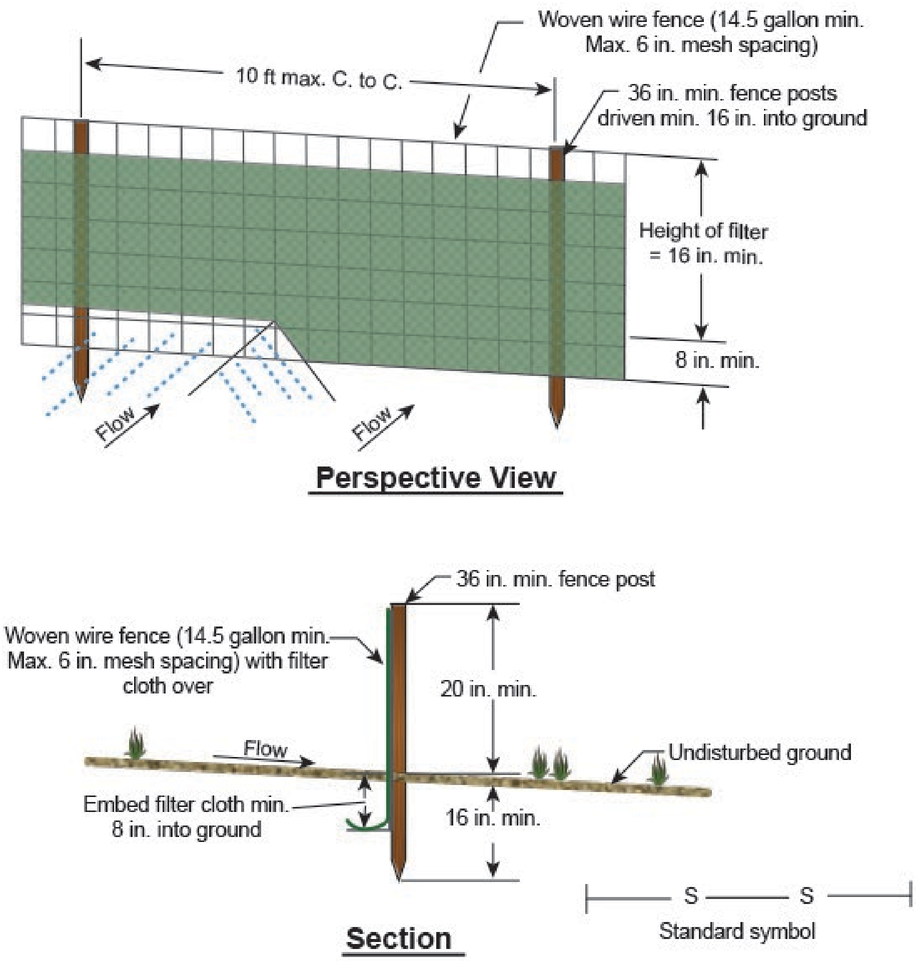
Materials

The filter fabric should meet specifications for silt fence materials included in ASTM D6461, unless otherwise approved by the appropriate erosion and sediment control plan approval authority. The fabric can be woven, nonwoven, or monofilament with a minimum width of 36 inches (Figure 158 and Figure 159).

Support posts should be 36 to 48 inches long and can be either wood or steel. Wood posts should be sound quality wood with a minimum cross-sectional area of 3 square inches, typically 2 x 2 inches nominal dimensions. Steel posts can be standard “T” or “U” sections weighing not less than 1 pound per linear foot. Steel posts can be easier to drive into compacted ground to a depth sufficient enough to hold the fabric up and support the horizontal load of retained water and sediment.

Woven wire fence can be used to help the silt fence withstand heavy rain or high wind events. Wire fencing should be a minimum 14.5 gage with a maximum 6-inch mesh opening, or as approved.

In lieu of constructing silt fence on site using the above recommended materials, prefabricated units can be used if installed per the manufacturer’s instructions. Prefabricated fences do not allow for variable post spacing or posting after the ground is compacted.



Construction Notes for Fabricated Silt Fence

1. Woven wire fence to be fastened securely to fence posts with wire ties or staples.
2. Filter cloth to be fastened securely to woven wire fence with ties spaced every 24 in. at top and mid-section.
3. When two sections of filter cloth adjoin each other, they shall be overlapped by 6 in. and folded.
4. Maintenance shall be performed as needed and material removed when bulges develop in the silt fence.

Figure 158. Silt fence diagram.

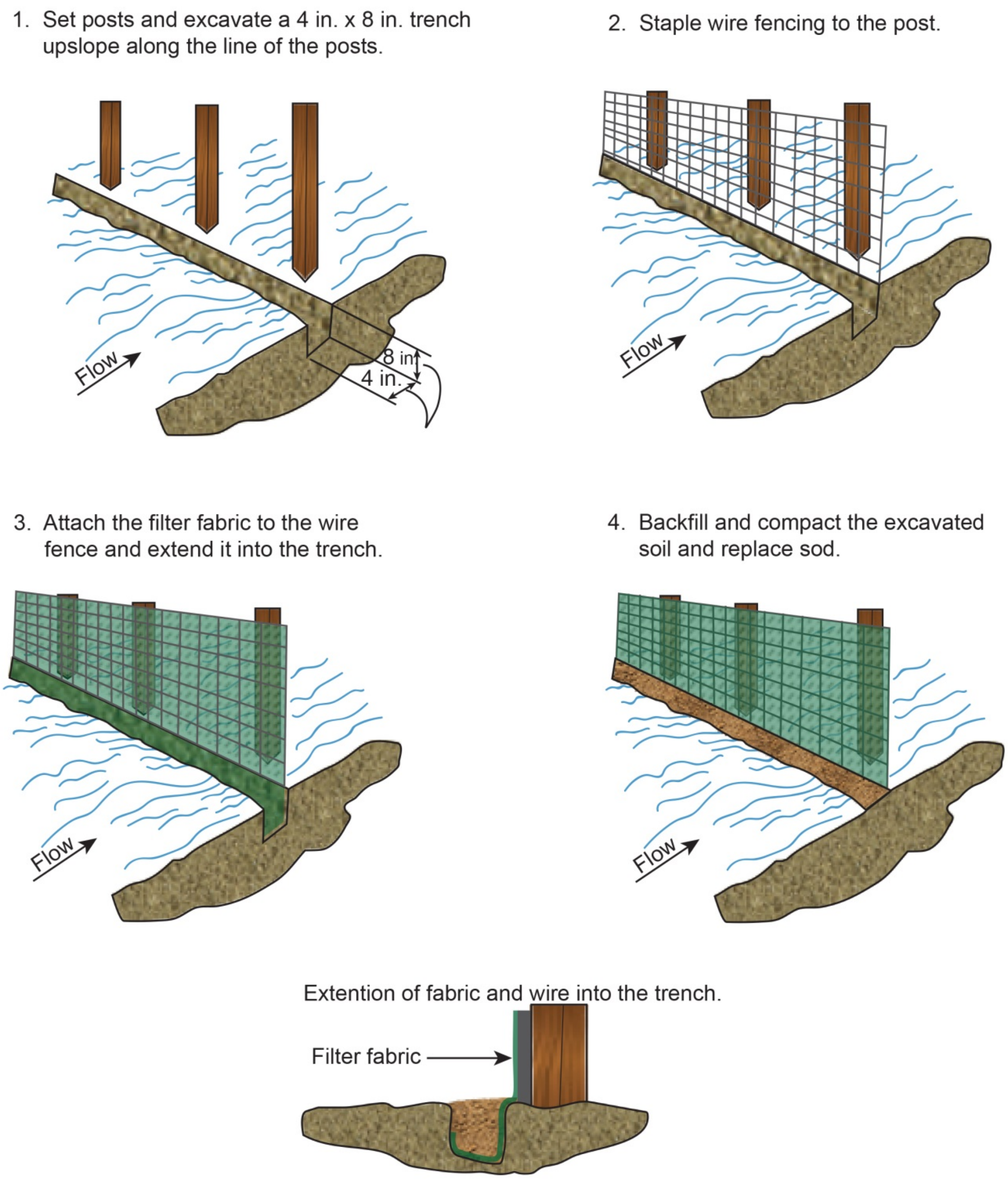


Figure 159. Silt fence construction diagram.

Construction Guidelines

Install the silt fence after cutting and slashing trees and before excavating haul roads, fill benches, or any soil-disturbing construction activity within the contributing drainage areas.

Silt fence can be installed using either the traditional trenching method or the static slicing method. The trenching method places the fence along a 6-inch wide x 8-inch deep trench; the fabric is keyed into the trench; and the trench is backfilled and compacted. To reduce sediment load, replace the vegetation or sod removed to create the trench.

The static slicing method uses a narrow blade pulled behind a tractor to create a 12-inch deep slit where the silt fence fabric is placed. Once the fabric is installed, the soil is compacted on both sides of the slit using tractor tires. The static slicing method achieves better performance with less time and effort than the trenching method (EPA 2012b).

Other guidelines for constructing and installing a silt fence include the following:

- Space posts 10 feet apart when a woven wire fence is used and no more than 6 feet apart when using extra-strength filter fabric (without a wire fence). Extend the posts a minimum of 18 inches into the ground, 24 inches if heavy sediment load is expected, and 30 inches if heavy wire-backed fencing is used. For prefabricated fencing, use the manufacturer's recommendations for post embedment depth.
- If standard strength filter fabric is used, fasten the optional wire mesh support fence to the upslope side of the posts using heavy duty wire staples, tie wires, or hog rings. Extend the wire mesh support to the bottom of the trench. Staple or wire the filter fabric to the fence.
- Extra strength filter fabric does not require a wire mesh support fence. Staple or wire the filter fabric directly to the posts.
- Do not attach filter fabric to trees.
- Where ends of filter fabric come together, overlap, fold, and staple the ends to prevent sediment bypass.
- Where joints in the fabric are required, splice it together only at a support post, with a minimum 6 inch overlap, and securely seal the joint.
- Extend the embedded filter fabric in a flap anchored by backfill to prevent the fabric from pulling out of ground.

Maintenance

Silt fences should be inspected periodically and after runoff events for damage (such as layover or tearing by wind, animals, or equipment) and for the amount of accumulated sediment. Remove the sediment when it reaches one-half the height of the silt fence. Where access is available, machinery can be used; otherwise, the sediment should be removed manually.

- Remove sediment deposits before heavy rain or when high water is anticipated.
- Place sediment deposits in an area protected by sediment and erosion control measures and where little danger of erosion exists.
- The life span of silt fence is generally 5 to 8 months. Remove and replace damaged silt fencing.
- If the silt fence has become clogged and no longer drains, replace it or install a second silt fence either above or below the original fence to collect additional sediment.
- Do not remove the silt fence until land-disturbing activities are completed and contributing drainage areas have been stabilized. Ensure the fabric is cut at ground level; remove the wire and posts and remaining sediment; and rake, seed, and mulch the area immediately.

Additional Resources

EPA (US Environmental Protection Agency). 2012. *Silt Fences*. Stormwater Best Management Practice. *http://www.epa.gov/npdes/pubs/siltfences.pdf*

BMP 66: Sediment Basins and Traps

Description

Sediment basins and traps serve as impoundment areas to detain sediment-laden runoff long enough to allow most of the sediment to settle out. Sediment remains stored in the basin or trap until it can be removed without contaminating additional runoff. Sediment traps are smaller than sediment basins; both can be designed to maintain a permanent pool of water or to drain completely dry (Figure 160).

Figure 160. Sediment basin designed to remain at a certain depth.

Sediment basins and traps can be constructed by excavation or by placing an earthen embankment across a low area or drainage swale. Both basins and traps have outlet structures that slowly release runoff and allow time for sedimentation.

Applicability

While sediment traps and basins are suitable for most construction projects, sediment traps are most appropriate for drainage areas up to 5 acres and are commonly used below construction operations that expose critical areas to soil erosion, including at the outlet of storm water diversion structures, channels, slopes drains, or construction site entrance wash racks.

Sediment basins are appropriate for drainage areas of 5 to 100 acres and are located where a permanent storm water management structure, such as an extended detention basin (BMP 23), wet pond (BMP 22), or constructed wetland (BMP 24), is planned.

Sediment traps and basins function best when used as part of a BMP treatment train system with other erosion and sediment controls (BMP 32: Landscaping and BMP 52: Mulching) located upstream.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☐ Erosion Control	☒ Sediment Control
☐ Source Control	☒ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
◖	Metals
○	Bacteria
◖	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Fair
Max. Tributary Drainage Area	100 acres
Max. Upstream Slope	25%
NRCS Soil Group	ABCD
Min. Ground Water Separation	3 feet
Min. Bedrock Separation	6 feet

Limitations

Due to their smaller size, sediment traps are more appropriate than sediment basins in linear construction projects where space may be limited.

Sediment traps and basins should not be located within surface waters (including intermittent stream or swales) or natural buffers (BMP 2) and should not collect water from wetlands.

Sediment traps and basins may be impractical for removing very fine sediment (silt and clay) due to the long detention times and large basin size requirements for settling fine sediment. Additional measures such chemical treatment (BMP 72) may be needed for sites with fine silt and clay soils. Soils on the site should be characterized to determine their settleability.

Impounded water can create mosquito breeding habitat. Section 3.5.6 provides more information on mosquito control. Sediment basins and traps may need protective fencing to keep children and wildlife from entering the pond.

Design Basis

Location

Soil testing is the first step in determining if a sediment basin is an appropriate BMP for your site. Test soil that represents the construction site. Imported soils should also be tested. Soil types should be determined down to the deepest excavations on the project.

To capture runoff before discharging off site, locate sediment traps and basins at the downgradient end of the site and the storm water outlet. If sediment traps are formed by constructing a dam embankment, locate the traps to provide the maximum volume capacity behind the structure.

Do not locate the traps where an embankment failure would result in unsafe conditions, property damage, or interrupted use or service of public utilities or roads. Ensure sediment traps are easily accessible for maintenance, sediment removal, and inspections.

Sizing

Sediment traps, which intercept runoff from less than 5 acres, should have a minimum size of 1,800 cubic feet per acre of tributary drainage area (EPA 2014c).

Sediment basins, which generally intercept runoff from more than 5 acres but less than 100 acres, should provide storage for either (1) the calculated volume of runoff from a 2-year, 24-hour storm, (2) 3,600 cubic feet per disturbed acre drained (EPA 2012b), or (3) the volume required to settle the design particle size using the following procedure.

1. Determine the pond surface area required to trap soil particles using Equation 44:

$$A_s = 1.2Q/V_s$$

Equation 44. Pond surface area based on settling velocity.

Where

As = pond surface area (ft^2) for trapping soil particles

Q = design inflow rate (cfs) based on the runoff from the design storm event for the drainage area

Vs = settling velocity for the design soil particle (ft/s)

Unless otherwise specified by the local jurisdiction, a 2-year design storm can be used for most applications. A 10-year design storm should be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection. The particle settling velocity can be calculated using a simplified form of Stokes law (Equation 45):

$$V_s = 2.81\, d^2$$

Equation 45. Settling velocity.

Where:

V_s = settling velocity for the design soil particle at 68°F in ft/s

d = diameter of sediment particle in millimeters (mm) (smallest soil grain size determined by wet sieve analysis, or d_{15}, or 0.01 mm for fine silt)

2. Calculate the settling volume required by multiplying the surface area by the settling depth. The settling depth should be a minimum of 3 feet and a maximum of 5 feet.
3. Typically, a sediment storage depth of 3 feet is appropriate unless large volumes of soil are expected from highly erodible site conditions. In this case, use the universal soil loss equation or other applicable estimating methods to design the storage depth on a site-specific basis.
4. Determine the final pond dimensions and volume by adding a sediment storage depth of 3 feet and 3H:1V side slopes from the bottom of the basin. The bottom should have a minimum 2% slope towards the outlet.
5. Adjust the geometry of the basin to effectively combine the settling zone volume and sediment storage volume while preserving the depth and side slope criteria listed above.

As noted, particle sizes of 0.01 mm and smaller have very low V_s so the A_s becomes extremely large, often making the overall basin size requirement too large to be practical. In this case, extra protection measures, such as flocculation (BMP 72), should be taken to capture small silt and clay sediment.

Geometry

The basin or trap should have a minimum length-to-width ratio of 2:1, and ratios between 3:1 and 6:1 are preferred for basins. Runoff should enter the impoundment as far from the outlet as possible to provide maximum retention time. If the minimum length-to-width ratio cannot be achieved, design the basin with earthen baffles or other deflectors to lengthen the flow path within the basin.

For sediment traps, the side slopes should be no steeper than 3:1 and the embankment height no more than 5 feet from the original ground surface. Sediment traps should have a flat bottom.

For sediment basins, sides slopes of 4:1 or flatter is recommended with a maximum side slope of 3:1. The water surface at the crest elevation of the pipe spillway should not exceed 10 feet measured upward from the original ground to the crest elevation of the spillway. Sediment basins should have a bottom that slopes to the outlet structure; avoid using fill to shape the bottom.

Outlet Structures

Sediment traps should have an overflow spillway weir that is at least 4 feet long for a 1-acre drainage area with an additional 2 feet added for each additional drainage acre. Emergency spillways should pass peak flows from the 100-year storm safely with the low-flow sediment outlet clogged.

Sediment basins should also have an overflow spillway and a flow control outlet that ensures adequate residence time to allow particle settling. These controls can be accomplished with a perforated riser pipe or plate, or a floating skimmer. Design the outlet to drain the basin within 24 to 96 hours. The pipe spillway should be armored and discharge at ground elevation below the dam and not more than 12 inches above any streambed.

The outlet structure should withdraw water from the surface to minimize pollutant discharge; however, this situation may not be feasible in areas with extended periods of cold weather.

Erosion controls and velocity dissipation devices should be used at the outlets. Sediment trap cross sections and outlet designs are shown in Figure 161–Figure 164.

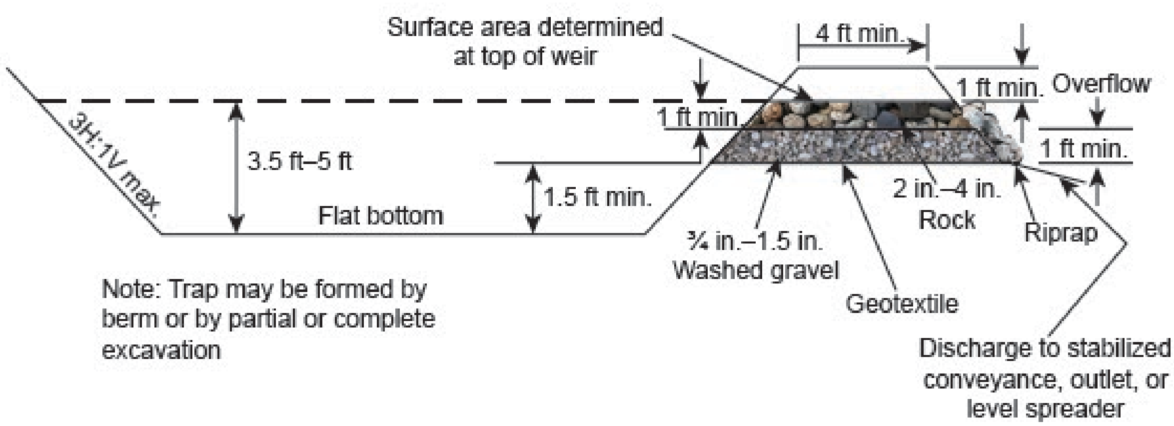


Figure 161. Sediment trap cross section (Washington State Department of Ecology 2012).

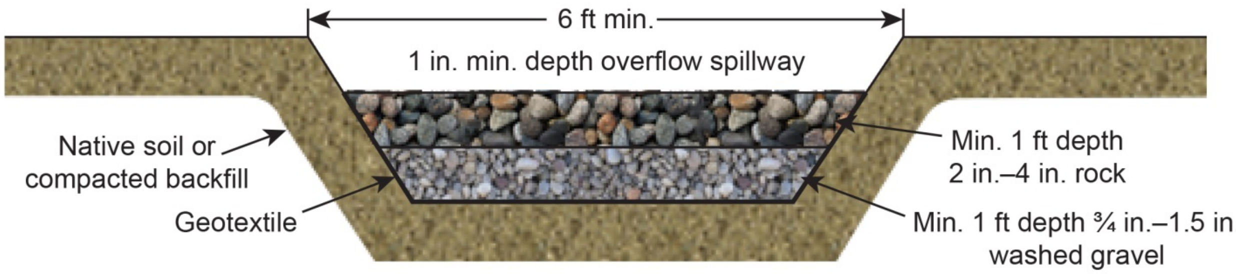


Figure 162. Sediment trap spillway outlet (Washington State Department of Ecology 2012).

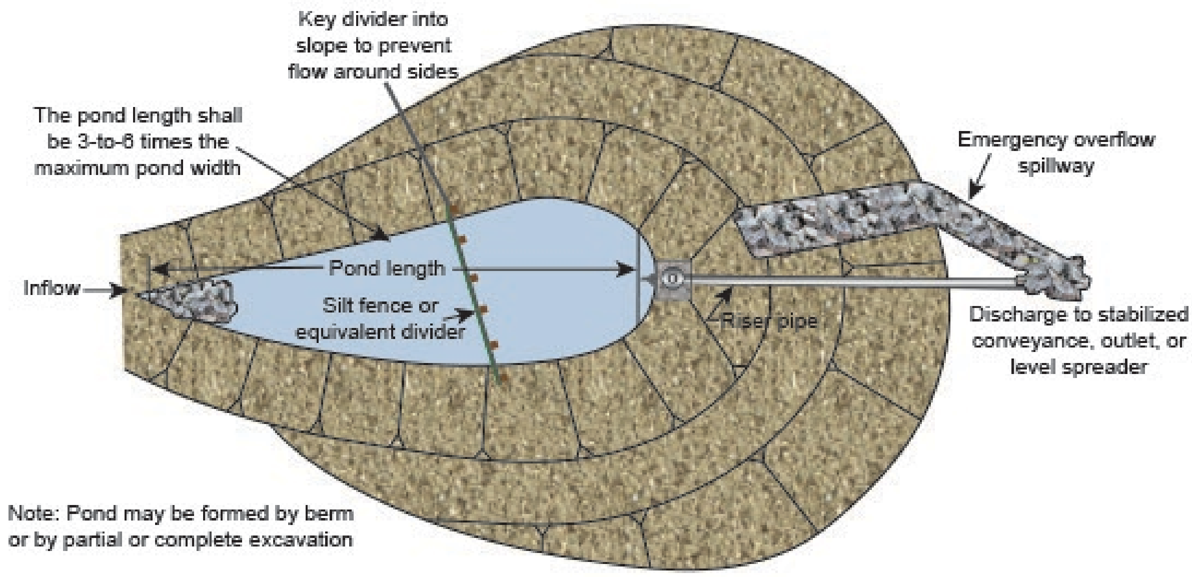


Figure 163. Sediment basin plan view (Washington State Department of Ecology 2012).

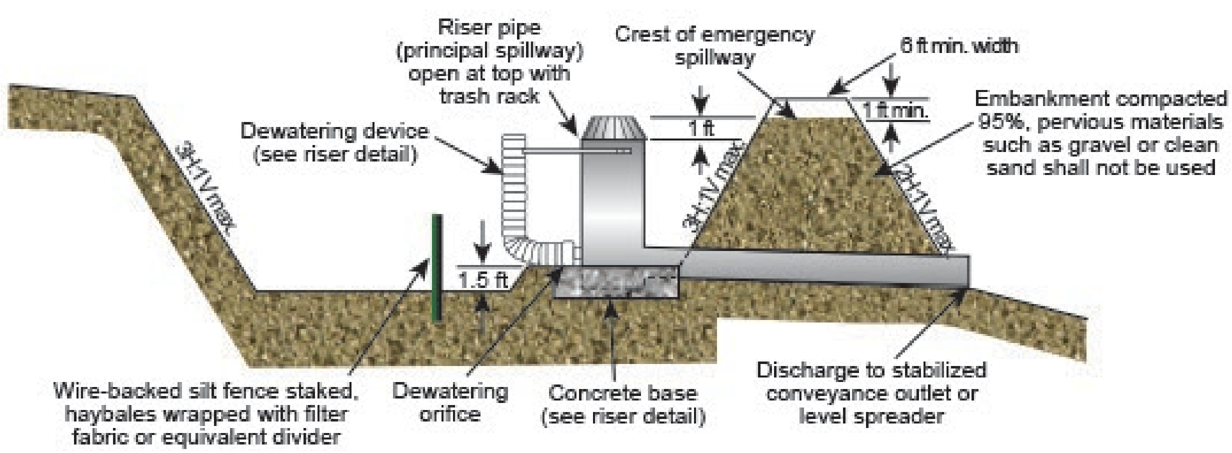


Figure 164. Sediment basin plan cross section (Washington State Department of Ecology 2012).

Construction Guidelines

Before clearing and grading, install sediment basins and traps. Fencing around the basin may be necessary for safety or to discourage vandalism.

Stabilization controls, such as erosion control matting (BMP 54) or vegetation restoration (BMP 8), should be used in the impoundment to prevent erosion, and the emergency spillway should be stabilized with riprap or other erosion control measures.

Dam Embankments

Before dam construction, prepare the dam site by clearing vegetation and removing topsoil. Topsoil should be stored on site for restoration, or if a permanent feature, to aid in revegetation of berm slopes and top. Areas under the embankment and any structural works should be cleared and grubbed, and the topsoil stripped to remove all trees, vegetation, roots, and other material unsuitable for dam construction. To facilitate clean out and restoration, clear the pool area (measured at the top of the pipe spillway) of all brush, trees, or other debris.

Fill material should be of the type and quality suitable for use as a dam embankment. Ensure the material is free of roots, woody vegetation, oversized stones, or rocks exceeding 6 inches in diameter. Do not use frozen material.

Before adding fill, scarify the areas where fill will be placed. Fill materials should be placed in 6-inch maximum lifts and compacted by construction equipment. The embankment should be raised and compacted to an elevation that provides for anticipated settlement to design elevation (allow at least 10% for settlement). Lifts should be continuous over the entire length of the fill and approximately horizontal.

Outlet

Level the bed for the pipe spillway to provide uniform support through its entire length under the dam. All pipe joints should be securely fastened and watertight. The riser should be rigidly and securely fastened to the barrel and the bottom of the riser should be sealed (watertight). The barrel should be placed on a firm foundation according to the lines and grades shown on the plans.

Construct an emergency spillway (as per design) on undisturbed soil—not on fill. The design width and entrance/exit channel slopes are critical to the spillway's ability to successfully protect the dam with a minimum of erosion hazard in the spillway channel. Place at least 1 foot of hand-compacted backfill (maximum 6-inch lifts) over the pipe spillway before allowing construction equipment to cross. Control movement of the hauling and spreading equipment over the fill so the entire surface of each lift will be traversed by not less than one tread tract of the equipment.

Maintenance

Sediment basins and traps should be inspected after each rainfall event and accumulated sediment should be removed to maintain at least one-half of the design capacity at all times. The sediment maintenance volume should be determined and marked before the basin is used.

Regularly inspect embankments for stability and seepage, and clean riser pipes and filter cloth as necessary to deal with clogging and to maintain good drainage from the basin. If gravel is used around the outlet pipe, remove, clean and replace the material as necessary to maintain outlet function.

Removed sediment should be disposed of and stabilized in an approved location so it does not reenter waters of the United States. Sediment may not be dumped into any water of the United States without appropriate permitting.

Sediment basins and traps should remain in operation and be properly maintained until vegetation, or other measures, permanently stabilize the upstream drainage area. Once the area is stabilized, the sediment basin or trap can either be regraded and stabilized with vegetation or, after sediment is removed, converted to a permanent detention basin and reconfigured to meet final design requirements for the permanent facility.

Additional Resources

CASQA (California Stormwater Quality Association). 2015. *California Stormwater Best Management Practices Handbook: Construction.* Menlo Park, CA. *https://www.casqa.org*

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

EPA (US Environmental Protection Agency). 2012. *EPA Construction General Permit*. Water: Stormwater. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu*

EPA (US Environmental Protection Agency). 2014. *Sediment Basins and Rock Dams.* Water: Best Management Practices. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu*

EPA (US Environmental Protection Agency). 2014. *Sediment Traps*. Water: Best Management Practices. *http://water.epa.gov/polwaste/npdes/swbmp/Sediment-Traps.cfm*

Fifield, J.S. 2001. *Designing for Effective Sediment and Erosion Control on Construction Sites*. Santa Barbara, CA: Forester Press.

BMP 67: Portable Sediment Tank

Description

Sediment tanks are compartmented containers where sediment-laden water is pumped and held until the sediment settles out by gravity (Figure 165). The treated water can then be discharged to another BMP, storm drainage system, or sanitary sewer system as allowed by state, local, and federal regulations.

Figure 165. Portable sediment tank.

Applicability

Portable sediment tanks can be used on any construction site and are well suited where space is limited, such as in urban settings with inadequate room for a sedimentation basin or trap (BMP 66).

Limitations

Portable sediment tanks are a relatively expensive method to store and treat site runoff due to the materials, equipment, and electricity required. In addition, they require a flat surface for installation.

Design Basis

Design and sizing of sediment tanks should follow the manufacturer's recommendations. Also consider the following guidelines:

- The sediment tank should be located to maximize ease of clean out and disposal of the trapped sediment and to minimize interference with construction activities and pedestrian traffic.
- The required storage volume depends on the expected flows into the tank and capacity of the pump and downstream conveyances.
- A wide variety of container designs may be used if the storage volume is adequate and approval is obtained from the local regulating authorities.
- Depending on the physical characteristics of the soil and sediment, the sediment removal efficiency of the sediment tank can be

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☐ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
○	Phosphorus
◖	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$$$
Maintenance Requirements	Medium
Ease of Installation	Easy
Freeze/Thaw Resistance	Poor
Max. Tributary Drainage Area	Unlimited
Max. Upstream Slope	NA
NRCS Soil Group	NA
Min. Ground Water Separation	NA
Min. Bedrock Separation	NA

increased by using flocculation chemicals, such as aluminum sulfate. A flocculation tank setup accrues additional costs, may require additional permitting, and is considerably more complicated because the rate of flocculent addition must be carefully monitored (BMP 72).
- Discharge from the tank should not cause downstream erosion. Stabilize the outlet pipe as necessary to prevent erosion (BMP 35) and cover it with a filter cloth to prevent sediment from leaving the tank.

Construction Guidelines

The manufacturer's specifications should be followed before, during, and after construction.

Maintenance

Portable sediment tanks should be inspected during and after each storm event. Pay special attention to the outlet structure during inspections. Sediment collected in the tanks should be removed and properly disposed of according to applicable state and federal regulations.

All portable sediment tanks should be inspected and maintained during the life of the project according to the manufacturer's specifications. Continue maintenance and inspection until permanent stabilization measures are in place, then the temporary control measures may be removed.

Additional Resources

NY DOT (New York State Department of Transportation). 2014. *New York State Department of Transportation Stormwater Management Program Plan*. *https://www.dot.ny.gov/divisions/engineering/environmental-analysis/repository/SWMPP_June2014.pdf*

BMP 68: Temporary Swale

Description

To reduce erosion and sedimentation, keep off-site storm water runoff from entering the work area during construction. Runoff generated on site containing sediments should not leave the construction site. A temporary swale is an excavated drainage designed to convey sediment laden-water to a sediment-trapping device or prevent runoff from entering disturbed areas by intercepting and diverting off-site flow to a stabilized outlet (Figure 166).

Figure 166. Roped off swale area.

Temporary swales often have limited applicability unless the excavated channel is sufficiently stabilized so it does not erode under flowing water conditions. An alternative to an excavated swale might be diversions placed on undisturbed ground that direct run-on water to a pipe or other collection device. Clean run-on water is kept clean as it is conveyed through the construction site or diverted so it does not enter the site. Keep run-on water clean to reduce on-site BMP quantity, maintenance, and expense.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Nitrogen
○	Phosphorus
◖	Metals
○	Bacteria
◖	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Fair
Max. Tributary Drainage Area	10 acres
Max. Upstream Slope	14%
NRCS Soil Group	BCD
Min. Ground Water Separation	3 feet
Min. Bedrock Separation	5 feet

Applicability

Temporary swales can be used on most construction sites in the following situations:

- Installed above a disturbed area to divert flows and reduce runoff.
- Installed below a disturbed area to convey runoff to a sediment trapping device.
- To reduce the amount and velocity of runoff over a large slope face.
- To transport off-site flows across a disturbed area such as a right-of-way.

Limitations

Improper construction of temporary swales may contribute to erosion by concentrating flow and/or adding sediment and turbidity to the storm water. In areas with highly erodible soils, high flows, or steep slopes it may be necessary to use additional soil stabilization or alternative BMPs.

The swale channel should be stabilized with geotextile fabric or other erosion control BMPs to keep run-on water clean.

Design Basis

Unless otherwise stated by local drainage design criteria, temporary swales should conform to predevelopment drainage capacities and should not be overtopped by the peak discharge from a 10-year design storm. Table 36 and Figure 167 provide guidance for designing temporary swales:

Table 36. Temporary swale design guidance.

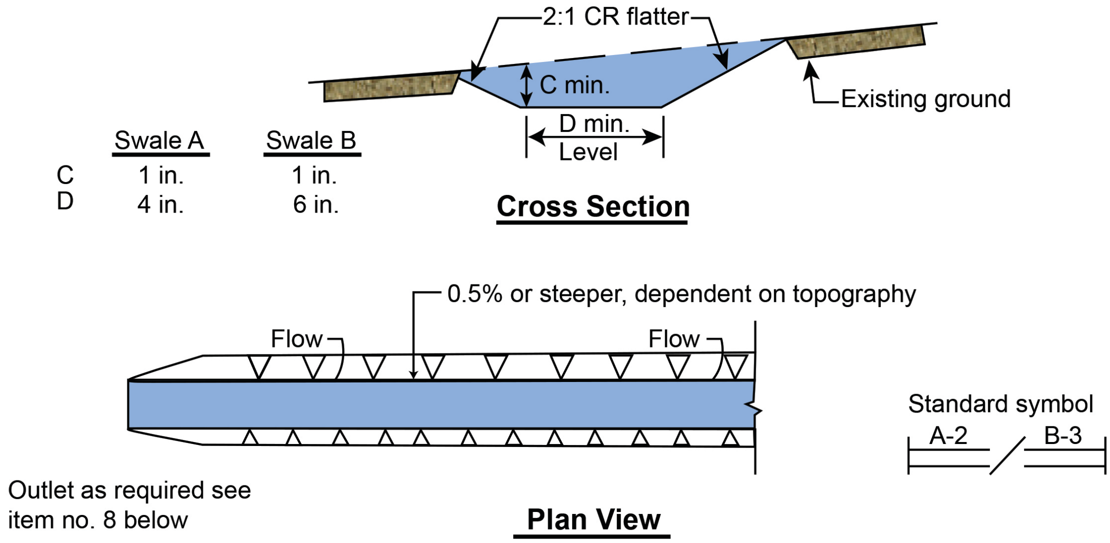
Description	Swale A	Swale B
Drainage area	5 acres or less	5–10 acres
Bottom width of flow channel	4 feet	6 feet
Depth of flow channel	1 foot	1 foot
Side slopes	2:1 or flatter	2:1 or flatter
Minimum grade	0.50%	0.50%
Maximum grade	15%	15%

Temporary swales should not cause additional soil erosion. Temporary swales require additional sedimentation controls such as check dams (BMP 60), velocity dissipation (BMP 35), and temporary channel liners (BMP 61). To account for highly erodible soils, refer to the next higher channel grade stabilization recommendations provided in Table 37.

Table 37. Flow channel stabilization criteria.

Type of Treatment	Channel grade (%)	Flow Channel A (less than 5 acres)	Flow Channel B (5–10 acres)
1	0.5–3.0	Cover with channel liners	Cover with channel liners
2	3.1–5.0	Cover with channel linersor line with 2-inch stone	Cover with channel linersor line with 2-in. stone
3	5.1–8.0	Cover with channel linersor line with 2-inch stone	Line with 4 to 8-inch stone
4	8.1–20	Line with 4 to 8-inch stone	Engineering design

If a temporary swale will be used in the permanent construction plan to convey site runoff, it should be designed and certified by a licensed professional engineer. Swales used to divert flows from a fully stabilized and undisturbed area may not need a downstream sediment-trapping device but should have a stabilized outlet.



Construction Specifications

1. All temporary swales shall have uninterrupted positive grade to an outlet.
2. Diverted runoff from a disturbed area shall be conveyed to a sediment trapping device.
3. Diverted runoff from an undisturbed area shall outlet directly into an undisturbed stabiled area at nonerosive velocity.
4. All trees, brushes, stumps, obstructions, and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the swale.
5. The swale shall be excavated or shaped to line, grade, and cross section as required to meet the criteria specified herein and be free of bank projections or other irregularities that will impede normal flow.
6. Fills shall be compacted by earth-moving equipment.
7. All earth removed and not needed on construction shall be placed so that it will not interfere with the functioning of the swale.
8. Stabilization shall be as per the chart below.

Figure 167. Temporary swale design guidance.

Construction Guidelines

Construct temporary swales before earth-disturbing activities begin. The swale should be stabilized within 10 days of installation with proper seeding (BMP 32) and mulching techniques (BMP 52). Construction traffic over temporary swales should be minimized and eliminated when possible.

Temporary swales should remain in place until after the contributing drainage area is stabilized. If the swale is not part of the permanent construction plan, remove it after construction is completed.

Maintenance

Temporary swales should be inspected before and after rain events, daily during extended events, and weekly during the rainy season. During dry weather periods, inspect swales bimonthly for signs of erosion and slope instability. Repair damaged areas and remove sediment and debris immediately.

Swales stabilized with vegetation should be mowed regularly to encourage thicker, healthier growth. Minimize fertilizer use because excess nutrients may compound water quality problems.

Additional Resources

CASQA (California Stormwater Quality Association). 2015. *California Stormwater Best Management Practices Handbook: Construction.* Menlo Park, CA. https://www.casqa.org

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf

EPA (US Environmental Protection Agency). 2020. *Temporary Diversion Dikes.* Water: Best Management Practices. http://water.epa.gov/polwaste/npdes/swbmp/Temporary-Diversion-Dikes.cfm

Hazra and ODOT (Hazra Engineering Company and Oregon Department of Transportation, Geo/Environmental Section). 2005. *ODOT Erosion Control Manual: Guidelines for Developing and Implementing Erosion and Sediment Controls.*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

King County (King County, Washington). 2009. *King County, Washington Surface Water Design Manual.* Seattle, WA: King County, Department of Natural Resources.

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. http://www.ecy.wa.gov/programs/wq/stormwater/manual.html

BMP 69: Diversion Dike

Description

Diversion dikes are temporary berms, often excavated from an adjoining temporary swale (BMP 68), used to channel water to a desired location. Diversion dikes protect construction areas from upslope runoff and divert on-site sediment-laden water to sedimentation trapping devices or stable outlets (Figure 168).

A diversion dike located on the perimeter of a site prevents off-site storm water runoff from entering a disturbed area and prevents sediment-laden storm water runoff from leaving the construction site or disturbed area. The outside slope of a perimeter dike that blocks clean off-site water must have a nonerosive surface.

Figure 168. Earth dike diverting flows at a construction site (CALTRANS 2003).

Applicability

Diversion dikes can be used on most construction sites in the following situations:

- Installed above a disturbed area to divert flows and reduce runoff.
- Installed below a disturbed area to convey runoff to a sediment trapping device.
- To reduce amount and velocity of runoff flow over a large slope face.
- At or near the perimeter of a construction area to keep sediment-laden runoff from leaving the site.
- To prevent flooding from adjacent water bodies by installing along roadways and construction site borders.
- For slopes greater than 10% consider using other types of storm drain diversions, such as a pipe slope drain (BMP 57).

Limitations

- Despite the simplicity of an earth-constructed diversion dike, improper design can limit effectiveness and contribute to erosion and flood damage by concentrating flow.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
○	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Fair
Max. Tributary Drainage Area	10 acres
Max. Upstream Slope	10%
NRCS Soil Group	BCD
Min. Ground Water Separation	5 feet
Min. Bedrock Separation	5 feet

- Earth dikes may create additional disturbed area on site and create barriers to construction equipment.
- Earth dikes should not be constructed on easily eroded soils or on steep slopes unless soil stabilization practices are used.
- When the drainage area above the earth or perimeter dike is greater than 10 acres, consult the NRCS standards and specifications for diversions.

Design Basis

Diversion dikes are often constructed of compacted soil or coarse aggregate. If a swale is used with the dike, it should have a positive grade to a stabilized outlet. To protect against erosion, stabilize the channel with erosion control matting or other stabilization measures as outlined in BMP 68: Temporary Swale. For shallower slopes (less than 5%), stabilization may be achieved with matting (BMP 54) or mulching (BMP 52) techniques. For steeper slopes (greater than 5%) or high flow velocities, additional stabilization and erosion prevention techniques such as check dams (BMP 60), velocity dissipation (BMP 35). and temporary channel liners (BMP 61) should be incorporated into the design.

Dikes with and without swales that will be part of a permanent drainage plan should be designed by a licensed professional engineer. Dikes and swales that are part of the permanent infrastructure for the site can be stabilized long term with landscaping, seeding, and sodding (BMP 32).

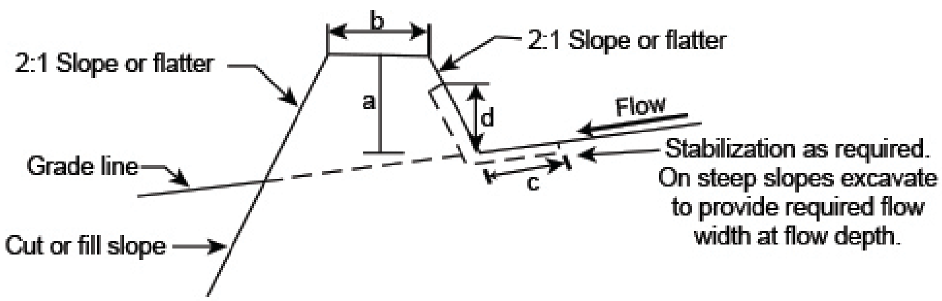
Diversion dikes that convey runoff from disturbed areas should be diverted to a sediment-trapping device. Runoff from undisturbed areas can be channeled to an existing or temporary swale (BMP 68) or to a level spreader (BMP 30).

Table 38 and Figure 169 provide design criteria for earthen diversion dikes, and Figure 170 provides criteria for earth and perimeter dikes. Any perimeter dike/swale should not be constructed outside the property lines without obtaining legal easements from adjacent property owners.

Diversion dikes can also be constructed using other materials, such as jersey barriers with bottom weep holes plugged or piping, which may not have the same erosion potential as earth dikes.

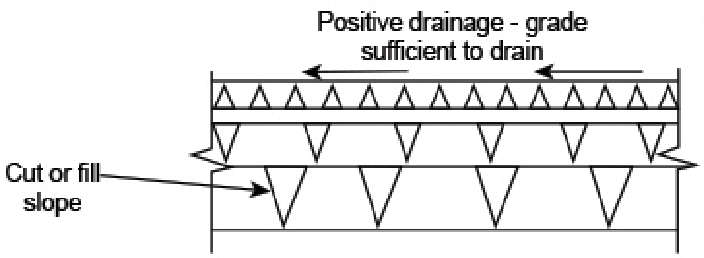
Table 38. Suggested diversion dike design criteria.

Description	Dike A	Dike B
Drainage area	5 acres or less	5–10 acres
Dike height	18 inches	3 feet
Dike width	2 feet	3 feet
Flow width	4 feet	6 feet
Flow depth in channel	8 inches	15 inches
Side slopes	2:1 or flatter	2:1 or flatter



Cross Section

	Dike A (5 ac. or less)	Dike B (5-10 ac.)
a - Dike Height	18 in.	36 in.
b - Dike Width	24 in.	36 in.
c - Flow Width	4 ft	6 ft
d - Flow Dept	8 in.	15 ft



Construction Specifications

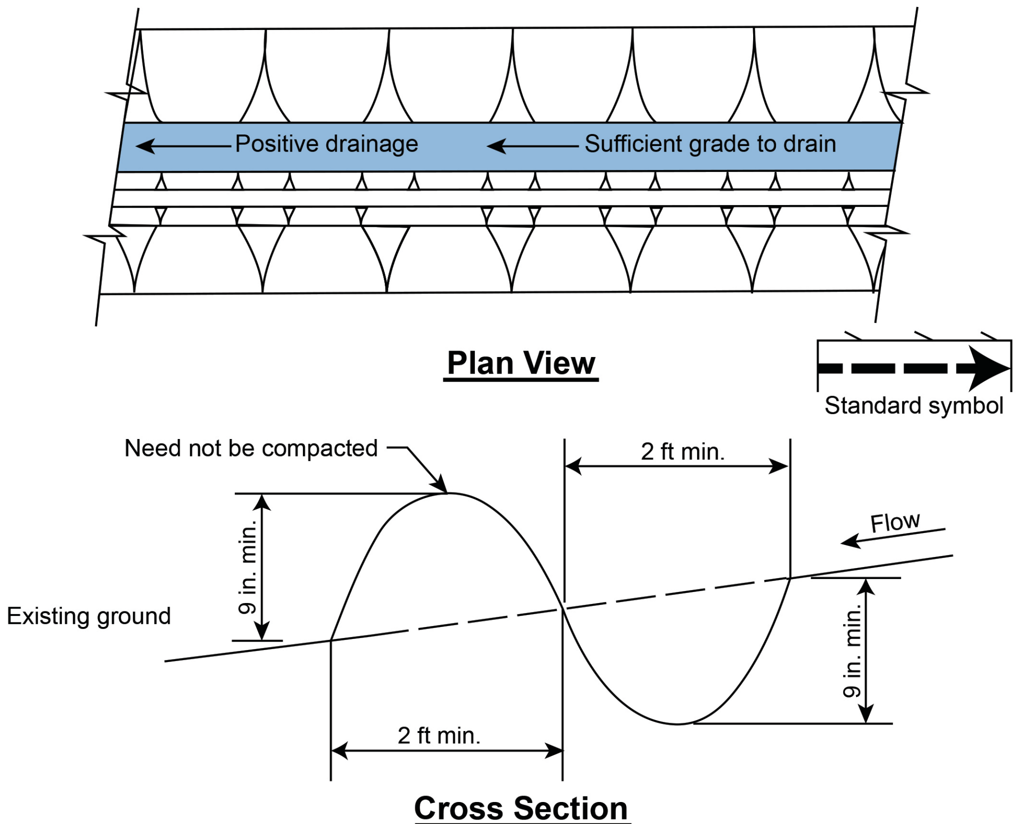
1. All dikes shall be compacted by earth-moving equipment.
2. All dikes shall have positive drainage to an outlet.
3. Top width may be wider and side slopes may be flatter if desired to facilitate crossing by construction traffic.
4. Field location should be adjusted as needed to utilize a stabilized safe outlet.
5. Earth dikes shall have an outlet that functions with a minimum of erosion. Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin where either the dike channel or the drainage area above the dike are not adequately stabilized.
6. Stabilization shall be: (A) in accordance with standard specifications for seed and straw mulch or straw mulch if not in seeding season. (B) Flow channel as per the chart below.

Flow Chart Stabilization

Type of Treatment	Channel Grade	Dike A	Dike B
1	0.5–3.0%	Seed and straw mulch	Seed and straw mulch
2	3.1–5.0%	Seed and straw mulch	Seed using jute or excelsior; sod; 2 in. stone
3	5.1–8.0%	Seed with jute or sod; 2 in. stone	Lined riprap 4 in.–8 in.
4	8.1–20%	Lined riprap 4 in.–8 in.	Engineering design

7. Periodic inspection and required maintenance must be provided after each rain event.

Figure 169. Earth dike design criteria.



Construction Specifications

1. All perimeter dike/swale shall have uninterrupted positive grade to an outlet.
2. Diverted runoff from a disturbed area shall be conveyed to a sediment trapping.
3. Diverted runoff from an undisturbed area shall outlet into an undisturbed stabilized are at non-erosion velocity.
4. The swale shall be excavated or shaped to line. Grade and cross section as required to meet the criteria specified in the standard.
5. Stabilization of the area disturbed by the dike and swale shall be done in accordance with the standard and specification for seed and straw mulch, and shall be done within 10 days.
6. Periodic inspection and required maintenance must be provided after each rain event.
7. Maximum drainage area limit: 2 acres

Figure 170. Perimeter dike design criteria.

Construction Guidelines

Install the dike before the majority of soil-disturbing construction activity begins. Earth and perimeter dikes should be properly compacted with earth-moving equipment and stabilized at least 10 days after installation. Stabilized outlets should be provided at the terminus of earth and perimeter dikes. Construction traffic over earth and perimeter dikes should be minimized and eliminated when possible.

If not part of the permanent drainage plan, completely remove temporary earth and perimeter dikes after the contributing drainage area is stabilized or when construction is completed.

Maintenance

Inspect dikes before and after rain events, daily during extended events, and weekly during the rainy season. During dry weather periods, inspect dikes bimonthly and look for signs of erosion and slope instability. Check outlets at each inspection and repair as needed to avoid gully formation.

Repair damage to the dike and associated flow channel immediately. Remove sediment and debris regularly. Reseed/stabilize the dike as needed to maintain its stability irrespective of wet or dry weather periods. If material must be added to the dike, ensure it is properly compacted by earth-moving equipment.

Mow vegetation regularly to encourage thicker, healthier growth. Minimize fertilizer use because excess nutrients may compound water quality problems.

Additional Resources

CASQA (California Stormwater Quality Association). 2015. *California Stormwater Best Management Practices Handbook: Construction.* Menlo Park, CA. *http://www.casqa.org.*

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

EPA (US Environmental Protection Agency). 2020. *Temporary Diversion Dikes.* Water: Best Management Practices. *http://water.epa.gov/polwaste/npdes/swbmp/Temporary-Diversion-Dikes.cfm*

Washington State Department of Ecology. 2012. *Stormwater Management Manual for Western Washington*. Lacey, WA. Publ. 12-10-030. *http://www.ecy.wa.gov/programs/wq/stormwater/manual.html*

BMP 70: Temporary Berms

Description

A temporary berm is a storm drain diversion with a ridge of compost, gravel bags, or sandbags that redirects runoff contributing to a storm drain line or outfall channel so that it may temporarily discharge into a sediment-trapping device (Figure 171). Temporary berms can also reduce the flow velocity of runoff, partially release the runoff as sheet flow, and provide some sediment removal.

Figure 171. Gravel bag berm (*Natural Building Blog*).

Applicability

Use diversions whenever construction site runoff would otherwise contribute sediment-laden water to a watercourse or to a storm water system that was not originally designed to handle increased pollutant load.

Temporary berms can be used to divert runoff away from newly constructed slopes until vegetation is established or until permanent measures are in place. Temporary berms are most appropriate in areas that have sheet flow drainage characteristics and where perimeter control is needed:

- Along the perimeter of a construction project site
- Downslope of exposed soil areas
- Around temporary stockpiles
- Downslope of paved surfaces

Gravel bag barriers can also be used where flows are moderately concentrated such as in ditches, swales, and around storm drain inlets.

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☐ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

◖	Sediment
○	Nitrogen
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	Low
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	5 acres
Max. Upstream Slope	50%
NRCS Soil Group	ABCD
Min. Ground Water Separation	NA
Min. Bedrock Separation	NA

Limitations

Do not use temporary berms for drainage areas greater than 5 acres or for contributing slopes steeper than 5%. For larger areas, a more permanent structure should be used. Temporary berms by themselves do not control erosion or remove significant quantities of sediment from runoff and should be used as part of a treatment train. Additional limitations include the following:

- Diverted flow may increase in volume and velocity causing downstream erosion. Additional BMPs may be needed with temporary berms.
- Installation can be labor intensive and costly, especially for gravel bag berms.
- Compost berms may leach nutrients, such as dissolved phosphorous and nitrogen, and should not be used in areas that drain to phosphorous-sensitive water bodies. When compost berms are no longer needed, immediately use the berms to amend the soil in preparation for landscaping (BMP 32).
- Burlap bags for gravel or sand have limited durability for long-term projects. Degraded bags that rupture when removed can increase pollutant load when the contents spill.
- Diversions will likely require approval from local officials.
- Storm drain diversions should not increase the existing downgradient sediment load.

Design Basis

General Guidelines

When applying a storm drain diversion technique, one of the following approaches may be used;

- **Off-line diversion** of sediment-laden runoff requires constructing a temporary sediment trap (BMP 66) at the outlet location of the diverted flow.
- **In-line diversion** within a storm drain is achieved by temporarily blocking the permanent outfall and installing a temporary outfall ditch or pipe. The temporary outfall conveys storm water flow to a sediment trap or basin. The diversion may be implemented at any point above a permanent outfall or before connecting into an existing storm drain system.
- **Delayed outfall completion** of a permanent storm drain outfall when constructing a new storm water system to temporarily divert storm water flow into a sediment trap (BMP 66), diversion dike (BMP 69), or temporary swale (BMP 68). The chosen BMP should be constructed to one side of the proposed permanent storm drain location whenever possible.

The following sections include general design criteria for compost berms, gravel bag berms, and sandbag berms.

Compost Berm

Compost filter berms perform most effectively when constructed approximately 1–1.5 feet high x 2–3 feet wide with a maximum spacing of 20 feet

Materials used in compost berms can be selected to target site-specific objectives in capturing sediment and other pollutants or supporting vegetation. Ensure the acquired compost is free of weeds and invasive species because compost berms contain constituents that may adversely affect water quality in receiving water bodies. The compost should meet the parameters in Table 39. Determine whether the receiving water bodies are impaired for specific contaminants that may be present in compost (e.g., sediment and nutrients). Table 39 provides recommendations on selecting the best compost for use in filter berms.

Table 39. Compost filter berm material parameters (adapted from Alexander 2003).

Parameters	Filter Berm to be Vegetated	Filter Berm to be Left Unvegetated
pH	5.0–8.5	NA
Soluble salt concentration (electrical conductivity in dS/m)	Maximum 5	NA
Moisture content (%, wet weight basis)	30–60	30–60
Organic matter content (%, dry weight basis)	25–65	25–100
Particle size (% passing a selected mesh size, dry weight basis)	3 inches, 100% passing 1 inch, 90% to 100% passing 3/4 inch, 70% to 100% passing 1/4 inch, 30% to 75% passing Maximum particle size length of 6 inches (no more than 60% passing 1/4 inch in high rainfall/flow rate situations)	3 inches, 100% passing 1 inch, 90% to 100% passing 3/4 inch, 70% to 100% passing 1/4 inch, 30% to 75% passing Maximum particle size length of 6 inches (no more than 50% passing 1/4 inch in high rainfall/flow rate situations)
Stability Carbon dioxide evolution rate	<8	NA
Physical constraints (man-made inerts)	<1	<1

Notes: deciSiemens per meter (dS/m)

Sandbag and Gravel Bag Berms

The following design criteria are suitable for sandbag and gravel bag berms (Figure 172).

Berm dimensions:

- Height—20 inches minimum
- Top width—20 inches minimum
- Bottom width—approximately 4.25 to 5 feet
- Bag size–length 2 to 2.6 feet, width 16 to 20 inches, depth or thickness 6 to 8 inches

Bag material should be woven polypropylene, polyethylene, or polyamide fabric, minimum unit weight 4 ounces per square yard; mullen burst strength exceeding 300 psi (ASTM D3786); and ultraviolet stability exceeding 70% (ASTM D4355).

Fill material for sandbag berms should be clean and free from clay balls, organic matter, and other deleterious materials that could leach from the bag. The filled bags should be between 88 to 132 pounds in mass.

Bag material for gravel bag berms should meet the same design considerations as sandbag berms. Fill material for gravel bag berms should be between 0.4 and 0.8 inch in diameter and clean and free from clay balls, organic matter, and other deleterious materials. The filled bags should be between 28 and 48 pounds in mass.

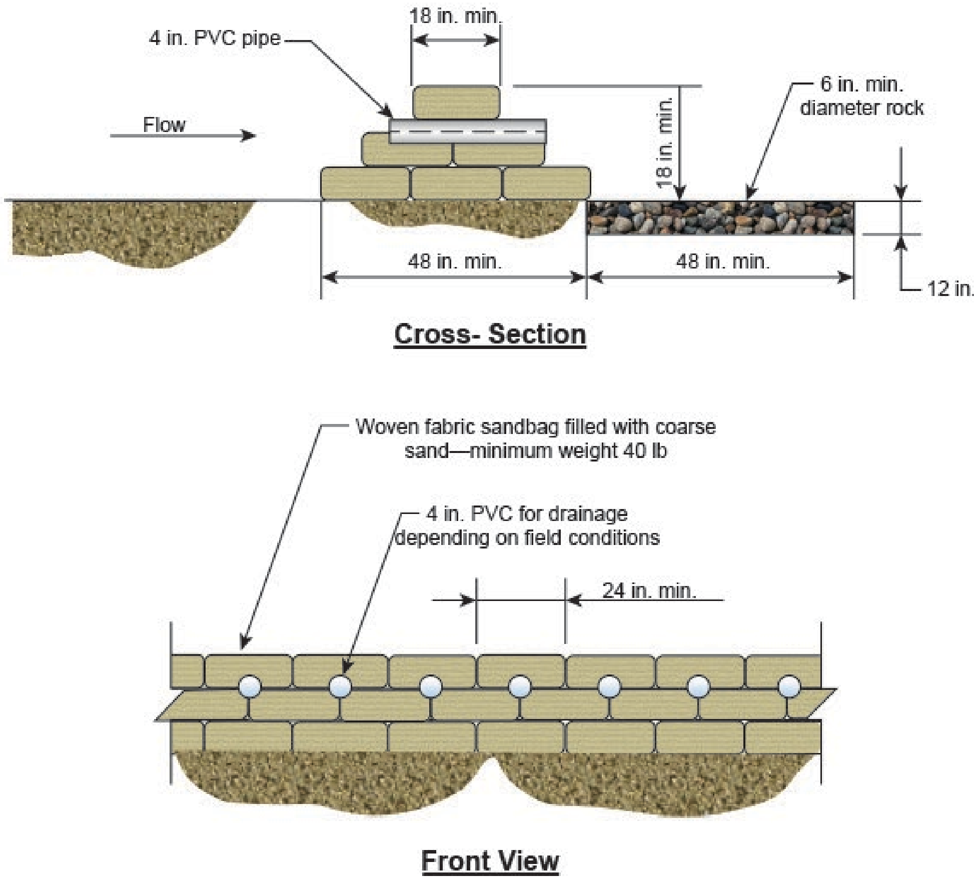


Figure 172. Sandbag berm.

Construction Guidelines

General Guidelines

When the areas contributing sediment to the system have been stabilized, follow the procedures below to restore the system to its planned use.

- Flush the storm drain system to remove any accumulated sediment.
- Remove the sediment control devices, such as traps, basins, dikes, and swales.
- For sites where an inlet was modified, seal the temporary diversion orifice and open the permanent outfall pipe.
- Establish a permanently stabilized outfall channel as noted on the plans.
- Restore the area to grades shown on the plan and stabilize with vegetative measures.
- For basins that will be converted from a temporary to a permanent storm water management measure, remove the accumulated sediment, determine outlets are as designed, and seed all disturbed areas to permanent vegetation.

Temporary berms should be constructed along a level contour when used as a perimeter sediment control device. Turn ends of the berm row upslope in a J-hook fashion to prevent flow around the ends. At the toe of slopes, place berms 5 to 10 feet away from the toe or as far from the toe as practicable.

Compost Berm

Compost berms may be left in place or spread evenly after construction is completed to revegetate and augment on-site soil. Depending on desired usage, compost can be preseeded before placement as a berm or seeded postconstruction. Allowing compost BMPs to remain in place following construction may be advantageous for sensitive areas and stream buffer zones as they can limit the reentry of heavy construction equipment.

Sandbag and Gravel Bag Berms

Sandbag and gravel bag berms should be installed to prevent flow under or between bags. Stack bags in an interlocking fashion to provide additional strength for resisting the force of the flowing water. Do not stack sandbags more than three high without broadening the foundation using additional sandbags or providing additional stability.

Maintenance

- Establish an ongoing maintenance program to ensure the system functions properly.
- Inspect storm water diversion systems and remove debris within 24 hours after each rainfall event as heavy storms may clog or damage the system.
- Periodically inspect temporary diversion structure outfalls and after each major storm for any visible erosion.
- Periodically inspect and maintain compost berms to ensure unwanted vegetation is eliminated before it is established.
- Reshaped or replace sandbags and gravel bags as needed during inspection. When sediment reaches 6 inches deep, remove and properly dispose of the accumulated sediment.
- Leave temporary berms in place until all protected areas are stabilized, then remove the berms to avoid creating additional sediment loads. Remove sandbags and gravel bags by hand to prevent damage from heavy equipment.

Additional Resources

Alexander, R. *Standard Specifications for Compost for Erosion/Sediment Control (Filter Berms)*. 2003. Specification MP 9-03. American Association of State Highway and Transportation (AASHTO) Provisional Standards Manual. Apex, NC: R. Alexander Associates, Inc. *http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/32/AASHTO-Specifications.pdf*

CASQA California Stormwater Quality Association. 2004. *California Stormwater Best Management Practices Handbook: New Development and Redevelopment*. Menlo Park, CA. *http://www.casqa.org.*

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

EPA (US Environmental Protection Agency). 2002. *Flow Diversion.* *http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_fl.pdf*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

New York State DEC (New York State Department of Environmental Conservation). 2005. *New York State Standards and Specifications for Erosion and Sediment Control*. Albany, NY: Division of Water. *http://www.dec.ny.gov/chemical/29066.html*

ODEQ (Oregon Department of Environmental Quality). 2013. *Construction Stormwater Best Management Practices Manual*. 1200-C NPDES General Permit. Portland, ID: ODEQ.

BMP 74: Inlet Protection

Description

Sediment and debris in storm water runoff from construction sites can clog storm water systems and contaminate downstream receiving water bodies. Inlet protection BMPs temporarily prevent sediment-laden runoff from entering storm drain inlets.


Figure 182. Inlet protection wattle (ITD 2014).

Inlet protection measures include abovegrade barriers (e.g., rock socks, sediment control logs, silt fence, gravel and mesh, or block and gravel), inserts (e.g., bags, racks, baskets, or *witch's hats* described in BMP 13: Catch-Basin Inserts), mats, and over excavations (Figure 182). Take care to not increase flooding with diverted flow from protected inlets.

Applicability

Inlet protection applies when sediment-laden runoff from a construction site threatens to enter an existing inlet or an inlet in place before permanent stabilization. Protection may include inlets in the general proximity of the construction area and is not limited to inlets on the construction site.

Limitations

Inlet protection is not a stand-alone BMP and should be used with other upgradient BMPs, especially in conditions of high flow or heavily laden sediment. Divert drainage areas greater than 1 acre to a sediment trap (BMP 66).

Some inlet protection methods, such as gravel and mesh filters and block and gravel filters, require significant space around the inlet and should not be used unless sufficient space is available to avoid a traffic hazard. Ponding around the inlet structure may also be a problem to traffic on site.

Inlet protection BMPs require a high level of maintenance to function properly. If sediment or other

Primary BMP Functions and Controls

☒ Construction	☐ Permanent
☒ Erosion Control	☒ Sediment Control
☐ Source Control	☐ Flood Control
☒ Filtration	☐ Infiltration

Typical Effectiveness for Targeted Pollutants

●	Sediment
○	Phosphorus
○	Metals
○	Bacteria
○	Hydrocarbons
◖	Litter

Other BMP Considerations

Relative Cost	$
Maintenance Requirements	High
Ease of Installation	Easy
Freeze/Thaw Resistance	Good
Max. Tributary Drainage Area	1 acre
Max. Upstream Slope	5%
NRCS Soil Group	ABCD
Min. Ground Water Separation	2 feet
Min. Bedrock Separation	2 feet

debris clogs the inlet and completely blocks flows, inlet control measures can cause localized flooding and erosion in unprotected areas.

Design Basis

Proper inlet protection design depends on inlet type and site configuration. When selecting the type of inlet protection BMP, consider factors such as type of inlet (e.g., curb or area, sump or on-grade conditions), traffic, anticipated flows, ability to secure the BMP properly, safety, and other site-specific considerations. To function correctly, inlet protection systems must ensure flow does not bypass the inlet and cause downstream erosion or flooding. The BMP should also not block flows from filtering into the inlet or catch basin.

Several types of inlet protection are presented below. Additional inlet protection systems and manufactured devices are available and may be selected for use as appropriate. The following design considerations can be applied to most inlet protection BMPs.

- Slope gradient—The drainage area should be fairly flat, with slopes of 5% or less. With filter fabric designs, the area immediately surrounding the inlet should not exceed a slope of 1%.
- Devices should be installed without inhibiting construction-related traffic or workers, or creating pedestrian hazards.
- Retrieval edges, cords, bars, chains, or other mechanisms should be flagged or marked for retrieval under submerged conditions.
- Ponding—Determine the extent of ponding and associated diverted flow expected at inlet protection locations. Both ponding and diverted runoff should not adversely affect construction-related activities or increase downstream erosion. Diverted flow can be managed through proper inlet protection placement and, where needed, additional erosion and sedimentation controls placed downstream of diverted flow.

Catch-Basin Inserts

Catch-basin insert filters (BMP 13) are available from manufacturers and are placed in the catch basin just below the grating. These inserts are a good choice along active roads with traffic and provide flow bypass without ponding around the inlet or creating a traffic hazard. Use these products according to the manufacturer’s recommendations with fabrics and other materials sized to handle projected site runoff and sediment load.

Washed Gravel and Wire Mesh Filter

A washed gravel barrier using wire mesh and filter fabric is placed on top of a grate inlet (Figure 183). This structure does not provide an overflow.

- To achieve maximum trapping efficiency, orient the longest dimension of the basin toward the longest inflow area.
- Remove any obstructions to excavating and grading. Excavate sump area, grade slopes, and properly dispose of soil.
- Secure the inlet grate to prevent seepage of sediment-laden water.

- Place wire mesh over the drop inlet so the wire extends a minimum of 1 foot beyond each side of the inlet structure. Overlap the strips of mesh if more than one is necessary.
- Place filter fabric over the mesh, extending at least 1 foot beyond the inlet opening on all sides.
- Ensure that weep holes in the inlet structure are protected by filter fabric and gravel.
- Place stone or gravel over the fabric/wire mesh to, at least, 20 inches deep.

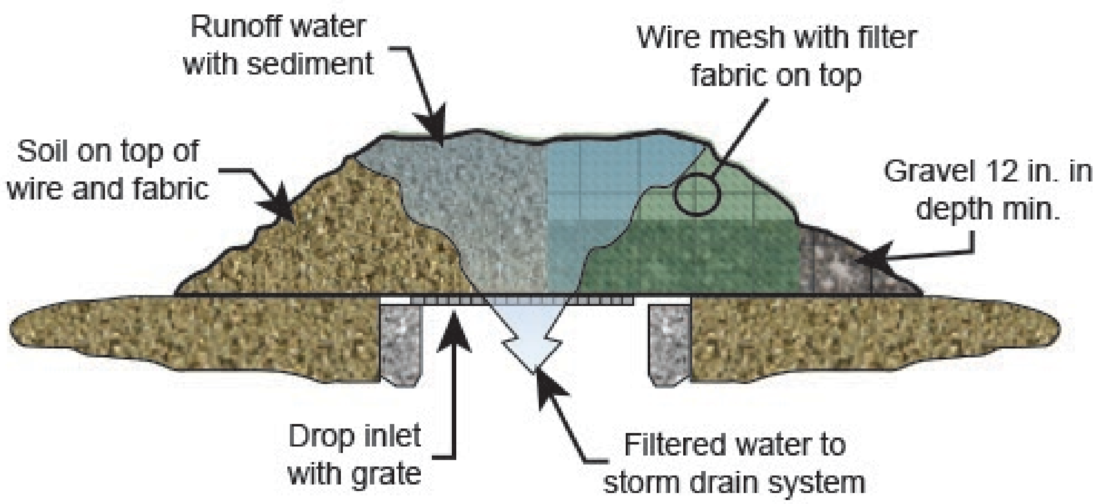


Figure 183. Washed gravel and wire mesh filter.

Block and Gravel Filter

The block and gravel filter is a barrier formed around a curb inlet with concrete blocks and gravel (Figure 184).

- Block and gravel filters can be used in areas of heavy flow, high velocities, and where overflow capability is needed.
- A block-and-gravel inlet protection device can be provided with an overexcavation sediment-trapping sump (Figure 184). The excavation should be 1 to 2 feet deep as measured from the crest or grate of the inlet. Side slopes should be 2:1 maximum. The recommended volume of excavation is 860 ft^3/acre of upgradient ground disturbed.
- To achieve maximum trapping efficiency, the longest dimension of the basin should be oriented toward the longest inflow area.
- Open ends of the block should face outward, not upward, with the ends of adjacent blocks abutting.
- On each side of the structure, lay one block on its side to allow for dewatering (BMP 73) of the pool if needed.
- The block barrier should be 1 to 2 feet high. Depending on block dimensions, the barrier may be placed 4 to 12 inches deep.
- Secure the inlet grate to prevent seepage of sediment-laden water.
- Place wire mesh over the drop inlet so the wire extends a minimum of 12 to 20 inches beyond each side of the inlet structure. Overlap the strips of mesh if more than one is necessary.

- Place filter fabric (optional) over the mesh and extend it at least 20 inches beyond the inlet structure.
- Place concrete blocks over the filter fabric in a single row lengthwise on their sides and flush with the edge of the inlet. Excavate the foundation a minimum of 2 inches below the crest of the inlet. The bottom row of blocks should be against the edge of the structure for lateral support.
- Before backfilling, place wire mesh over the outside vertical end of the blocks so that stone does not wash down the inlet.
- Place gravel against the wire mesh to the top of the blocks.

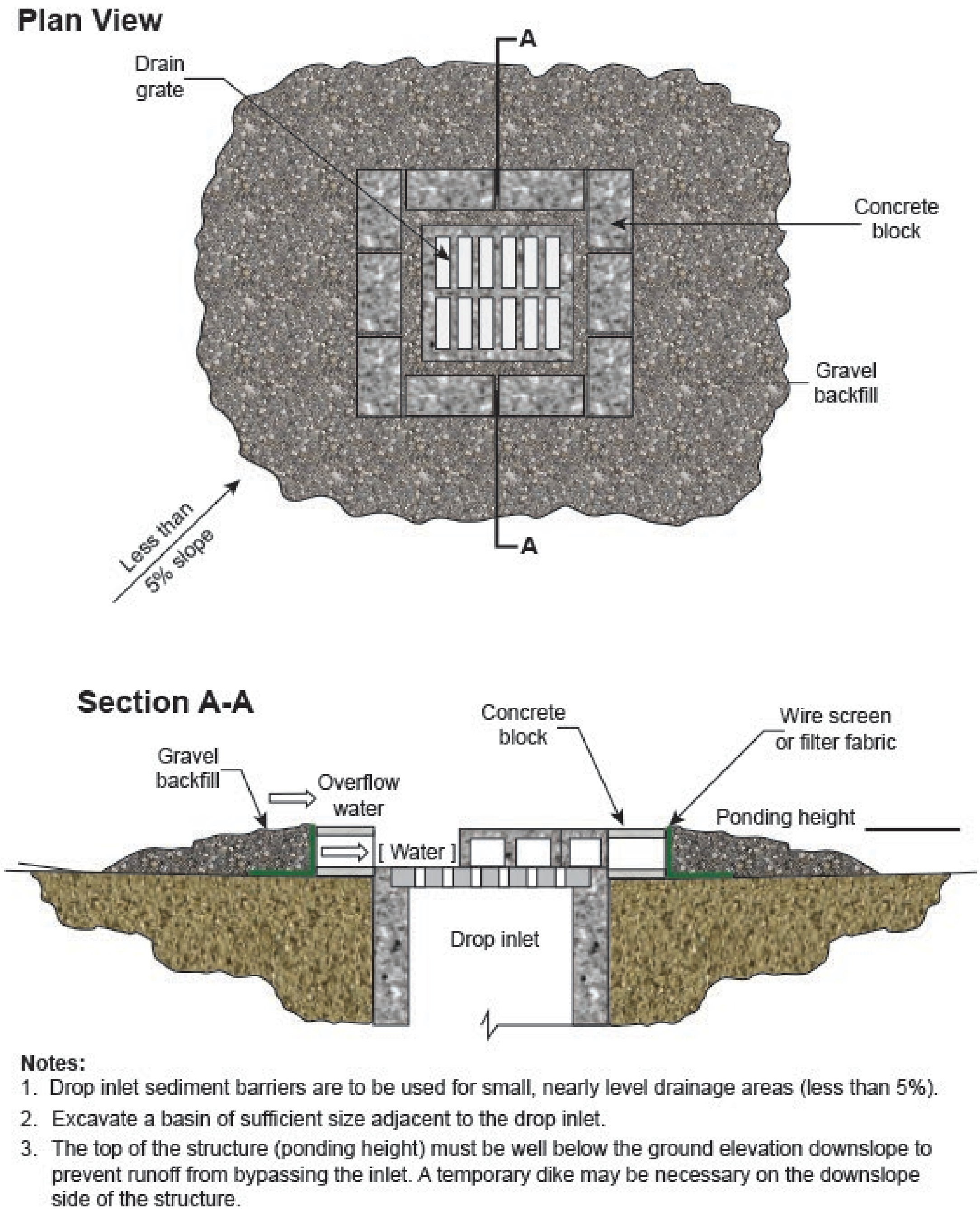


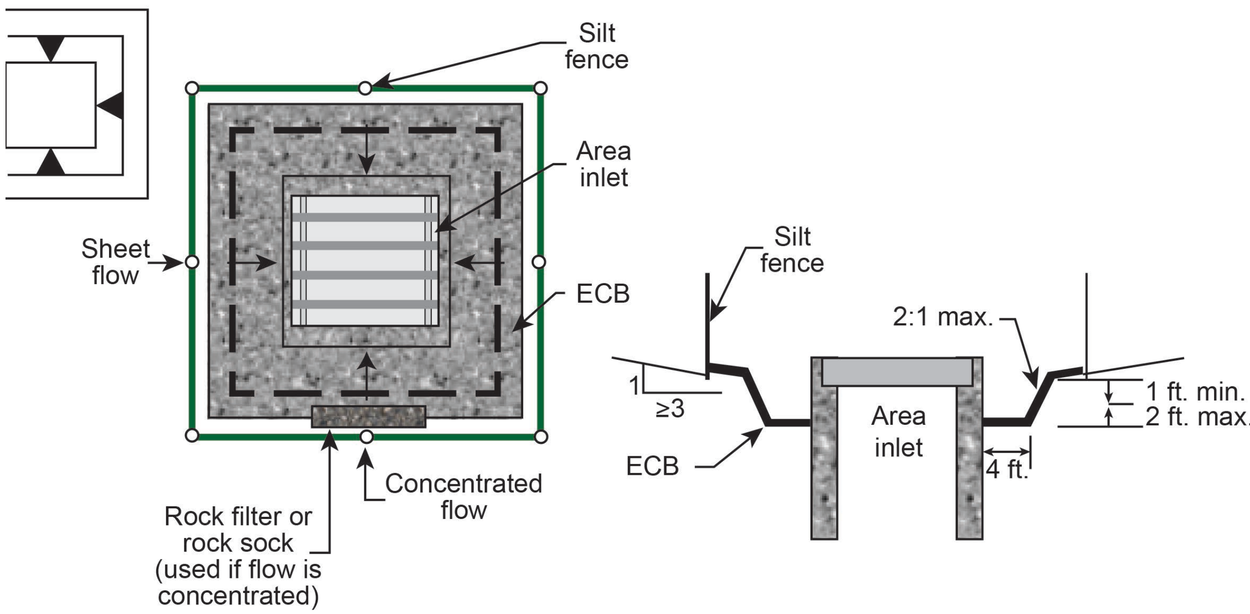
Figure 184. Block and gravel filter (King County 2009).

Swale or Overexcavation Inlet Protection

Swale or overexcavations around an inlet create a sediment-trapping pool that removes sediments by settling and/or flow through a drainage structure protected by filter fabric.

- Excavate completely around inlet to a depth of 1 to 2 feet below notch elevation.
- If the inlet is not in a low point, construct a diversion dike (BMP 69) in the ditch line below it. The top of the dike must be at least 6 inches higher than the top of frame (weir).

- Drive a 2- x 4-inch post 1 foot into the ground at four corners of the inlet. Place nail strips between posts on the ends of the inlet. Assemble the top portion of the 2 x 4 frame using overlap joint shown in Figure 185. The top of frame (weir) should be 6 inches below the edge of the roadway or diversion dike (BMP 69) adjacent to inlet.
- Stretch wire mesh tightly around frame and fasten securely. Ends should meet at the post.
- Stretch the filter cloth tightly over the wire mesh, extending the cloth from top of the frame to 18 inches below the inlet notch elevation. Fasten securely to the frame. Ends should meet at the post, overlapped and folded, and fastened down.
- Backfill around the inlet in compacted 6-inch layers until the layer of earth is even with the notch elevation on the ends and top elevation on the sides.



IP-5. Overexcavation Inlet Protection

Instalation Notes:

1. This form of inlet protection is pimarily applicable for sites that have not yet reached final grade and should be used only for inlets with a relatively small contributing drainage area.
2. When using for concentrated flows, shape basin 2:1 ratio with length oriented towards direction of flow.
3. Sediment must be periodically removed from the overexcavated area.

Figure 185. Overexcavation inlet protection (Colorado UDFCD 2010).

Curb Inlet Protection

- Place a layer of washed stone in front of a curb inlet to filter runoff before entering the inlet.
- Attach a continuous piece of wire mesh to the 2 x 4 weir (measuring throat length plus 2 feet to either side) as shown in (Figure 186).
- Place a piece of approved filter cloth (such as 40–85 sieve) of the same dimensions as the wire mesh over the wire mesh and securely attach to the 2 x 4 weir.

- Securely nail the 2 x 4 weir to 9-inch long vertical spacers located between the weir and inlet face (maximum 6 feet apart).
- Place the assembly against the inlet throat and nail (minimum 2 feet) lengths of 2 x 4 to the top of the weir at the spacer locations. These 2 x 4 anchors should extend across the inlet top and be held in place by gravel-filled bags or alternate weight.
- Place the assembly so the end spacers are a minimum of 1 foot beyond both ends of the throat opening.
- Form the wire mesh and filter cloth to the concrete gutter and against the face of curb on both sides of the inlet. Place clean 2-inch stone over the wire mesh and filter fabric to prevent water from entering the inlet under or around the filter cloth.
- Ensure storm flow does not bypass inlet by installing temporary earth or asphalt dikes directing flow into inlet.

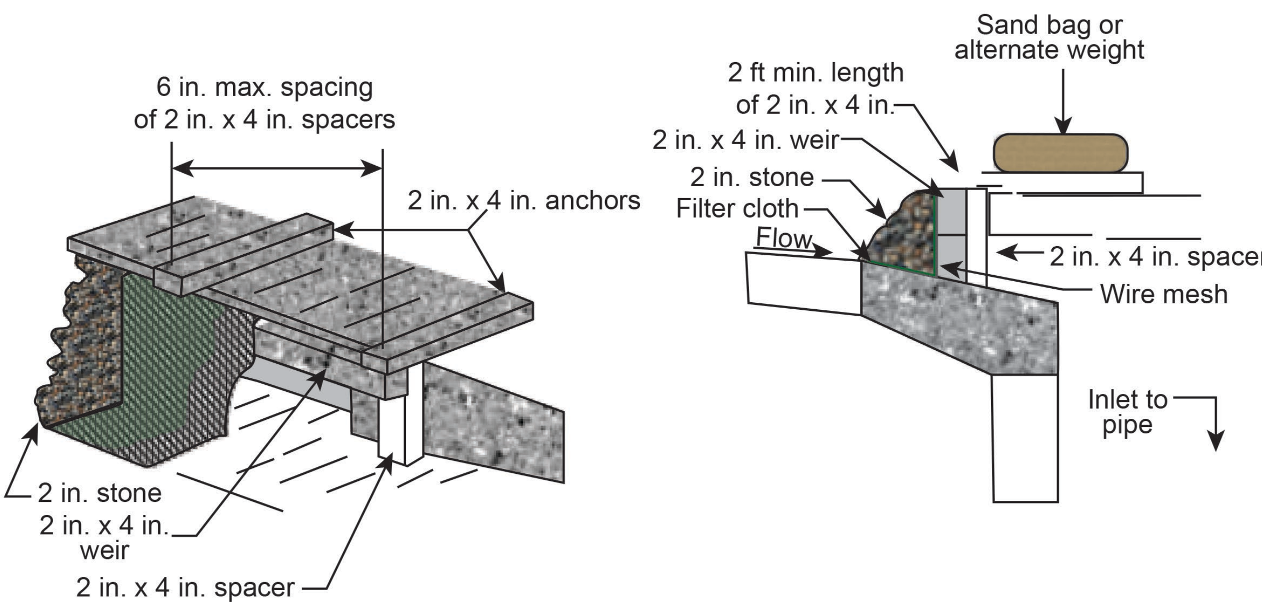


Figure 186. Curb inlet protection detail.

Rock Sock Inlet Protection

Rock socks are bags filled with washed gravel that can be placed around a sump inlet as shown in Figure 187.

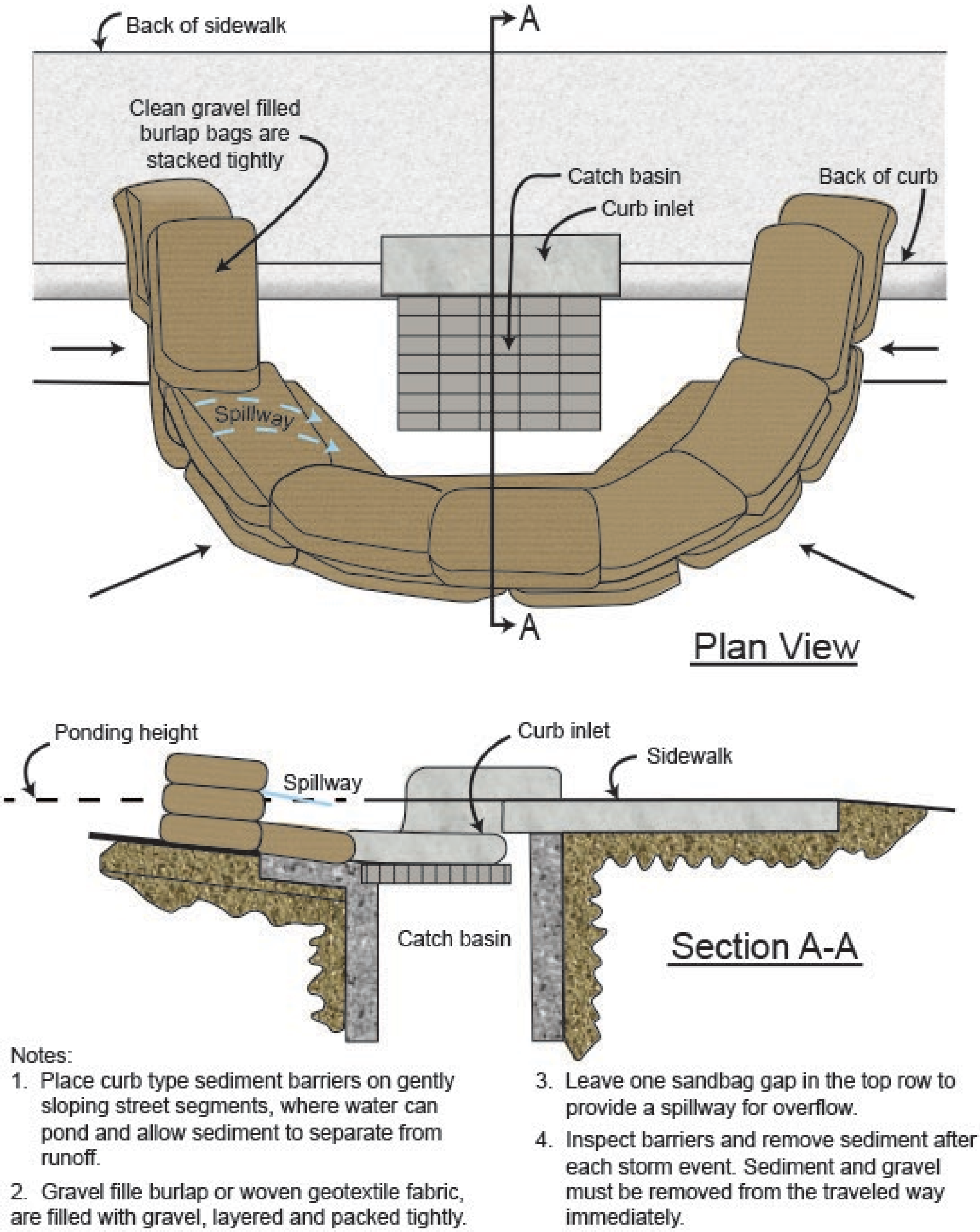


Figure 187. Rock sock inlet protection.

Construction Guidelines

Inlet protection devices should be installed around existing inlets before earth-disturbing activities begin. The type of inlet protection selected should consider if freezing conditions might be experienced during its use. Inspections and field adjustments may be necessary to ensure proper installation and performance.

Inlet protection should remain in place and operational up to 30 days after the drainage area is completely stabilized. Unless cleaned for reuse as a permanent site control or cleaned and left to biodegrade, all inlet inserts should be removed after construction is completed (or after site stabilization is established).

Maintenance

Inspect regularly and after every storm. Make any repairs necessary to ensure inlet protection measures are in good working order. Check for tears in filter fabric that allow untreated sediment-laden runoff to enter into the inlet.

Remove accumulated sediment and restore the trap to its original dimensions when sediment has accumulated to half the design depth of the trap. Remove sediment accumulations located upstream of inlet protection to maintain effectiveness. All sediments removed should be disposed of properly. On gravel-and-mesh devices, clean (or remove and replace) the stone filter if it becomes clogged.

Replace inlet inserts per manufacturer's instructions or when device no longer drains. At no time should devices be punctured or otherwise modified to bypass flows.

Additional Resources

CASQA (California Stormwater Quality Association). 2015. *California Stormwater Best Management Practices Handbook: Construction.* Menlo Park, CA. *http://www.casqa.org/*.

Colorado UDFCD (Colorado Urban Drainage and Flood Control District). 2010. *Urban Storm Drainage Criteria Manual, Volume 3 Best Management Practices*. Denver, CO. *http://udfcd.org/wp-content/uploads/2014/07/Title-Page.pdf*

EPA (US Environmental Protection Agency). 2011. *Storm Drain Inlet Protection*. *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater-documents*

Hazra and ODOT (Hazra Engineering Company and Oregon Department of Transportation, Geo/Environmental Section). 2005. *ODOT Erosion Control Manual: Guidelines for Developing and Implementing Erosion and Sediment Controls.*

ITD (Idaho Transportation Department). 2014. *Best Management Practices.* Boise, ID: ITD.

Appendix E: Non-Stormwater Discharge Evaluation (EF-029A)

Appendix E
Non-Stormwater Discharge Evaluation Form (EF-029A)

By the end of the first year of permit coverage (2021), all discharge points at Perpetua shall be evaluated for any presence of unauthorized non-stormwater discharges.

Non-Stormwater Discharge Evaluation Form	
Date of Evaluation:	
Description of Evaluation Criteria Used:	
Discharge Points Inspected:	
Description of Unauthorized Non-Stormwater Discharges Found:	
If Unauthorized Discharges found, describe action(s) taken to immediately correct: *Utilize the Corrective Action Form (EF-029F) in Appendix H as needed.*	
Evaluator Name / Title:	
Evaluation Signature:	

Appendix F: Routine Visual Inspection Form (EF-029B), Control Measure Inspection Form (EF-029C), Visual Assessment Monitoring Form (EF-029D)

Appendix F
Routine Visual Inspection Form (EF-029B)

GENERAL INFORMATION:
Inspection Date and Time:
Inspector(s) Name / Title:
Inspection Type: ☐ Quarterly Routine ☐ Construction (type:)
DISCHARGE AND WEATHER INFORMATION
Is a stormwater discharge occurring (i.e. a “measurable storm event”)? ☐ Yes ☐ No
If so, select storm event type: ☐ Rain event ☐ Snowmelt
Provide a description of any discharges occurring:
Provide a description of weather conditions:

CONTROL MEASURE INSPECTION		
Structural Control Measure	**Operating Effectively?**	**If no, in need of maintenance, repair, or replacement?**
Refer to Control Measure Inspection Form for entire list – any additional control measures not listed there, document here		
	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No	☐ Yes ☐ No
Notes:		

OUTFALL INSPECTION			
Outfall Name	**Location**	**Inspected?**	**Adequate Condition?**
001	North side of Camp Facility Area	☐ Yes ☐ No	☐ Yes ☐ No
002	West of Office Area, prior to seep	☐ Yes ☐ No	☐ Yes ☐ No
003	Northeast of Hangar, down hillside from road	☐ Yes ☐ No	☐ Yes ☐ No
004	Northeast of Hangar, down hillside from road	☐ Yes ☐ No	☐ Yes ☐ No
Notes:			

DRILL SITE INSPECTION (if none active, indicate N/A)			
Site ID	**Location**	**Inspected?**	**Control Measures Sufficient?**

POTENTIAL POLLUTANT SOURCE INSPECTION (if not present, indicate N/A)			
Potential Source	**Map ID**	**Inspected?**	**Control Measures Sufficient?**
Diesel Fuel	1	☐ Yes ☐ No	☐ Yes ☐ No
Gasoline	2	☐ Yes ☐ No	☐ Yes ☐ No
Drinking Water Treatment	3	☐ Yes ☐ No	☐ Yes ☐ No
Wastewater Treatment and Reuse	4	☐ Yes ☐ No	☐ Yes ☐ No
Used Oil Transfer / Storage	5	☐ Yes ☐ No	☐ Yes ☐ No
Sediment	6	☐ Yes ☐ No	☐ Yes ☐ No
Jet A, Diesel Fuel	7	☐ Yes ☐ No	☐ Yes ☐ No
Oils, Greases, Fuel (Maintenance)	8	☐ Yes ☐ No	☐ Yes ☐ No
Sanitary Waste	9	☐ Yes ☐ No	☐ Yes ☐ No
Diesel Fuel (generator)	10	☐ Yes ☐ No	☐ Yes ☐ No
Core Cuttings	11	☐ Yes ☐ No	☐ Yes ☐ No
Diesel Fuel (generator)	12	☐ Yes ☐ No	☐ Yes ☐ No
Sediment and gravel (drill pad)	13	☐ Yes ☐ No	☐ Yes ☐ No
Drilling equipment	14	☐ Yes ☐ No	☐ Yes ☐ No
Construction Staging Areas	15	☐ Yes ☐ No	☒ Yes ☐ No
Access Road Construction	16	☐ Yes ☐ No	☐ Yes ☐ No
Sediment (Borrow Pit)	17	☐ Yes ☐ No	☐ Yes ☐ No

Any Unidentified Potential Pollutant Sources? ☐ **Yes** ☐ **No**			
Location:		**Description:**	
Location:		**Description:**	
Location:		**Description:**	
Location:		**Description:**	

Any Unidentified Discharges of Pollutant Sources? ☐ **Yes** ☐ **No**			
Location:		**Description:**	
Location:		**Description:**	
Location:		**Description:**	
Location:		**Description:**	
Location:		**Description:**	

[1]**Conditions Requiring Corrective Action**
Were any of the following conditions observed: ▪ An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by the MSGP or another NPDES permit to a water of the United States) occurred? ▪ Stormwater control measures are not stringent enough for the stormwater discharge to be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards or to meet the non-numeric effluent limits? A required control measure was never installed, was installed incorrectly, or not in accordance with the MSGP, or is not being properly operated or maintained?
Any incidents of non-compliance?
General Comments, Routine Maintenance:
CORRECTIVE ACTION INFORMATION:
If any of the conditions described in Footnote 1 above were observed, corrective action is required to be taken in accordance with Section 6.2-6.4 and documented on the related Corrective Action form in Appendix H of the SWPPP within **24-hours of discovery** of the condition.
SWPPP UPDATES
If construction or a change in design, operation, or maintenance at the facility occurs that significantly changes the nature of pollutants discharged via stormwater, or significantly increases the quantity of pollutants discharged, the facility shall review the SWPPP (e.g., sources of pollution, spill and leak procedures, non-stormwater discharges, selection, design, installation and implementation of your stormwater control measures) to determine if modifications are necessary to meet the effluent limits in the MSGP. Describe any changes to the facility and required SWPPP updates:
INSPECTION CERTIFICATION:
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."
Inspector(s) Signature(s):

Appendix F

Control Measure Inspection Form (EF-029C)

NOTE: This inspection form is a dynamic document and is updated frequently to capture current site conditions. Therefore, the EF-029C that is included in this SWPPP version is current as of the date listed in the footer of the Form. The revision date of only EF-029C is tracked within the form itself rather than within *Table 1, SWPPP Modifications,* (above) to avoid adding a significant number of revision entries.

To view the most recently updated EF-029C, refer to the Environmental Files.

BMP Control Measures Inspection Report (Form EC-029C)

General Information

Project Name	Stibnite Gold Project
Project Location	Stibnite, ID
NPDES Tracking Number	IDR053133
Date(s) of Inspection	
Start/End Time	
Inspector's Name(s)	
Inspector's Title(s)	
Inspector's Email	
Inspector's Qualifications	
Describe present phase of construction	Large mineral exploration program encompassing approximately 4400 meters north-south & 2400 meters east-west, & including 4 major exploration areas.
Type of Inspectio	

Weather Information
Has there been a storm event since the last inspection? Y / N
Storm start date and time:
See attached weather data for temperature and precipitation amounts.
Weather at time of Inspection:
Have any previously unidentified discharges of pollutants occurred since the last inspection? Y / N
If yes, describe:
Have any discharges occurred since last inspection? Y / N
If yes, describe:
Are there any discharges at the time of inspection? Y / N
If yes, describe:

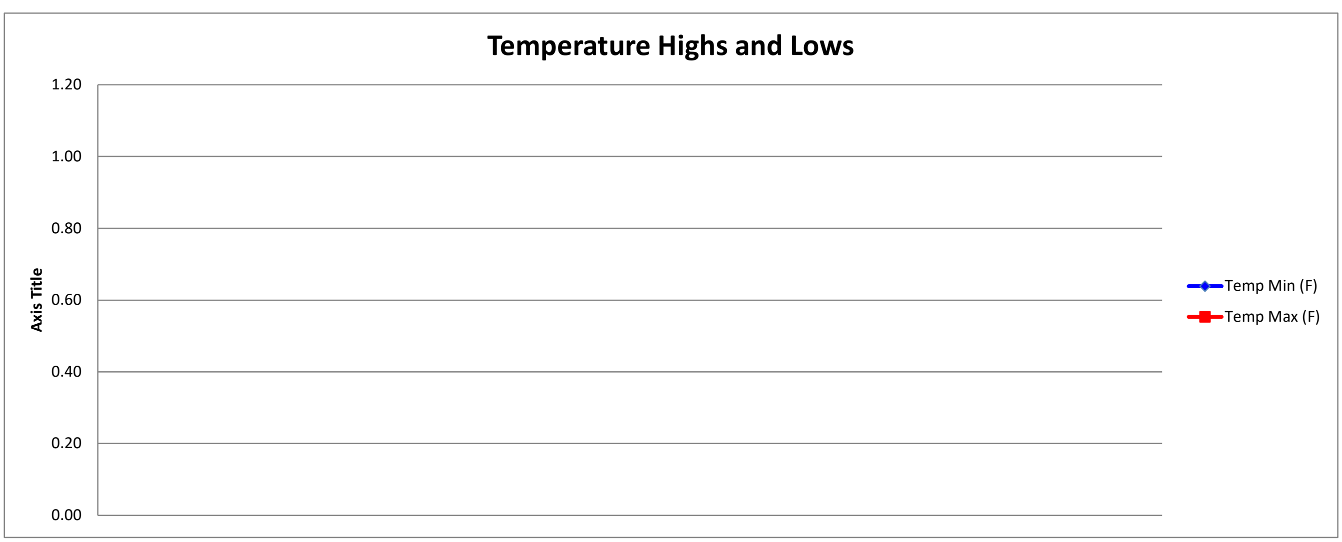
Table 3-1: IDEQ Control Measure List

BMP Fact Sheet #	Description
General Control Measures for Earth Disturbing Activities and Construction	
36	Construction Timing
37	Staging Areas
38	Preserve Topsoil and Vegetation
39	Clearing Limits
40	Vehicle Sediment Control
41	Stabilized Construction Roads and Staging Areas
42	Erosion Prevention on Construction Roads
Good Housekeeping	
43	Dust Control
44	Stockpile Management
46	Spill Prevention and Control
47	Construction Equipment Washing and Maintenance
48	Hazardous Materials Management
49	Concrete Waste Management
50	Sanitary and Septic Waste Management
Slope Protection and Stabilization	
52	Mulching
53	Geotextile
54	Matting
55	Soil Binders
31	Topsoiling
32	Landscaping
58	Slope Roughening
59	Gradient Terracing
Channel Protection	
61	Channel Liners
56	Riprap Slope Protection
74	Inlet Protection
60	Check Dams
62	Temporary Stream Crossing
Sediment Collection and Runoff Diversion	
63	Biofilter Bags
64	Fiber Rolls
65	Silt Fence
11	Vegetative Filter Strip
66	Sedimentation Basins and Traps
67	Portable Sediment Tank
68	Temporary Swale
69	Diversion Dike
70	Temporary Berms

Weather Information

Date	Rain Total (in)	Temp Min (F)	Temp Max (F)
	Total rainfall	**Average Min**	**Average Max**
	0	#DIV/0!	#DIV/0!

* Error means that there is no weather data avaliable or only part of the day was recorded by the machine due to maintence on the machine or other technical issues.



CERTIFICATION STATEMENT

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

Print Name & Title:

Signature:

Print Name & Title:

Signature:

Print Name & Title:

Signature:

BMP #	Maintenance or Corrective Action	Description of Work to be Completed	Date Identified	Date Completed

Please describe any of the following: incidents of noncompliance, discharges, additional controls needed, and major projects done to control storm water.

Location: Drill Pads

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	GW-25	631912	4974298	Drill Pad	2023		
2	GW-30	631845	4974254	Drill Pad	2023		
3	GW-27	631816	4974145	Drill Pad	2023		
4	GW-24	631878	4974027	Drill Pad	2023		
5	GW-31	632127	4973926	Drill Pad	2023		
6	GW-5	630664	4972350	Drill Pad	2023		
7	GW-6	630891	4972445	Drill Pad	2023		
8	GW-28	631952	4973932	Drill Pad	2023		
9	GW-33A	631884	4973281	Drill Pad	2023		
10	GW-33B	631884	4973281	Drill Pad	2023		
11	GW-39B	631291	4977054	Drill Pad	2023		
12	GW-40B	631213	4976965	Drill Pad	2023		
13	POC-1A	630841	4977345	Drill Pad	2023		
14	POC-1B	630841	4977345	Drill Pad	2023		
15	DOTC-10-21	631215	4973059	Drill Pad	2023		
16	DOTC-11-64	631611	4976634	Drill Pad	2023		
17	DOTC-11-70	631594	4976664	Drill Pad	2024		
18	DOTC-12-192	631172	4973564	Drill Pad	2023		
19	DOTC-12-193	631238	4973066	Drill Pad	2023		
20	DOTC-12-203	631302	4973117	Drill Pad	2024		
21	DOTC-12-345	632128	4973928	Drill Pad	2023		
22	DOTC-12-349	631086	4973005	Drill Pad	2023		
23	PRI-24-532	631915	4974054	Drill Pad	2024		
24	PRI-24-533	631972	4974120	Drill Pad	2024		
25	PRI-24-534	631968	4974081	Drill Pad	2024		
26	PRI-24-535	631919	4974108	Drill Pad	2024		
27	PRI-24-536	631862	4974220	Drill Pad	2024		
28	PRI-24-537	631872	4974324	Drill Pad	2024		
29	PRI-24-538	631905	4974298	Drill Pad	2024		
30	PRI-24-539	631871	4974271	Drill Pad	2024		
31	PRI-24-540	631860	4973444	Drill Pad	2024		
32	PRI-24-541	631948	4974308	Drill Pad	2024		
33	PRI-24-542	632057	4973924	Drill Pad	2024		
34	PRI-24-543	631959	4973982	Drill Pad	2024		
35	PRI-24-544	631996	4973910	Drill Pad	2024		
36	PRI-24-545	632104	4973962	Drill Pad	2024		
37	PRI-24-546	632026	4973958	Drill Pad	2024		
38	PRI-24-547	631895	4974091	Drill Pad	2024		
39	PRI-24-548	631944	4974112	Drill Pad	2024		
40	PRI-24-549	632041	4974083	Drill Pad	2024		
41	PRI-24-550	632039	4973902	Drill Pad	2024		
42	PRI-24-551	631967	4974044	Drill Pad	2024		
43	PRI-24-552	631927	4974016	Drill Pad	2024		
44	PRI-24-553	632078	4974021	Drill Pad	2024		
45	PRI-24-554	632007	4974005	Drill Pad	2024		
46	PRI-24-555	631942	4974256	Drill Pad	2024		
47	PRI-24-556	631924	4974217	Drill Pad	2024		
48	PRI-24-557	631867	4974210	Drill Pad	2024		
49	PRI-24-558	631880	4974189	Drill Pad	2024		
50	PRI-24-559	631852	4974160	Drill Pad	2024		
51	PRI-24-560	631820	4974192	Drill Pad	2024		
52	PRI-24-561	631792	4974219	Drill Pad	2024		
53	PRI-24-562	631839	4974252	Drill Pad	2024		

Location: Drill Pads

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting	Y Northing	BMP	Date	Maintenance	Corrective Action Needed and Notes
54	PRI-24-563	632584	4976992	Drill Pad	2024		
55	PRI-24-564	632572	4976895	Drill Pad	2024		
56	PRI-24-565	631823	4974296	Drill Pad	2024		
57	PRI-24-566	631852	4974321	Drill Pad	2024		
58	PRI-24-567	632527	4976953	Drill Pad	2024		
59	PRI-24-568	632596	4976953	Drill Pad	2024		
60	PRI-24-569	632573	4976932	Drill Pad	2024		
61	PRI-24-570	632558	4976953	Drill Pad	2024		
62	PRI-24-571	632510	4976985	Drill Pad	2024		
63	PRI-24-572	632547	4976989	Drill Pad	2024		
64	WE Sonic	632640	4976961	Temp. road	2024		

Location: West End

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	WE-01	631735	4976510	War bar and sed trap	2024		
2	WE-02	631749	4976539	War bar and sed trap	2024		
3	WE-03	631786	4976577	Rolling dip and sed trap	2024		
4	WE-04	631819	4976604	Rolling dip	2024		
5	WE-05	631910	4976683	Rolling dip	2024		
6	WE-06	632030	4976762	Rolling dip	2024		
7	WE-07	632126	4976838	Rolling dip	2024		
8	WE-08	632266	4976937	War bar and sed trap	2024		
9	WE-09	632266	4976937	Road dip and sed trap	2024		
10	WE-10	632348	4977000	Road dip and sed trap	2024		
11	WE-11	632406	4976948	Roadside ditch	2024		
12	WE-12	632554	4976748	Roadside ditch	2024		
13	WE-13	632663	4976621	Roadside ditch w/ sed trap	2024		
14	WE-14	632702	4976588	Drainage ditch	2024		

Location: Homestake

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	HS-01	631367	4977043	Water bar and sed trap	2024		
2	HS-02	631423	4977011	Water bar and sed trap	2024		
3	HS-03	631402	4976980	Water bar and sed trap	2024		
4	HS-04	631320	4976980	Borrow ditch	2024		
5	HS-05	631393	4976913	Water bar and sed trap	2024		
6	HS-06	631431	4976921	Water bar and sed trap	2024		
7	HS-07	631413	4976888	2 water bars and sed trap	2024		
8	HS-08	631453	4976883	Water bar and 2 sed traps	2024		
9	HS-09	631498	4976879	Water bar and sed trap	2024		
10	HS-10	631550	4976873	Water bar and sed trap	2024		
11	HS-11	631588	4976873	Water bar and sed trap	2024		
12	HS-12	631607	4976876	Water bar and sed trap	2024		
13	HS-13	631634	4976881	Water bar, ditch, and sed trap	2024		
14	HS-14	631662	4976877	2 sed traps on inside corner	2024		
15	HS-15	631764	4976925	Settling ponds	2024		
16	HS-16	631631	4976844	Water bar and sed trap	2024		
17	HS-17	631564	4976816	Water bar and sed trap	2024		
18	HS-18	631521	4976800	Water bar and sed trap	2024		
19	HS-19	631538	4976779	Water bar and sed trap	2024		
20	HS-20	631572	4976786	Water bar and sed trap	2024		
21	HS-21	631617	4976789	Water bar and sed trap	2024		
22	HS-22	631659	4976781	Water bar and sed trap	2024		
23	HS-23	631705	4976769	Water bar and sed trap	2024		
24	HS-24	631811	4976766	Settling pond and drainage ditch	2024		
25	HS-25	631693	4976726	Water bar and sed trap	2024		

Location: Homestake

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
26	HS-26	631662	4976662	Water bar and sed trap	2024		
27	HS-27	631592	4976663	Super sump	2024		
28	HS-28	631679	4976572	Water bar and sed trap	2024		
29	HS-29	631690	4976520	Water bar and sed trap	2024		
30	HS-30	631702	4976495	Water bar	2024		
31	HS-31	631407	4976777	Water bar and sed trap	2024		
32	HS-32	631414	4976751	Water bar and sed trap	2024		
33	HS-33	631460	4976604	Water bar and sed trap	2024		
34	HS-34	631464	4976571	Water bar and sed trap	2024		
35	HS-35	631504	4976436	Highwall ditch	2024		

Location: Stibnite Road

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	SR-01	631336	4977145	Roadside ditch and sed trap	2024		
2	SR-02	631301	4977045	Roadside ditch and sed trap	2024		
3	SR-03	631291	4977003	Roadside ditch and sed trap	2024		
4	SR-04	631243	4976994	Culvert and sed traps	2024		
5	SR-05	631191	4977062	Roadside ditch	2024		
6	SR-06	631125	4977101	Slight rolling dip and sed trap	2024		
7	SR-07	630887	4977174	Ditch outlet	2024		
8	SR-08	631905	4977044	Roadside ditch and outlet	2024		
9	SR-09	631105	4976899	Ditch, water bar, and sed trap	2024		
10	SR-10	631986	4976834	Rolling dip and roadside ditch	2024		
11	SR-11	631103	497653	Roadside ditch and sed trap	2024		
12	SR-12	631130	4976519	Rolling dip	2024		
13	SR-13	631169	4976417	Roadside ditches	2024		
14	SR-14	631187	4976779	Roadside ditch and outlet	2024		
15	SR-15	631173	4976208	Roadside ditch	2024		
16	SR-16	631185	4976136	Roadside ditch +?	2024		
17	SR-17	631237	4975903	Roadside ditch	2024		
18	SR-18	631440	4975680	Roadside ditch	2024		
19	SR-19	631576	4975483	Roadside ditch and sed trap	2024		
20	SR-20	631618	4975433	Roadside ditch into french drain	2024		
21	SR-21	631762	4975224	Culvert	2024		
22	SR-22	631711	4974979	Culvert	2024		
23	SR-23	631710	4974728	Culvert	2024		
24	SR-24	631706	4974559	Culvert	2024		
25	SR-25	631656	4974298	Culvert and settling pond	2024		
26	SR-26	631744	4973936	Roadside ditch and sed trap	2024		
27	SR-27	631780	4973914	Culvert	2024		
28	SR-28	631792	497387	Culvert	2024		
29	SR-29	631804	4973865	Roadsid ditch and sed trap	2024		
30	SR-30	631822	4973764	Roadsid ditch and sed trap	2024		
31	SR-31	631834	4973690	Long sed trap	2024		
32	SR-32	631866	4973664	Drainage ditch, culvert, and sed trap	2024		
33	SR-33	632051	4973615	Roadside ditch	2024		
34	SR-34	632089	4973578	Roadside ditch, culvert, and sed trap	2024		
35	SR-35	632231	4973503	Roadside ditch	2024		
36	SR-36	632063	4973569	New diversion ditch	2024		

Location: Yellow Pine Pit

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	YP-01	631111	4976864	Water bar and sed trap	2024		
2	YP-02	631113	4976851	Water bar and sed trap	2024		
3	YP-03	631123	4976793	Water bar	2024		
4	YP-04	631135	4976775	Water bar and sed trap	2024		
5	YP-05	63187	4976691	Water bar and sed trap	2024		
6	YP-06	631227	4976658	Water bar and sed trap	2024		
7	YP-07	631236	4976647	Water bar and sed trap	2024		
8	YP-08	631248	4976632	Water bar and sed trap	2024		
9	YP-09	631255	4976619	Water bar and sed trap	2024		
10	YP-10	631264	4976601	Water bar and sed trap	2024		
11	YP-11	631274	497658	2 water bars and sed trap	2024		
12	YP-12	631291	4976575	Water bar and sed trap	2024		
13	YP-13	631317	4976568	Water bar and sed trap	2024		
14	YP-14	631366	4976442	Water bar and sed trap	2024		
15	YP-15	631420	4976385	Under road pipe	2024		

Location: DMEA

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	DM-01	631651	4974336	Water bar and sed trap	2024		
2	DM-02	631651	4974362	Water bar and sed trap	2024		
3	DM-03	631650	4974379	Water bar and sed trap	2024		
4	DM-04	631628	4974379	Water bar and sed trap	2024		
5	DM-05	631617	4974358	Water bar and sed trap	2024		
6	DM-06	631600	4974328	Water bar and sed trap	2024		
7	DM-07	631589	4974265	Stream crossing and silt fence	2024		
8	DM-08	631591	4974259	Water bar	2024		
9	DM-09	631586	4974245	Water bar and sed trap	2024		
10	DM-10	631582	4974197	Water bar and sed trap	2024		
11	DM-11	631588	4974153	Water bar and sed trap	2024		
12	DM-12	631588	4974342	Water bar and sed trap	2024		
13	DM-13	631578	4974370	Water bar and sed trap	2024		
14	DM-14	631563	4974387	Water bar and sed trap	2024		
15	DM-15	631546	4974406	Water bar and sed trap	2024		
16	DM-16	631540	4974412	Culvert	2024		
17	DM-17	631548	4974450	Water bar and sed trap	2024		
18	DM-18	631546	4974471	Water bar and sed trap	2024		
19	DM-19	631540	4974506	Water bar and sed trap	2024		
20	DM-20	631531	4974537	Water bar and sed trap	2024		
21	DM-21	631518	4974577	Water bar and sed trap	2024		
22	DM-22	631507	4974607	Water bar	2024		
23	DM-23	631495	4974642	Water bar	2024		
24	DM-24	631465	4974643	Water bar	2024		
25	DM-25	631445	4974731	Water bar and sed trap	2024		
26	DM-26	631430	4974769	Water bar and sed trap	2024		
27	DM-27	631414	4974806	Water bar, berm, and sed trap	2024		
28	DM-28	631407	4974791	Water bar and sed trap	2024		
29	DM-29	631401	4974758	Water bar and sed trap	2024		

Location: DMEA

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
30	DM-30	631402	4974732	Water bar and sed trap	2024		
31	DM-31	631399	4974680	Water bar and sed trap	2024		
32	DM-32	631384	4974603	Water bar and sed trap	2024		
33	DM-33	631370	4974629	Water bar and sed trap	2024		
34	DM-34	631337	4974682	Water bar and sed trap	2024		
35	DM-35	631232	4974682	Water bar and sed trap	2024		
36	DM-36	631317	4974578	Water bar and sed trap	2024		
37	DM-37	631295	4974526	Water bar	2024		
38	DM-38	631208	4974494	Water bar	2024		
39	DM-39	631208	4974450	Water bar and sed trap	2024		
40	DM-40	631211	4974329	Water bar and sed trap	2024		
41	DM-41	631167	4974287	Water bar	2024		
42	DM-42	631145	4974267	Water bar	2024		
43	DM-43	631103	4974232	Water bar	2024		
44	DM-44	631080	4974197	Water bar	2024		
45	DM-45	631058	4974159	Water bar and sed trap	2024		
46	DM-46	631057	4974100	Water bar	2024		
47	DM-47	631062	4974067	Water bar and sed trap	2024		
48	DM-48	631114	4973988	Water bar and sed trap	2024		
49	DM-49	63143	4973890	Water bar and sed trap	2024		
50	DM-50	631197	4973740	Water bar	2024		
51	DM-51	631229	4973660	Water bar and sed trap	2024		
52	DM-52	631292	4973568	Water bar	2024		
53	DM-53	631257	4973562	Water bar	2024		
54	DM-54	631232	4973558	Water bar	2024		

Location: Helipad, Hangar, and Driller's Laydown

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	MY-01	631867	4973623	2 half-culverts and ditch at ephemeral stream crossing	2024		
2	MY-02	631920	4973541	Culvert and sed trap	2024		
3	MY-03	631901	4973496	Generator containments and frac tank piping	2024		
4	MY-04	631874	4973528	Generator containment	2024		
5	MY-05	631877	4973483	Ephemeral stream diverted around helipad	2024		
6	MY-06	631877	4973482	Fuel storage	2024		
7	MY-07	631856	4973475	Generator containment/lightp lant	2024		
8	MY-08	631901	4973476	Sanitary waste management (porta-pots)	2024		
9	MY-09	631828	4973624	Borrow ditch	2024		
10	MY-10	631820	4973648	Sed trap	2024		

Location: Repository, Airstrip, and Hangar Flats

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	HF-01	631679	4973173	Repository interceptor ditch and basin	2024		
2	HF-02	631634	4973275	Hillside ditch	2024		
3	HF-03	631454	4973063	Leroy's Lake	2024		
4	HF-04	631511	4973047	Culvert and sed trap	2024		
5	HF-05	631825	4973260	Sed ponds and airstrip ditch	2024		
6	HF-06	631616	4973082	Lake tank, piping, evap pond, and generator containment	2024		
7	HF-07	631502	4973005	Water well, generator containment	2024		
8	HF-08	631478	4973018	Culvert	2024		
9	HF-09	631318	4972908	Culvert, ditch, and sed trap	2024		
10	HF-10	631131	4972828	Water bar	2024		
11	HF-11	631090	4972823	Water bar	2024		
12	HF-12	631023	4972862	Water bar, sed trap, and drainage ditch	2024		
13	HF-13	631040	4972891	Water bar and sed trap	2024		
14	HF-14	631050	4972908	Water bar and sed trap	2024		
15	HF-15	631046	4972951	Mulch pile	2024		
16	HF-16	631177	4973039	Sed trap	2024		
17	HF-17	631201	4973046	Super sump	2024		
18	HF-18	631291	4973098	Ditch and sed trap	2024		
19	HF-19	631171	4972826	Sed traps and HECLA ditch	2024		
20	HF-20	631110	4972805	Culvert and ditch	2024		
21	HF-21	630909	4972696	Dual culverts	2024		
22	HF-22	630834	4972629	Culvert and sed pond	2024		

23	HF-23	631393	4973135	Diversion borrow ditch	2024		

Location: Shop and Camp

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	SC-01	632068	4974019	Fuel storage area	2024		
2	SC-02	632075	4974014	Solid waste management (dumpsters)	2024		
3	SC-03	632077	4973998	Sanitary waste management (porta-pots)	2024		
4	SC-04	632054	4974014	Generator containments	2024		
5	SC-05	632072	4973965	French drain and drainage swale	2024		
6	SC-06	632062	4973990	Fuel storage area	2024		
7	SC-07	632051	4973957	Parking ditch and sed trap	2024		
8	SC-08	632076	4973841	Sanitary waste management (porta-pots)	2024		
9	SC-09	632084	4973891	Perimeter ditch	2024		
10	SC-10	632039	4973811	Garnet Cr. Culvert	2024		
11	SC-11	632037	4973868	Culvert and ditch	2024		
12	SC-12	632014	4973964	Water bar and sed trap	2024		
13	SC-13	632013	4973978	Ditch, Outfall-002, and culvert	2024		
14	SC-14	631917	4974006	Straw, lumber, and materials storage yard	2024		
15	SC-15	631994	4974124	Water bar and sed trap	2024		
16	SC-16	631985	4974181	Water bar and sed trap	2024		
17	SC-17	631950	4974204	Roadside ditch and french drain	2024		
18	SC-18	631910	497423	Armored channel and settling pond, Outfall-001	2024		
19	SC-19	631929	4974146	Core-cutting facility	2024		

Location: Shop and Camp							
BMP Control Measure Inspection Form (EF-029C)							
Seq	**BMP No.**	**X Easting Coordinate**	**Y Northing Coordinate**	**BMP Description**	**Date BMPs**	**Maintenance Required?**	**Corrective Action Needed and Notes**
20	SC-20	631853	497428	Solid waste management (dumpsters)	2024		

Location: ASAOC

BMP Control Measure Inspection Form (EF-029C)

Seq	BMP No.	X Easting Coordinate	Y Northing Coordinate	BMP Description	Date BMPs	Maintenance Required?	Corrective Action Needed and Notes
1	AOC-1	631278	4976813	NW Bradley Removal	2023		
2	AOC-2	631176	4976601	NWB Dumps	2023		
3	AOC-3	631569	4975389	Fiddle Borrow Source	2023		
4	AOC-4	631835	4975120	BMC North	2023		
5	AOC-5	631800	4974727	BMC South	2023		
6	AOC-6	631997	4973591	LMC East	2023		
7	AOC-7	631934	4973576	LMC West	2023		
8	AOC-8	631780	4973356	Repository East	2023		
9	AOC-9	631599	4973182	Repository West	2023		

BMP Description	Removal Date	Removal Description

Photo Support

Appendix F
Visual Assessment Form (EF-029D)

Outfall:	☐ No Discharge Occurred During Monitoring Period		
Grab Sample Location:			
Sample Collection Date:		**Sample Collection Time:**	
Signature of Person Collecting Sample:			
Was the sample collected within the first 30 minutes of the measurable storm event? If no, provide explanation as to why sample was collected after the first 30 minutes:			
Nature of Discharge (rain, snowmelt):		**Magnitude of Event (in):**	
Start of Discharge (date/time):		**Duration of Event (hrs):**	
Was previous discharging storm event more than 72 hours before this event?	☐ Yes ☐ No		
Visual Assessment Date:		**Visual Assessment Time:**	
Signature of Person Performing Visual Assessment:			

Visually inspect sample for the following characteristics; If the characteristic is present in sample, write "Present (or P)" in the Result column, and provide a description of the characteristic and its probable source. If the characteristic is absent from sample, indicate with "Not Present (or NP)" in the Result column.

Characteristic	Indicator(s) of Contamination	Result	Description / Probable Source(s) of Contamination	Action Required? If yes, describe below
Color	Unusual color, such as reddish, brown, or yellow hue			
Odor	Noticeable odor (smells like gas fumes, rotten eggs, sour, etc.)			
Clarity	Not clear – cloudy or opaque			
Floating Solids	Floating materials at or near top of sample			
Settled Solids	Materials settled at the bottom after approx. 30 minutes			
Suspended Solids	Particles suspended in the water will affect clarity and color			

Foam	After gently shaking the bottle, foam is present			
Oil Sheen	Rainbow color or sheen on surface of the water			
Other obvious indicators of pollution	Unusual color, such as reddish, brown, or yellow hue			

[1]Conditions Requiring Corrective Action

Were any of the following conditions observed:

- An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by this or another NPDES permit to a water of the United States) occurred?
- Stormwater control measures are not stringent enough for the stormwater discharge to be controlled as necessary such that the receiving water of the United States will meet applicable water quality standards or to meet the non-numeric effluent limits?
- A visual assessment showed evidence of stormwater pollution (e.g., color, odor, floating solids, settled solids, suspended solids, foam)?

If any of the above conditions were observed during the routine inspection, Corrective Action is required to be taken in accordance with Section 6.2-6.4 and documented on the related Corrective Action form in Appendix I of the SWPPP within **24-hours of discovery** of the condition.

Comments / Additional Notes / Routine Maintenance:

INSPECTION CERTIFICATION:

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

Inspector(s) Signature(s):

Appendix G: Impaired Waters Monitoring Form (EF-029E)

Appendix G
Impaired Waters Monitoring Form (EF-029E)

IMPAIRED WATERS MONITORING INFORMATION			
Date and Time:			
Sampler(s) Name:			
Sample Obtained From:	☐ Rain Event ☐ Snowmelt Event ☐ No discharge occurred during monitoring period		
Time Sample Obtained:			
Within first 30 minutes of event discharge?		☐ Yes ☐ No	
If no, provide reason why:			
Did sampled event follow a preceding measurable storm by at least 72 hours?			
If no, provide reason why:			
Discharge Information:	Rain event inches:		
	Rain fall duration:		
Comments:			
Sampler Signature:			

Monitoring Notes:

Impaired Waters Monitoring is required once per year at each SIDP. Outfalls 001, 002 and 003 are all SIDPs so sampling is only required at one outfall. Sample type is a grab or composite sample. Circle which outfall was sampled:

Outfall 001 Outfall 002 Outfall 003

Impaired Waters Monitoring is required once per year at Outfall 004 (not considered a SIDP). Sample type is a grab or composite sample. Circle outfall to confirm sampled:

Outfall 004

The EFSFSR requires analysis for the following impairments:

☐ Antimony (limitation: 5.2 micrograms/L)

☐ Arsenic (limitation: 10 micrograms/L)

☐ Temperature (limitation: 10°C for a 7-day average maximum daily temperature: June – Sept)

Refer to Section 5.5 of this SWPPP for details on result exceedances and subsequent monitoring.

Appendix H: Corrective Action Form (EF-029F)

Appendix H
Corrective Action Form (EF-029F)

Complete the following form for each Corrective Action resulting from a routine facility inspection, visual assessment monitoring event, indicator monitoring event, ELG monitoring event, non-compliance or similar event. The Corrective Action documentation process is a **two-step** process. The first half of this form must be completed within ***24-hours*** of discovery of the condition. The second portion of this form must be completed within ***5 days*** of discovery of the condition.

CORRECTIVE ACTION ID: (example: "date-001" "MMYY-001")	
CORRECTIVE ACTION: 24-HOUR INFORMATION	
Date and Time:	
Form Completed By:	
Triggering Event / Reason for Action:	
Description of Condition:	
Immediate Action(s) Taken:	
Signature, If Action(s) Completed:	
CORRECTIVE ACTION: 5-DAY INFORMATION	
Additional Action(s) Taken or to Be Taken:	
Expected Action(s) Timeframe:	
Completed Within 14 days of discovery? ☐ Yes ☐ No If not, why: Provide estimated schedule for completion:	
Signature and Date: When Action(s) Completed	

Appendix I: Endangered Species and Historic Properties Criterion Documentation

Appendix J: Time Critical Removal Actions (TCRAs)

- Appendix J.1 DMEA Dump Removal Construction Information (CLOSED[1])
- Appendix J.2 Hennessy Creek Diversion Project Construction Information (CLOSED[1])
- Appendix J.3 Smelter Flats Diversion Project Construction Information (CLOSED[1])
- Appendix J.4 Fiddle Borrow Source Project Construction Information (CLOSED[1])
- Appendix J.5 Lower Meadow Creek Tailings Removal (CLOSED[1])
- Appendix J.6 Bradley Man Camp Dumps Waste Rock and Tailings Removal (CLOSED[1])
- Appendix J.7 NW Bradley Man Camp Dumps Removal (CLOSED[1])
- Appendix J.8 Onsite Repository Project (CLOSED[1])

[1]CLOSED TCRA documentation can be found in the Environmental files.