

***BEST MANAGEMENT PRACTICES FOR  
TIMBER HARVEST OPERATIONS***



**The Commonwealth of Pennsylvania**

**Department of Environmental Protection  
Bureau of Clean Water**

**And**

**Bureau of Waterways Engineering and Wetlands  
Harrisburg, Pennsylvania**

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This publication resulted from the joint efforts of the Bucks, Cambria, Cumberland, Wayne and Westmoreland County Conservation Districts; the Pennsylvania Sustainable Forestry Initiative (SFI) Implementation Committee; the Pennsylvania Association of Conservation Districts (PACD); the Pennsylvania Game Commission; the Pennsylvania Forest Products Association; the Pennsylvania Department of Conservation and Natural Resources (DCNR) Bureau of Forestry; the Pennsylvania Department of Environmental Protection (DEP) Bureau of Clean Water; and the DEP Bureau of Waterways Engineering and Wetlands.

This publication, *Best Management Practices for Timber Harvest Operations*, replaces an earlier version which was entitled, *Timber Harvest Operations Field Guide for Waterways, Wetlands and Erosion Control* (3930-BK-DEP4016). Other previous publications replaced by this document include:

- *Best Management Practices for Silvicultural Activities in Pennsylvania's Forest Wetlands*, a pocket guide for foresters, loggers, and other forest land managers, prepared by the Forested Wetlands Task Force, May 1993; and
- *Controlling Erosion and Sediment from Timber Harvest Operations* (3930-BK-DEP2322), Revised April 2003.

For additional information refer to DEP's *Erosion and Sediment Pollution Control Program Manual* ([363-2134-008](#)) (E&S Manual). Where information differs from this document and the E&S Manual, the information in the E&S Manual will prevail. Additional approved best management practices (BMPs) and specifications can be found on DEP's website, [www.dep.pa.gov/constructionstormwater](http://www.dep.pa.gov/constructionstormwater) (select E&S Resources).

## **Disclaimer**

This booklet has been published by DEP as a quick reference guide and contains the most commonly used BMPs for silviculture activities and considerations for conducting silviculture activities that impact streams and their floodways or wetlands. This booklet is not intended as a substitute for and does not supplant the rules and regulations of the Commonwealth of Pennsylvania.

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## I. PURPOSE

The purpose of this publication is to assist persons proposing or conducting timber harvesting activities, such as landowners, foresters, and loggers, to prepare and implement erosion and sediment control (E&S) best management practices (BMPs) for sites that do not require a written E&S Plan, and to develop and implement E&S Plans where required. Additionally, this publication is intended to provide guidance when seeking to conduct timber harvesting and related activities in and around streams and wetlands. Experience has shown that most erosion problems on timber harvesting activities originate with the improper layout or construction of skid trails, skid roads, haul roads, landing areas, and stream/wetland crossings. Additional concerns may arise as a result of inclement weather and freeze thaw cycles. Therefore, the focus of this publication is to provide guidance and furnish specifications to properly design and implement effective E&S BMPs and stream and wetland crossings on a timber harvesting site.

When using this publication, it is important to remember that for every situation described, there may be more than one adequate method to minimize erosion and prevent sediment pollution.

## II. RELEVANT FEDERAL AND STATE LAWS

Both federal and state laws address earth disturbance activities which have the potential to affect water quality and discharge pollutants into waters of the Commonwealth. These laws include sections 401 and 404 of the Water Pollution Control Act Amendments of 1972 (known as the Clean Water Act) (33 U.S.C. §§ 1341 and 1344), the Clean Streams Law (35 P.S. §§ 691.1-691.1001), Dam Safety Encroachments Act (32 P.S. §§ 693.1-693.27), and the regulations thereunder. Persons proposing or conducting timber harvesting activities in the Commonwealth of Pennsylvania should be familiar with these laws and regulations.

### A. Pennsylvania Clean Streams Law

Many of Pennsylvania's water quality regulations are issued under the authority of the Clean Streams Law and are enforced by DEP. The Clean Streams Law is the main law designed to protect Pennsylvania's water resources and sets forth the legal framework intended to "preserve and improve the purity of the waters of the Commonwealth." DEP's regulations, set forth in the Pennsylvania Code, implement the Clean Streams Law. Timber harvesting activities must be done in conformance with the applicable federal and state laws, including sections 401 and 404 of the Clean Water Act, Clean Streams Law, Dam Safety and Encroachments Act and the regulatory requirements of 25 Pa. Code Chapters 93, 102, and 105.

#### 1. 25 Pa. Code Chapter 93

Under Chapter 93, DEP sets water quality standards for Pennsylvania's surface waters, including wetlands. These standards are used to assess whether Pennsylvania's surface waters are capable of supporting different water uses such as fish and other aquatic life, recreation, water supply for drinking, agriculture and industry, and other protected uses. All surface waters in Pennsylvania are classified based on their designated use and associated water quality criteria under Chapter 93. Surface waters may also have an existing use classification that reflects the use they are actually attaining. The designated and existing uses assigned to Pennsylvania's surface waters can affect their regulatory protection and permitting requirements. Both designated and existing uses are equally protected when DEP issues a permit or approval for an activity which may impact the surface water's use (i.e., if either use classification has higher protection requirements, those requirements would apply). Particular attention should be paid to special protection waters that are designated as High Quality Waters (HQ) or Exceptional Value Waters (EV). For more information see DEP's *Water Quality Antidegradation Implementation Guidance* (DEP Document #391-0300-002, November 2003). Timber harvesting operations comply with Chapter 93 through implementation of E&S BMPs under Chapter 102.



DEP's Water Quality Antidegradation  
Implementation Guidance

## 2. 25 Pa. Code Chapter 102

In Pennsylvania, all earth disturbance activities must be undertaken in accordance with DEP's Chapter 102 regulations. Under these regulations, all earth disturbance activities, regardless of size or extent, are required to implement and maintain E&S BMPs to minimize the potential for accelerated erosion and resulting sedimentation to waters of the Commonwealth. Timber harvesting is considered an earth disturbance activity under Chapter 102 because the operations involved in moving the product from the stump to the mill disturbs the forest floor and exposes soils to accelerated erosion. While the felling of trees itself does not create an earth disturbance, the activities involved in moving the product from the stump to the mill may cause erosion and sediment pollution.



Chapter 102 Regulations

When planned disturbances total 5,000 square feet or more, or has the potential to discharge to a special protection surface water (under Chapter 93), DEP's regulations require that a written E&S Plan must also be developed and kept on-site at all times (25 Pa. Code § 102.4(b)(2)). Additionally, a written E&S Plan must be developed if required under another regulation. Typically, the earth disturbance activity for a timber harvesting activity includes the haul roads, landings, skid roads, and skid trails.

DEP's eMAP tool (<http://www.depgis.state.pa.us/emappa/>) and Existing Use Classification list (visit [www.dep.pa.gov](http://www.dep.pa.gov) and search for "Existing Use Classifications") can be used to identify special protection surface waters. Additionally, EV wetlands are defined at 25 Pa. Code § 105.17(1). DEP offers a standard *Erosion and Sediment Control Plan Template for a Timber Harvesting Operation* (3800-FM-BCW0539) that satisfies Chapter 102 requirements. The matrices in Appendix D of this guide can be used to help estimate the anticipated amount of disturbance for a timber harvesting activity.



DEP's eMAP tool



DEP's Existing Use List

DEP's regulations require timber harvesting activities that will disturb 25 acres or more to obtain an E&S Permit ([25 Pa. Code § 102.5\(b\)](#)). All necessary permits must be obtained prior to beginning any earth disturbance activity. Inquiries as to whether or not a permit is required should be addressed to the local county conservation district or DEP Regional Office.

## 3. 25 Pa. Code Chapter 105

Activities associated with timber harvesting operations are also governed by DEP's Chapter 105 Dam Safety and Waterway Management regulations adopted under the provisions of the Clean Streams Law, Dam Safety and Encroachments Act, and the Floodplain Management Act (32 P.S. §§ 679.101-679.601). Chapter 105 regulations govern the crossing of streams and their floodways, wetlands, and other bodies of water. Bridges, culverts, fills, walls, embankments, other structures, and activities which change the course, current, or cross section of a stream, floodway, wetland, or body of water are regulated by Chapter 105. Most structures and activities in Pennsylvania waterways (dams, water obstructions and encroachments) require some type of authorization or permit from DEP to protect public health, safety, and the environment.

The following is a partial list of activities that require permits or may requires a license from DEP:

- Deposition of solid fill, gravel, soil, slate and other such material in wetlands, streams, and floodways for the construction of temporary and permanent roads. Fill material will be required to be “clean” or washed stone or gravel depending upon permit conditions. Note: Clean stone is required in the conditions of General Permit 8 (GP-8).
- Construction, operation, maintenance and modification, enlargement or abandonment of any dam, water obstruction or encroachment (i.e., culverts, fills, ditching).
- Clearing and grubbing, digging ditches and conducting other similar activities in wetlands. This includes activities that would alter the course, current or cross section through rutting.
- Constructing roads, whether temporary or permanent, in or across streams and their floodways and wetlands.
- Placing support mats, corduroy, and other temporary fabricated roads in wetlands for use as haul roads, skid roads, or skid trails.
- Depositing fill for skid trails, skid roads, or other roads in or across streams and their floodways and wetlands.
- If timber harvesting activities will occupy submerged lands of the Commonwealth, a submerged lands license may be required under Chapter 105.

Permits are not required to fell timber and other vegetation, including cutting in wetlands, by hand (manually with saws) or to fell timber with machines (such as a feller buncher) where the machines are located outside the wetland as long as activity does not cause earth disturbance or change wetland hydrology.

There are three levels of permitting provided by Chapter 105: waiver of permit requirements, general permit coverage, and issuance of a Chapter 105 Water Obstruction and Encroachment Permit. If the activity is not waived it may qualify for general permit coverage. General permits have been issued for similar types of activities and contain specific conditions and limitations. If the regulated activity does not qualify for these, then an individual permit is required.

#### Chapter 105 Waivers and Timber Harvest

Permit requirements are waived in the regulations for certain regulated structures or activities under [25 Pa. Code § 105.12\(a\)](#). Most waived structures and activities do not require prior notification to or approval from DEP. However, a permit may be required if upon complaint or investigation DEP finds these structures or activities have a significant effect upon safety or the protection of life, health, property, or the environment. Waived structures and activities are still subject to compliance with the Dam Safety and Encroachments Act and the Chapter 105 regulations. The most common waiver utilized in timber harvest operations is the installation of a temporary or permanent stream crossing in a stream or floodway with a drainage area of less than 100 acres (refer to Drainage Area Determination below). This activity does not require a Chapter 105 permit if the crossing will not impact a wetland (wetland impacts require a permit). See 25 Pa. Code § 105.12(a)(2). Note that wetlands are often located in the floodways adjacent to headwater streams. Also, even though the stream crossing may not require a permit, sediment pollution and encroachments are still regulated, and the crossing may still require federal authorization from the US Army Corps of Engineers (USACOE) as referenced to PASPGP below. The installation of a temporary or permanent stream crossing in a stream or floodway with a drainage area of 100 acres or more requires a Chapter 105 general or individual Water Obstruction and Encroachment permit.

#### Chapter 105 General Permits and Timber Harvest

Projects that qualify for General Permit coverage are now available as online electronic permit applications through DEP's e-permitting system:

<https://www.dep.pa.gov/Business/Water/Waterways/Chapter-105-ePermitting/Pages/default.aspx>.



Ch. 105 e-permitting

Many projects qualify for a simple Water Obstructions and Encroachment general permit registration if they can be designed and implemented in accordance with the criteria in the general permit. Each general permit contains specific conditions (i.e. size of structure, drainage areas, time of year restrictions, considerations for species of special concern, etc.) that must be followed by the applicant. Each general permit application includes a full listing of these conditions. The general permits most often used in timber harvesting activities include General Permit 7 (GP-7) for Minor Road Crossings and GP-8 for Temporary Road Crossings.

Temporary crossings on non-public roads that will be used no longer than one year can generally be permitted through GP-8. This permit allows streams to be crossed using a culvert, a series of culverts, a bridge, or a ford. The purpose of the permit is to facilitate completion of temporary projects, such as a timber harvest, that can be completed in one year or less. Temporary crossings must be restored at the end of their use in accordance with the requirements of the permit. Note that the permit application identifies a number of restrictions where the GP-8 cannot be applied. Information and applications for GP-8 may be obtained from any conservation district office or online in the GP-8 folder on DEP's eLibrary ([3150-PM-BWEW0508](#)).



Ch. 105 Application Forms on eLibrary

Minor (permanent) crossings of streams that have an upstream watershed drainage area of one (1) square mile or less or wetland crossings that disturb less than one-tenth (0.1) of an acre and that are not designated EV or floodways delineated by the Federal Emergency Management Agency (FEMA) can generally be permitted through GP-7. All wetlands impacted through the use of the GP-7 must be replaced. The replacement, in accordance with the definition of mitigation in [25 Pa. Code § 105.1](#), can be adjacent to or in the immediate proximity of the minor road crossing and at a ratio of 1:1 for area, function and value. See also [25 Pa. Code § 105.20a](#). Mitigation will also generally require monitoring for a period of five years to determine success. Other options available for mitigation are credits purchased through an approved in-lieu fee program or a mitigation bank if one is available in the watershed area of the impact. Note that the permit application identifies a number of additional restrictions where the GP-7 cannot be applied. Information and applications for GP-7 may be obtained from any conservation district office or online in the GP-7 folder on DEP's eLibrary ([3150-PM-BWEW0507](#)).

#### Drainage Area Determination

Drainage area of a stream is necessary to determine eligibility for some waivers and General Permits. Upstream drainage area is determined from the location of the proposed stream crossing or point on a stream. One tool for determining this is the United States Geological Survey (USGS) StreamStats web application using the delineate tool (<https://streamstats.usgs.gov/ss/>). Once a basin is delineated to a precise point on a stream network is completed, click continue and then select the drainage area field (DRNAREA) from the basin characteristics options and then continue to see the basin area in square miles. There are 640 acres in a square mile. In reference to a stream crossing qualifying for the waiver under 25 Pa. Code § 105.12(a)(2), a basin drainage area result of 0.15 square miles (96 acres) or less would qualify.



USGS Stream Stats

#### Individual Water Obstruction and Encroachment Permit

Structures and activities that do not qualify for a permit waiver or a general permit must obtain a Chapter 105 Water Obstruction and Encroachment Permit from DEP. The application serves as a joint application for the Chapter 105 Water Obstruction and Encroachment Permit and when applicable, the federal Section 404 permit under the Clean Water Act issued by the USACOE (refer to PASPGP below). Currently, most activities qualify for inclusion and are not forwarded to the USACOE for independent review. In this case the PASPGP federal authorization would be attached to the Chapter 105 Water Obstruction and Encroachment Individual Permit upon issuance from DEP. Should a separate federal review be required by the USACOE, the applicant would be notified by DEP and/or



USACOE concerning the additional processing and information required for the review and/or issuance of a federal Section 404 permit by the USACOE. Work may not begin until both the state and federal authorizations are received.

DEP has two types of joint permit applications – Small Projects and Standard. A Small Projects Application may be made for projects in streams and floodplains where insignificant impacts on safety and protection of life, health, property, and the environment can be demonstrated without detailed studies or engineering calculations. For all other projects, including those projects affecting wetlands and those projects where safety and environmental impacts must be determined through technical studies, a Standard Application must be submitted to DEP. Either type of application can be made using the Joint Permit Application forms, found on DEP's eLibrary ([3150-PM-BWEW0036](#)).

Chapter 105 permits, including general permits, are issued with the provision that adequate E&S control measures will be implemented by the permittee. It is imperative that operators always implement and maintain adequate E&S controls and comply with Chapter 102 of DEP's regulations.

Refer to Section II.B.3. of this guide for additional details on wetland crossings. All necessary permits must be obtained before the timber harvesting activity can begin. Questions about permit requirements should be addressed to DEP's Regional Office Waterways and Wetlands permitting section or a Chapter 105 delegated county conservation district office.



25 Pa. Code  
Chapter 105

## **B. Pennsylvania Natural Diversity Inventory Environmental Review**

Chapter 102 and 105 permits require the protection of state and federal threatened and endangered (T&E) species on a project site. In addition, permit applicants may have to address potential impacts to Species of Special Concern. Permit applicants must coordinate with the Pennsylvania Natural Heritage Program (PNHP) to search for and address any potential impacts to T&E species. The online Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review tool available through the Pennsylvania Conservation Explorer website (<https://conservationexplorer.dcnr.pa.gov/>) is the most efficient means of conducting this screening in a timely manner. Upon completion, a PNDI receipt, valid for a period of two years from the date the search was conducted, is automatically available for printing. To provide proof of coordination with PNHP and PNDI, applicants must submit a signed PNDI receipt as part of the permit application.



PNDI Review

Early coordination (prior to permit application) by prospective applicants and their consultants with the appropriate jurisdictional agencies is the most effective means of a timely permit decision. If the review determines there are potential impacts to a T&E species, the PNDI receipt will provide an explanation of the potential impact(s) and instructions on how to resolve the potential impact(s). Read and follow these instructions carefully.

## **C. Municipal and County Notification Requirement**

Act 14 of 1984 requires that applicants for Chapter 102 and 105 permits give written notification to each local municipality and county in which the permitted activity is located. Acts 67, 68 and 127 of 2000 amended the Municipalities Planning Code to provide new tools for local governments to plan for and manage growth by directing state agencies to consider and in some cases rely upon comprehensive plans and zoning ordinances when reviewing applications for the permitting of infrastructure or facilities. DEP may not issue a permit or authorization until 30 days after the municipality and county government in which the activity is located have received the required written notices.

Chapter 102 and 105 permit applicants are therefore required to notify local governments of planned land development activities and to provide local governments the opportunity to identify any land use planning or zoning ordinance conflicts associated with the proposed project before DEP or a delegated county conservation district completes its review of the NOI/permit application.

**Municipal notification requirements for Chapter 105 General Permits are different than other permit types. The instructions for the notification can be found in the General Permit Registration Instructions, located in DEP's [eLibrary](#).**

Municipal and county notification is not required if Chapter 102 or 105 permitting is not needed for the timber harvesting activity.

#### **D. Fish and Boat Code**

The Fish and Boat Code is administered by the Pennsylvania Fish and Boat Commission and regulates the impact of human-made alterations or activities on waters of the Commonwealth and prohibits the introduction of any substance harmful to aquatic life. ([30 Pa.C.S.A. §§ 101 et seq.](#)) Particularly relevant sections include 30 Pa.C.S.A. §§ [2502](#), [2503](#), and [2504](#).



PA Fish & Boat Code

#### **E. Federal Water Pollution Control Act Amendments of 1972**

The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. § 1251 et seq.) (Clean Water Act) is the primary federal law that protects the health of our nation's waters, including lakes, rivers, and coastal areas. The Act regulates discharges of pollutants into waters of the United States and regulates quality standards for surface waters. The Act is jointly enforced by the United States Environmental Protection Agency (EPA) and the USACOE.



Clean Water Act (EPA)

##### **1. National Pollutant Discharge Elimination System**

Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Section 402 of the Act establishes a program to regulate the point source discharge of pollutants into waters of the United States. Silvicultural activities are exempt from the National Pollutant Discharge Elimination System (NPDES) permit process under section 402 of the Act in areas where a federal section 404 authorization has been issued if there is no discharge of dredged or fill material that contains toxic pollutants and no conversion of a wetland to a non-wetland (refer to Appendix E of this guide).

##### **2. Pennsylvania State Programmatic General Permit**

The Pennsylvania State Programmatic General Permit (PASPGP) is an authorization that the USACOE has granted DEP the authority to provide in conjunction with the General Permits associated with the Water Obstructions and Encroachment Permits under Chapter 105. The PASPGP allows for a streamlined permitting process for eligible structures and activities that eliminates the need for redundant federal reviews and processing for certain qualifying projects and ensures compliance with federal regulations such as the federal Clean Water Act, Rivers and Harbors Act of 1899, Endangered Species Act, the National Historic Preservation Act, and the Magnuson-Stevens Fisheries Conservation and Management Act.

### **III. SITE PLANNING**

Careful planning of timber harvesting activities to control erosion and sedimentation, avoid wetland and stream crossings, and minimize impacts where practicable is essential to ensuring that all planned water quality protection measures are practical and effective.

Timber harvesting activities undertaken without planning can produce undesirable environmental, economic, and aesthetic consequences. Using available topographic maps, soil surveys, and aerial imagery in combination with local knowledge or field reconnaissance/survey can help identify problematic site conditions and allow for the development of an effective E&S Plan for protecting soil and water resources and other sensitive environmental areas from adverse impacts during the operation.

## A. Soil Considerations

Consideration of soil type is important when designing road systems. Soils vary in their ability to absorb stormwater, maintain structure, or resist erosion and compaction.



NRCS Web Soil Survey

General soil information and soil surveys are available online using the United States Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey (<https://websoilsurvey.sc.egov.usda.gov/App/>). The soil survey contains specific information on soil types and soil features, such as drainage and suitability for road base, that may affect road location and construction.

DEP regulations in Chapter 102 require that timber harvesting E&S Plans must identify the types, depths, slope, locations, and limitations of the soils ([25 Pa. Code § 102.4\(b\)\(5\)\(ii\)](#)). This includes a soil map that shows the location of the soils across the project area.

### 1. Erosion Hazard

Soil erosion is one of the most serious environmental problems affecting the quality of soil, land, and water resources. While erosion is a natural process, accelerated erosion that occurs at a greater rate than normal as a result of earth disturbance activities conducted during a timber harvesting activity can degrade site productivity and lead to sedimentation. Soil erosion hazard is an estimate of how easily soil particles can be detached from the soil surface. Soils classified as slight are likely to have little or no erosion. Soils classified as moderate will likely have some soil erosion and haul roads, skid roads, and skid trails will require simple erosion-control measures and occasional maintenance. Soils classified as severe indicate that significant erosion is expected. Soils with a moderate or severe erosion hazard are poor choices for log landing and road locations, and, if possible, alternatives should be considered.

### 2. Soil Drainage

Soil drainage is one of the most significant considerations in road construction. Soils classified as somewhat poorly drained to very poorly drained often cause problems because they may not support the weight of logging equipment during periods of soil saturation. BMP implementation is usually required to prevent degradation of the road, erosion of these soils, and to maintain operability of the job. Poorly drained and very poorly drained soils cause problems during wet periods and very often contain wetlands (see **Table 1**). In addition to soil drainage characteristics, the soil's hydric soil status can also be used to indicate when wetlands may be present on the site.

Surface features, such as stones, should not be used as indicators of soil drainage. Several soil types in Pennsylvania appear from surface features to be well drained, when in fact, they are not. The extent and types of soils encountered on a logging site can be highly variable. The timber harvester must recognize the capabilities of a soil and be prepared to adjust the road design during construction to avoid problem areas, especially near streams, wetlands, floodways, and floodplains.

**Table 1. Descriptions and Use Limitations of Soil Drainage Classes**

<b>Drainage Class</b>	<b>Description</b>	<b>Degree of Limitation*</b>
Well Drained	Water is removed readily from the soil. Wetness does not inhibit plant growth. Commonly medium textured.	Slight
Moderately Well Drained	Water is removed slowly from the soil during some periods. Wet for only short periods during the growing season, but periodically long enough to affect most dry site plants.	Slight
Somewhat Poorly Drained	Water is removed slowly enough that soil is wet for significant periods during the growing season.	Moderate
Poorly Drained	Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water commonly at or near the surface.	Severe
Very Poorly Drained	Water is removed from soil so slowly that free water remains at or on the surface during most of the growing season. Very poorly drained soils are found in level or depressed areas and are frequently ponded.	Severe

\*Slight – indicates that use of equipment may not be limited to a particular kind of equipment or time of year.

Moderate – indicates a short seasonal limitation or a need for some modification in management or equipment.

Severe – indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

## **B. Water Considerations**

All surface waters, including lakes, ponds, streams, floodways, and wetlands, whether natural or artificial, in Pennsylvania are protected waters of the Commonwealth. It is illegal to damage wetlands or to allow eroded sediment from earth disturbance activities to enter streams and lakes without authorization from DEP or in compliance with DEP regulations. Certain activities may require permits from DEP and nearly all timber harvest operations require a written E&S Plan.

### **1. Designated and Existing Uses**

Timber harvesting E&S Plans must identify the name and designated and existing uses for surface waters, including wetlands, which may receive runoff within or from the timber harvest's project site (refer to Section II.A.1 of this guide) (25 Pa. Code § 102.4(b)(5)(v)). Designated uses for waters of the Commonwealth are found in [25 Pa. Code §§ 93.9a-z](#).

Existing uses are found on [DEP's website](#) (search for "Existing Use Classifications").

### **2. Streams and Stream Crossings**

A stream is any channel having defined bed and banks, whether natural or artificial, with perennial or intermittent flow of surface water. Perennial streams normally flow throughout the year, whereas intermittent streams normally flow in the wetter parts of the year (i.e., October through May) or after a major storm.



Ch. 93  
Regulations



DEP Website  
Keyword Search:  
"Statewide Existing Use"

Stream crossings are a major concern in the construction and use of haul roads, skid roads, and skid trails. The potential for sediment to enter a stream at crossing points is great. It is always best to avoid crossing a stream or wetland if an alternate location is possible. Timber harvesting E&S Plans should identify the planned location of all stream and wetland crossings and all appropriate permits must be obtained prior to constructing any crossings (refer to Section II of this guide).

Pay attention to both stream and road alignment when selecting the site for a stream crossing. The road should cross the stream at right angles. Ideally, the streambed should be narrow and straight with even banks so as not to obstruct the flow of water. Approach the stream at as gentle a slope as possible. Maintain all stream approaches in a firm and stable condition and direct any runoff to a sediment removal area (e.g. filter strip, straw bale, silt fence, sump, or trap for treatment). Waterbars and/or

broad-based dips should be installed and maintained as required on the approaches to the stream crossing (refer to Section IV.B of this guide).

Portable bridges are perhaps the most common method of temporary stream crossings. They can span a stream without inhibiting streamflow or aquatic movement and can be installed without extensive soil backfill, thereby reducing impacts to water quality.

Culverts used in temporary stream crossings should be appropriately sized (i.e. provide a waterway area sufficient to adequately discharge the normal flow of the watercourse or stream, and must be of sufficient length to extend beyond the toe of the clean rock fill) and placed in the natural drainage channel on the same grade as the streambed. Temporary stream crossing culverts should be installed with clean rock material. It is important to ensure that temporary stream crossings are kept open and functioning by keeping them free of debris and other obstructions.

Fords are sometimes used for haul road stream crossings, but they are not acceptable for use on skid roads or skid trails as skidding through ford crossings is prohibited. When skid roads or trails must cross streams, culverts or portable bridges can be used. Temporary fords can typically be authorized utilizing GP-8 (Temporary Road Crossings) if they are not used for skidding. Stream sections suitable for ford crossings must have low banks and solid streambeds. If the streambed at the site of a ford crossing does not have a rock bottom, provide a layer of clean rock, taking care not to obstruct the streamflow. GP-8 cannot be used to authorize ford crossings of streams in High Quality (HQ) or Exceptional Value (EV) watersheds (see Condition e. of GP-8 for other limitations). For specific design information and limitations, refer to GP-8. It is important to note that terms and conditions for GP-7 are different than for GP-8. Refer to the terms and conditions of GP-7 to see the limitations and restrictions for use of this general permit. If a permanent stream crossing cannot meet the terms and conditions of GP-7, an individual water obstruction and encroachment permit is required.



25 Pa. Code 105.1

The floodways of streams are also regulated under Chapter 105. Regulated floodways are as indicated on FEMA mapping or, if not indicated, it is assumed to be 50 feet from the top of bank landward, absent evidence to the contrary (see [25 Pa. Code § 105.1](#)). Place landings as far from streams and wetlands as possible (within 50 feet of stream or within FEMA floodway requires Chapter 105 permitting action by DEP).

### 3. Wetlands and Wetland Crossings

In order to avoid confusion, the term *wetlands* has been given a specific legal definition in both federal and state law. Wetlands are defined under Section 404 of the Clean Water Act and Chapter 105 regulations issued pursuant to Pennsylvania's Dam Safety and Encroachments Act as:

***Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs and similar areas.***

This means that during the growing season, a wetland is an area having **sufficient water supply** to create **soil conditions that lack oxygen** (known as anaerobic conditions), and to support **plant life adapted to a wet environment** (known as hydrophytic vegetation).

Although "wetlands" is a collective term that includes a diverse group of wet natural environments, wetlands share three basic characteristics that make them unique components of the environment:

- **The presence of water** (hydrology) at or near the surface for a portion of the year,
- **Plants that are adapted to wet conditions** (hydrophytic vegetation), and
- **Soils that result from wet conditions** (hydric soils).



These three characteristics are interrelated. Together, the presence of only one of these is usually sufficient to identify a wetland for planning purposes. **Of the three, the presence of water is the driving force that creates and maintains wetlands. The types of plants and soil characteristics may indicate the frequency and duration that water persists in an area. The types and locations of wetlands that may form on the landscape are also reflective of where the water is coming from (i.e., below ground, spring seeps, overland flow) and how long it persists, which is why landform or topography is an important factor to consider.**

#### a. Wetland Identification

DEP utilizes the USACOE 1987 Wetland Delineation Manual as its means for identifying and delineating wetlands. In addition, the USACOE has developed [regional supplements](#) to this manual for region specific wetland identification procedures. In Pennsylvania, there are three applicable regional supplements depending on the site location: Atlantic and Gulf Coast Plain, Northcentral and Northeast Mountains, and Easter Mountain and Piedmont Regional Supplements.

In addition to reading the manuals, DEP encourages practitioners to seek out training in wetland identification and delineation.

Identification of wetlands relies on the identification of three wetland parameters under normal circumstances: hydrology, hydric soils, and wetland vegetation. **While this guide provides a basic overview of what these include, a practitioner should review and understand the wetland identification manuals.** Wetland identifications and delineations cannot always be performed at the wet times of the years. To determine if the parameters are met, indicators of these three parameters are most commonly used and explained in the regional supplements.



ACOE Wetland  
Delineation Regional  
Supplements

Hydrology indicators are used to identify if wetland hydrology is present at a site. While standing water is an obvious sign of wetland hydrology, there are many other indicators of wetland hydrology. In forested wetlands these could include shallow groundwater, sediment deposits, moss trim lines, just to name a few. These hydrology indicators are clearly explained with color photographs in the USACOE Regional Supplements to the Wetland Delineation Manual. The graphic below depicts hummocks, a type of microtopographic relief, and a feature allowing plants to adapt and survive in the saturated conditions of a wetland.



The presence of hydric soils is another factor used to in wetland identification. Hydric soils form under the oxygen depleted conditions that develop from the saturation occurring in wetlands. These soils take significant time to develop and as such often tell the “story” of the wetland hydrologic cycles. To aid in hydric soil identification, the NRCS [Field Indicators of Hydric Soils in the United States](https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soil/hydric-soils) is utilized by the USACOE Delineation Manual Regional Supplements. Also see <https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soil/hydric-soils>.



NRCS Field Indicators of  
Hydric Soils

Wetland vegetation is the third factor used in wetland identification. While in forested settings the focus can be on trees, all strata of vegetation must be evaluated and accounted for in evaluating wetland vegetation. The USACOE Regional Supplements identify specific procedures in identifying if the vegetation community sufficient to indicate a wetland is present. As part of this, each plant species is assigned a wetland indicator status. These indicator statuses are maintained by the USACOE as the [National Wetland Plant List](#).



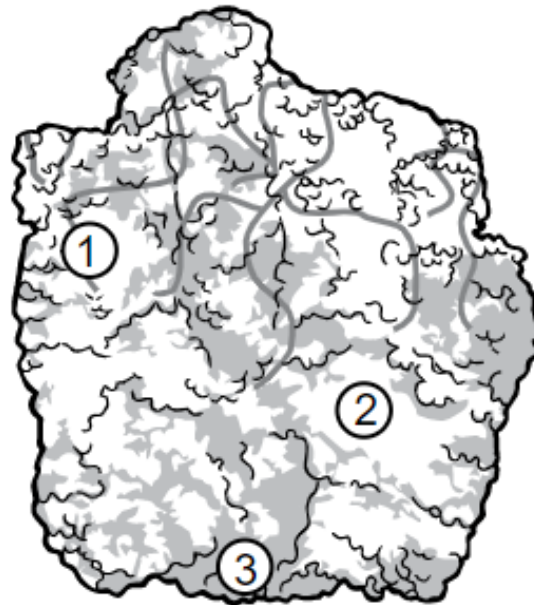
National Wetland  
Plants List

Once a wetland has been identified, it is important to identify the boundaries of this waters. Wetland boundaries can often fall along sharp changes in slope and topography of the land. However, the **boundary of a wetland** can be established approximately at the point at which none of these indicators are found.

#### Things to Look for to Identify Wetlands in Pennsylvania’s Forests:

- Landscape and Other Forest Features Favorable to Wetlands:
  - (1) Hummocks.
  - (2) Favorable landscape positions/landforms such as but not limited to convergent slopes, toe slope terrace, backwater depressions, etc.
  - (3) Vernal pools.
  - (4) Sphagnum moss.
- Hydrology Features:
  - (1) Water stains/water marks.
  - (2) Aquatic fauna.
  - (3) Microtopographic relief.
  - (4) Iron sheen, Iron staining, Iron deposits on the surface.
  - (5) Sparsely vegetative concave surface.
  - (6) Drainage patterns.
  - (7) Saturation or inundation.
- Soils: A Depleted Matrix Soil Profile (Hydric Soil Indicator F3). In general, this will appear as a reduced greyed matrix with redox features (usually rusty iron deposits appearing as mottles).
  - (1) A Depleted matrix soil profile below a dark surface layer (Hydric Soil Indicators A11 or A12).
  - (2) A Dark soil profile with redox features in it (usually rusty iron deposits appearing as mottles).
  - (3) Muck soils.

While depicted in black and white in the graphic below, these features in soil will generally have a grayish background, often with a “mottled” appearance, with contrasting bright orange to reddish specks, splotches, or streaks.



- ① (dark gray lines) - red/orange coated pore linings
- ② (white) represents the matrix color - the dominant background color could be darker grays to brownish or reddish grays
- ③ (lighter gray splotches) - Red/orange redox concentrations

- Plants:

- (1) Plant adaptations to the wet environment.

- (a) Shallow roots at or near the surface. These areas often have tree throws present. Note: there are many wetlands which contain hemlocks or hemlock swamps where the hemlock trees have adapted using shallow roots to survive in the wetland.
- (b) Fluted or buttressed trunks.
- (c) Stooling/multiple trunks.
- (d) Tussocks.

- (2) Common wetland trees and shrubs in PA (see **Appendix B** for more common wetland trees and shrubs):

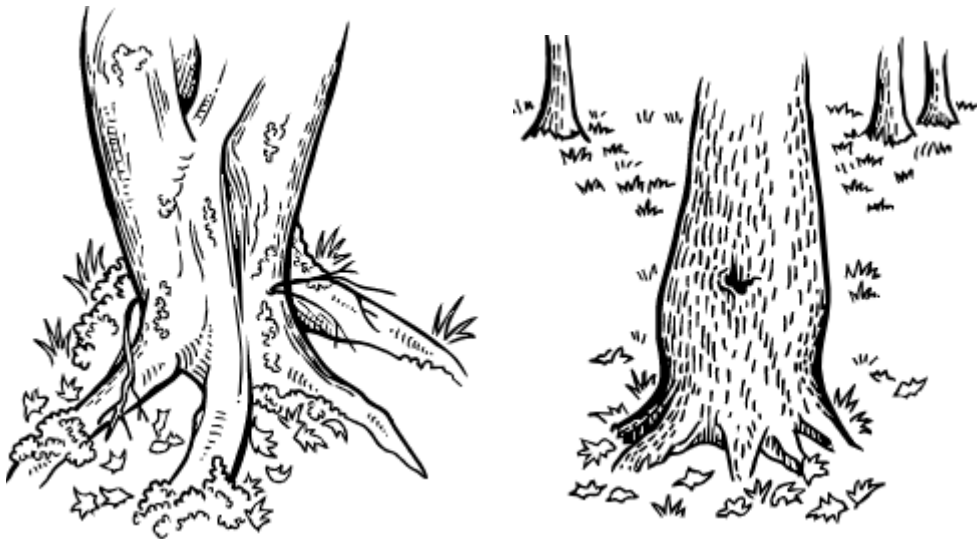
- (a) Willows.
- (b) Silver Maple.
- (c) Sycamore.
- (d) Black or Green Ash.
- (e) Box Elder.
- (f) High Bush Blueberry.
- (g) Shrub Type Dogwoods.
- (h) Alders.
- (i) Buttonbush.



(3) Common wetland emergent plants in PA (see **Appendix B** for more common wetland emergent plants):

- (a) Cinnamon Fern.
- (b) Rushes.
- (c) Jewel Weed.
- (d) Skunk Cabbage.
- (e) Sedges.
- (f) Joe Pyeweed.
- (g) Sensitive Fern.
- (h) Ostrich Fern.

The graphic below depicts fluted and buttressed tree trunks. These are adaptations of the trees to survive in wetland hydrology conditions.



#### **b. Appropriate Timber Harvesting Practices for Forested Wetlands**

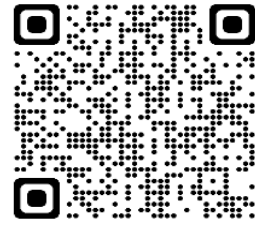
Timber production is recognized as a land use that is compatible with wetland protection provided habitat is maintained and BMPs are implemented. However, access systems, which include haul roads, skid roads, skid trails and landing areas, can affect water quality and hydrology. Extra care must be taken when carrying out forestry operations in wetlands because of their vulnerability to soil compaction, accelerated erosion, reduced site productivity, habitat destruction and disturbance of their water systems. Harvesting should be done with regard to season, maintaining standing trees for habitat, soil type, soil moisture, and type of equipment used. Good planning and supervision will protect site integrity and enhance regeneration. Careful implementation of BMPs will protect important wetland functions while allowing cost-effective timber harvesting.

Wetlands are considered waters of the Commonwealth. Although structures and activities that change the hydrology of a wetland are regulated by Chapter 105, the potential for sediment pollution to wetlands must be minimized as required by Chapter 102.

Federally jurisdictional wetlands are also regulated as waters of the United States; however, normal forestry operations in wetlands such as site preparation, harvesting, and minor drainage are exempt from federal permit requirements under Section 404 of the Clean Water Act (refer to **Appendix E** of this booklet) as long as the activity:

- Qualifies as “normal silviculture” (33 CFR § 323.4(a)(1)(i)).
- Is part of an “established” silviculture operation (33 CFR § 323.4(a)(1)(ii)).
- Follows at a minimum the fifteen-mandatory road BMPs (33 CFR § 323.4(a)(6)).

- Does not discharge any toxic pollutants listed under Section 307 of the Clean Water Act in dredge or fill materials into waters of the United States (33 CFR § 323.4(b)).
- Is not part of an activity whose purpose is to convert a water of the United States into a use to which it was not previously subject (33 CFR § 323.4(c)).



EPA Website on Section 404  
of the Clean Water Act  
[epa.gov/cwa-404](http://epa.gov/cwa-404)

The following recommended forest practices are consistent with the existing silvicultural exemptions contained in Section 404(t) of the Clean Water Act. In addition, timber harvesting operators should meet many of the requirements of DEP's general permits for road crossings in wetlands by implementing these BMPs.

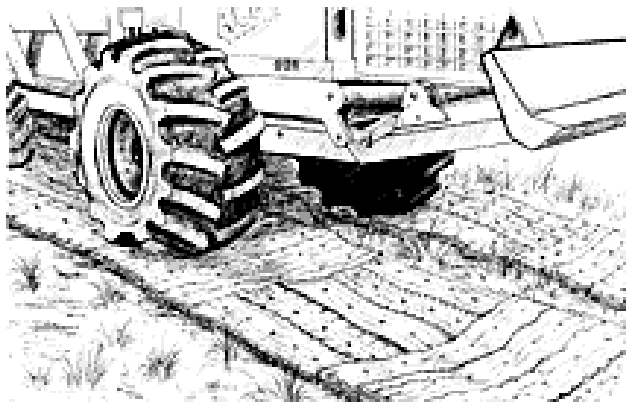
#### i. Wetland Crossings

**Wherever possible, wetland crossings must be avoided, especially if alternatives exist.**

If the crossing cannot be avoided, locate and orient the crossing so as to have the least amount of disturbance, usually at the narrowest practicable point of the wetland. Wetland crossings must be appropriately permitted under Chapter 105, and all conditions of the permit must be satisfied.

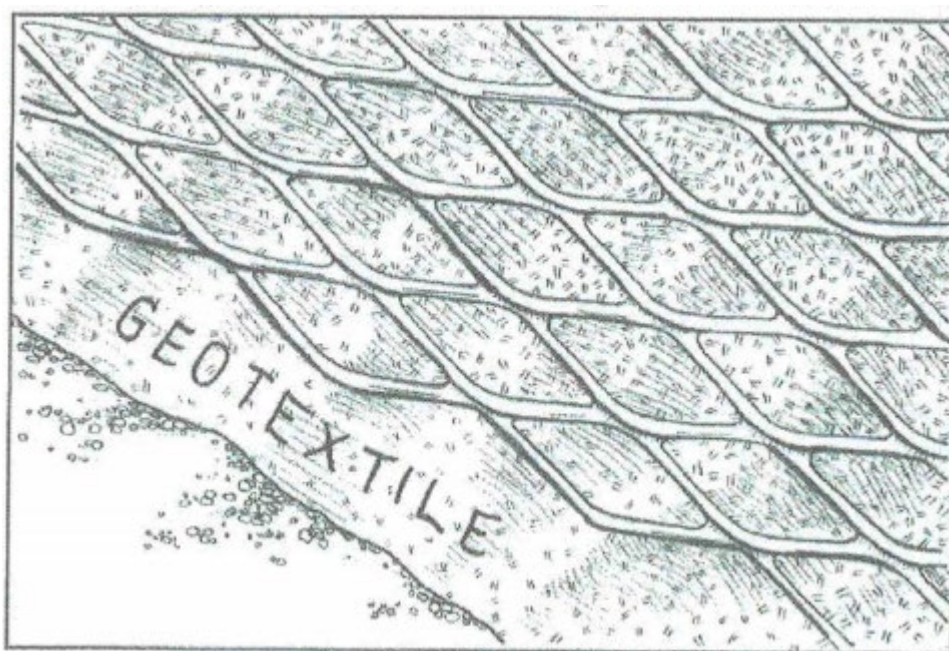
Temporary crossings should be constructed from materials that can be placed with a minimum of disturbance to the soil surface and completely removed when no longer needed. Some examples of stabilized crossing methods are illustrated in **Figure 1**, **Figure 2**, and **Figure 3** below.

**Figure 1. Typical Tire Mat Wetland Crossing**



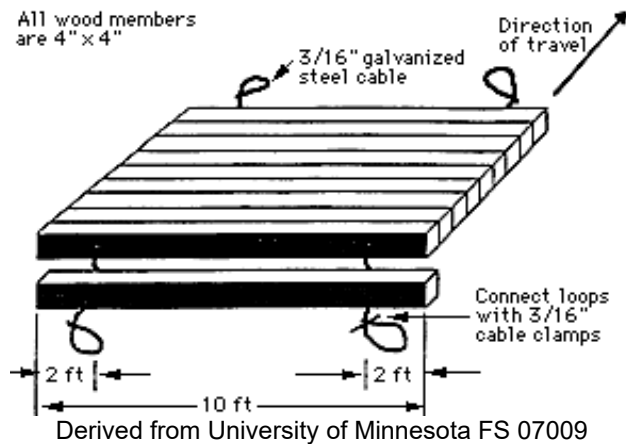
Derived from University of Minnesota FS 07013

**Figure 2. Typical Expanded Metal Grating Wetland Crossing**



Derived from University of Minnesota FS 07011

**Figure 3. Typical Wood Mat for Wetland Crossing**



**A geotextile underlayment should be used under the wood mat.**

## ii. Felling

Proper precautions should be taken when logging near a wetland or stream. Overharvesting of a forested wetland can prevent regeneration and may have lasting impacts on the wetland. Excessive slash left in streams, ponds and lakes may cause negative impacts to those resources. Felling trees into water bodies can cause habitat damage and disturb breeding and spawning areas of aquatic species and amphibians. The following are only recommendations and are not requirements but are intended to provide guidelines and guidance on avoiding and minimizing impacts to wetlands.

- Avoid felling into standing water.
- Keep slash out of streams and wetlands with standing water, lakes, and ponds.
- Leave tops in the wetland if felling into standing water cannot be avoided.
- Avoid felling into vernal pools (a.k.a. temporary ponds); however, it is acceptable to carefully place a few dead logs projecting into the pool to serve as basking habitat for reptiles and amphibians.
- Harvesting of forested wetlands should be selective and maintain forest canopy and trees throughout the wetland post-timber harvest to sustain wetland habitat.
- Harvesting in Exceptional Value (EV) wetlands should be avoided to the greatest extent practicable. See [25 Pa. Code § 105.17\(1\)](#).



See 25 Pa. Code 105.17(1)

## iii. Skidding

Soil disturbance, which leads to accelerated erosion, can be minimized by well-designed and located skid trails or skid roads.

- Avoid and minimize equipment entry into wetlands to the greatest extent possible.
- If skidding equipment is required to enter wetlands, schedule the harvest during the drier seasons of the year or during time when the ground is frozen. Skidding should cease when surface rutting occurs.
- Skidding should be confined to a few primary trails regardless of season to minimize the area affected.
- Concentrate skidding in defined corridors and use cable skidding when possible. Minimize skid trails by maximizing winch and choker cable lengths.

- Avoid grapple skidders unless the material is gathered by a swinging head feller-buncher located outside of the wetlands.
- Use low ground pressure equipment when possible, and in wettest areas consider using tracked vehicles. Use conventional tires on skidders only when the ground is dry or frozen.
- Use brush or corduroy to minimize soil compaction and rutting when skidding in wet areas.
- Use only approved or permitted road crossings.
- Never skid through vernal pools or across stream channels.
- Avoid skidding through temporary ponds, wetlands, or spring seeps to the greatest extent possible.
- Reduce skid volumes when skidding through wetland areas.

#### **iv. Landings**

Proper water control measures, location, and size of landings will limit soil erosion and compaction that can occur from concentrated heavy equipment use.

- Do not locate log landings in wetlands.
- Avoid spills of oil and other hazardous material and store operating supplies of such materials away from wetlands and waterways.

#### **v. Haul Roads**

When properly located, constructed, and maintained, roads will have limited impact on water quality, hydrology, erosion, and wildlife and fish habitat. Particular care should be exercised to avoid making permanent changes in water levels and drainage patterns.

- Avoid wetlands and stream crossings through areas known to provide habitat for rare, threatened, and endangered species, and avoid crossing through headwaters of public water supplies.
- Allow roads time to settle between construction and use.
- Avoid road construction during wet periods.
- Minimize road width to the size necessary to carry traffic.
- Use fabric mats or pads under fill to minimize disturbance to wetlands and facilitate removal of temporary roads.
- Construct haul road entrances to prevent mud on truck tires from getting on paved road surfaces that could wash into nearby wetlands.

#### **vi. Vernal Pools and Spring Seeps**

Vernal pools are seasonal pools that fill with water in the spring and fall. Vernal pools are a unique wetland habitat that provides for a vast amount of diversity in wetland systems and are the sole source of breeding for many amphibians. In addition, their hydrology is in a delicate balance where it is present at just the right time to promote breeding and reproduction and are gone later in the year. As such, their functions are unique and can be easily disturbed by timber harvest practices.

Spring seeps are small wetlands typically found in sloping terrains where groundwater reaches the surface and shallow, broad flows move outward, creating a saturated zone. The groundwater can flow year-round or be present seasonally. Although seeps and vernal pools only contain occasional trees, both are effectively shaded by the overlapping crowns of the adjacent forest trees.

Vernal pools and spring seeps provide quality wildlife habitat and should be protected from the impacts of timber harvesting activities. Special management practices, as described below, should be applied when operating around ponds, vernal pools, and seeps.

- Use filter strips around vernal pools and seeps.
- Avoid timber harvesting in vernal pools or within a complex of pools and within a buffer around the pools.
- Apply a buffer around vernal pools to ensure canopy retention and prevent drainage of the pools. The no-harvest buffer should be no less than two (2) tree crown widths (or 100 feet) around individual pools with a recommended four (4) tree crown widths (or 200 feet) around pool complexes or high-quality individual sites and include the entire area of land and slope which may be impounding the pool(s).
- Avoid clear-cutting and use selective cutting in the areas from the recommended vernal pool buffer boundary outward to 1,000 feet to maintain ambient water quality and hydrology characteristics and to protect core amphibian habitat, which includes the upland areas immediately adjacent to vernal pools.
- Conduct a PNDI Search for all wetlands in which timber harvesting will occur since many wetlands, including vernal pools, contain habitat for threatened and endangered species. Follow all avoidance measures before harvesting in wetlands which serve as habitat for threatened and endangered species, as indicated on the PNDI receipt. These wetlands are Exceptional Value (EV) and should be avoided to the greatest extent practicable. See [25 Pa. Code § 105.17\(1\)](#).
- Fell trees away from vernal pools or seeps.
- Leave tops in the wetland if felling into standing water cannot be avoided.
- Do not skid through vernal pools, seeps, or wetlands.
- Avoid making ruts near or within a vernal pool. Harvesting under frozen or snowy conditions is advisable to minimize rutting and disturbance of leaf litter.
- Locate haul roads downstream from the head of a seep and avoid road building directly uphill from seeps.
- Concentrate skidding on defined corridors and use cable skidders when possible. Minimize skid trails by maximizing cable lengths to reduce erosion and sedimentation.

### C. Site Layout

Use of BMPs not only protects streams and wetlands, but also benefits loggers and landowners. Loggers know that the layout of a timber harvest can have a tremendous impact on an operation's productivity. A poorly laid out harvest can result in inefficiencies, bottlenecks, and lost potential revenues. In contrast, careful planning that results in proper site layout and the use of appropriate BMPs not only generates a more efficient operation, it also helps protect the environment in the following ways:

- Limits wear and tear on machinery and equipment
  - Cleaner wood; less chain sharpening and easier product preparation
  - Less down-time because of poorly designed road and impassable skid trails
- More efficient utilization of equipment and manpower
  - Less idling of the skidder
  - Faster turn-times
  - Fewer skid trails needed
  - Less time constructing stream crossings
  - Smaller more efficient landings
  - Less time for post-harvest cleanup

- Minimizes impact of timber harvesting on the environment
  - Reduces soil disturbance and compaction
  - Reduces erosion and sedimentation
  - Maintains water quality
  - Protects fish and wildlife habitat
- Maintains forest productivity
  - Aids forest regeneration
  - Protects future growing stock
  - Protects biological diversity
- Adherence to higher environmental standards
  - Competitive advantage from higher quality operations
  - Improves landowner relationships
  - Better acceptance of the industry by the general public
  - More interest from potential clients

The principal areas of earth disturbance associated with a timber harvest that need careful consideration are haul roads, skid roads, skid trails and landing areas. Managing erosion on logging road systems is a water control problem. The very first and most important step is to locate these features in areas that will maximize efficiency and cause the least potential for accelerated erosion. The next step is to build a functional drainage system of culverts, dips, bridges, turnouts, and out-sloping or in-sloping roads to carry water away. After that, the road must be kept reasonably free of ruts, curbs and logging debris that may prevent water from moving freely into drainage structures. The basic principal is to get the water off the road as soon as possible.

**Figure 4** is an example of a typical timber harvest site plan and **Figure 5** is an alternative timber harvest site plan.

**Figure 4. Typical Timber Harvest Site Plan**

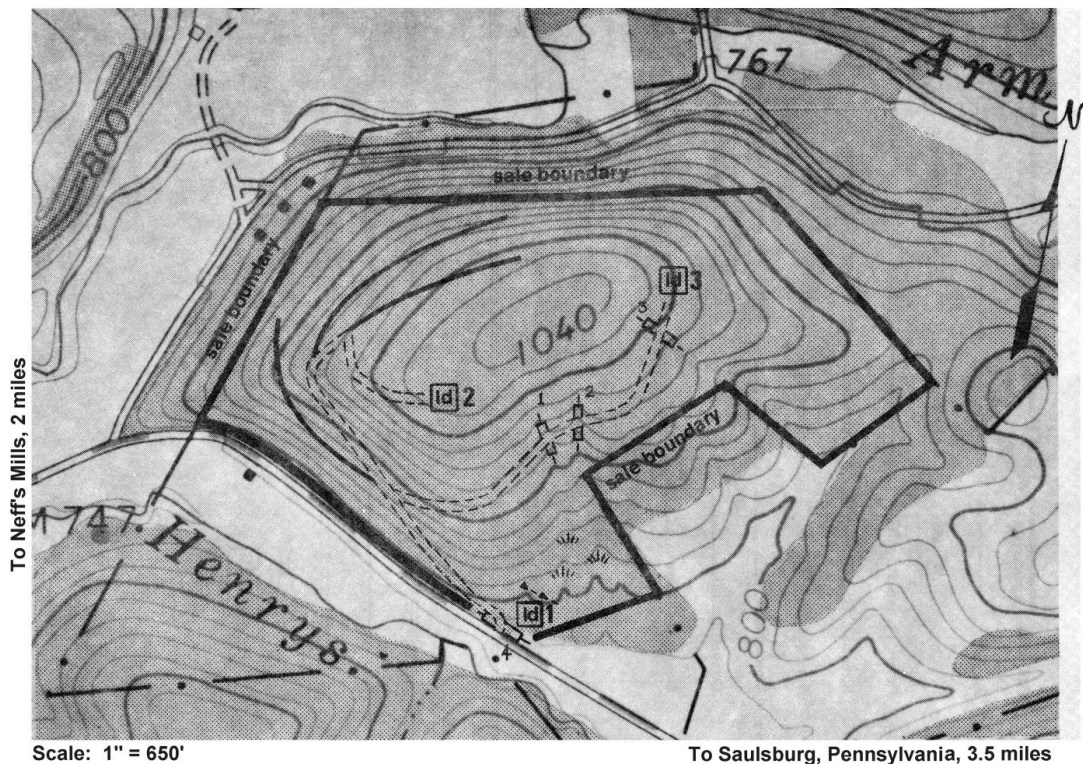
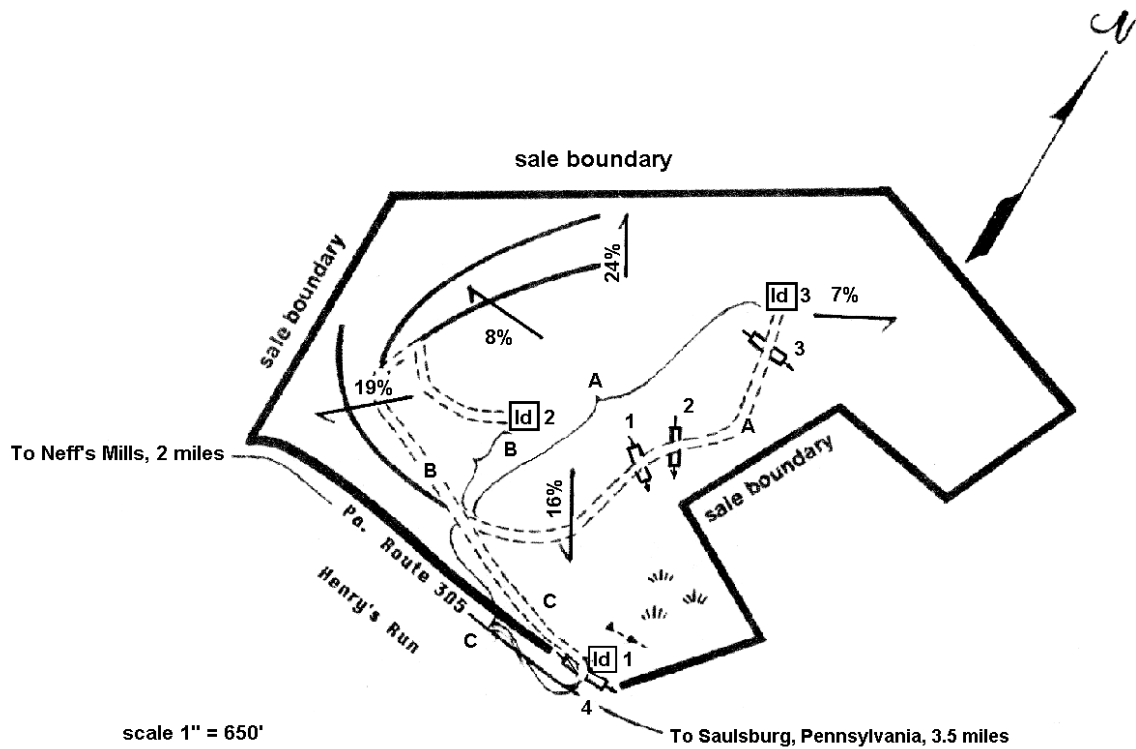


Figure 5. Alternative Timber Harvest Site Plan



## 1. Haul Roads

Haul roads for a timber harvest project typically run from the landings to the entrance(s). Every haul road system should be planned and developed as if it will be a permanent road. Many haul roads initially considered to be temporary, are often used again and again. Therefore, the entire haul road system should be designed before any haul road construction begins. This process may seem to take more time, but the haul road system will be more efficient, less costly, and easier to maintain.

The following points should be considered when laying out a road system:

- **Construct only as much road as necessary.** Minimize clearing. Keep road width to the minimum necessary for safe and efficient operation.
- **Terminal points** – Locate the start and end of the road system using the best access that is safe and visible from public roads. Locate landings away from streams and wet areas. Install rock construction entrances (Section IV.B.11) at all exit points onto a public roadway. Install an entry gate or barricade to keep potentially damaging and unwanted traffic off the haul road. **NOTE: A highway occupancy permit may be required.**
- **Grades** – Haul roads with a maximum slope of 10% and a minimum of 2% are usually the easiest to maintain. Where absolutely necessary, grades of 15 to 20% can be used for short distances. Follow the contour as much as possible.
- **Topography** – Roads on moderate side hills are easiest to build and drain. Avoid steep slopes wherever possible.
- **Drainage** – Construct roads to drain at all times, such as using crowned or insloped surfaces. Install ditch relief culverts (Section IV.B.1) at specified intervals, as shown in Table 2 or Table 3. Provide outlet protection at all culvert outfalls. Turnouts, as shown in Figure 8, may be used on low-side ditches to direct flow into filter strips.
- **Grading** – Minimize cut and fill work and keep slopes at stable angles. Remove trees from tops of cuts when the root system is undercut, and seed and mulch cut and fill slopes promptly.



(Section IV.B.12.). Do not place fill into open sinkholes, waterways, wetlands, floodways, or other sensitive areas.

- **Obstacles** – Design the road system to go around springs, seeps, wetlands, poor drainage areas, ledges, and rocky areas wherever possible.
- **Soils** – Be aware of soil texture, drainage class and slope position as outlined in Appendix E of DEP's E&S Manual. Some soils are poorly drained or seasonally wet and are difficult to log. Others are unstable when support is removed to make a road cut or when used as fill. The NRCS soils website should be consulted to identify soil limitations. Minimize the traffic areas. Running equipment over soil compacts it and damages its ability to infiltrate runoff.
- **Distances from streams** – Filter strips should be maintained along stream corridors to provide sediment filtration and maintain stream temperatures. Wherever sufficient filter strips are not possible between roadways and receiving waters, install BMPs such as silt fence (Section IV.B.7) as the roadway progresses. See Section IV.B.6 for minimum filter strip widths.
- **Stream and stream crossings** – See Section III.B.2. for stream and stream crossing considerations, minimize the number of stream crossings. Cross at a 90-degree angle and approach the stream from as gentle a slope as possible. **NOTE: A Chapter 105 permit and Submerged Lands License Agreement may be required.**
- **Old roads** – It is often possible to use existing roads and thereby lessen soil disturbance. However, to avoid problems, carefully evaluate the road's suitability for upgrading.
- **Size and duration of the sale** and the anticipated season of harvest.
- **Floodways** – See Section III.B.2. for stream and floodway considerations. Roadway construction within floodways - typically 50 feet from top of streambank - and wetlands require Water Obstruction and Encroachment permits.
- **Floodplains** – Identify their location and the potential for impact. Avoid floodplains and wetlands if possible.
- **Wetlands and wetland crossings** – See Section III.B.3. for wetland and wetland crossing considerations.
- **Water control structures** – Carefully plan the use of broad-based dips, waterbars, culverts, and ditches to maintain existing flow patterns and minimize the amount of runoff being conveyed by roadways and roadside ditches.

## 2. Skid Roads and Skid Trails

The primary difference between a skid road and a skid trail is the degree of preparation for use. Main skid roads should be flagged, cleared, and graded. Skid trails, which are used for transporting logs from stump to main skid road, are usually not graded and need only minimal clearing. In developing a skid road and trail system, pay special attention to proper drainage and soil stabilization. The following items should be considered:

- **Grades** – Keep grades as low as the topography will permit. Do not go straight up the slope; proceed across the slope as much as possible. Grades of 20% or more should be avoided. Where unavoidable, they should be kept to short distances and make use of waterbars.
- **Use waterbars** wherever it is not possible to avoid going straight up or down slopes.
- **Avoid rocky slopes and steep grades.**
- Skid trails and skid roads should be located at least 50 feet from stream channels, wherever possible.
- **Stream and stream crossings** – See Section III.B.2 for stream and stream crossing considerations. Use temporary bridges or culverts and obtain all appropriate permits/authorizations.
- **Wetlands and wetland crossings** – See Section III.B.3 for wetland and wetland crossing considerations.

### 3. Log Landings

Log landings are used to store and process logs and other products prior to loading and transportation. The number and size of landings should be kept to the minimum necessary to operate safely and efficiently. Few erosion problems are associated with a properly located landing. Problems will occur, however, when water control is not considered in selecting a location. Only sites that will hold up under the anticipated use by heavy equipment should be chosen. Avoid sensitive areas such as riparian management zones, waterways, wetlands, caves, spring seeps, and open sinkholes. Allow adequate undisturbed filter strips between the landing and streams or sensitive areas (Section IV.B.6).



E&S Pollution Control Manual

Disturb only the area needed for safe operations. If the topography warrants, use a diversion channel, as described in Chapter 6 of DEP's E&S Manual, above the landing to keep upslope runoff from entering the landing area. The diversion channel should have a suitable protective liner and outlet to an existing waterway wherever possible. If no waterway exists, the discharge should be directed to a stable area. If leveling is necessary, cut and fill should not alter the natural drainage pattern of the area.

Heavy equipment quickly compacts soils on landings, preventing water from infiltrating. Consider the use of fabric mats and pads at landing sites to minimize soil erosion and compaction. The landing should be sloped so as to direct runoff to a sediment removal BMP such as a wood chip berm, silt fence, straw bales, etc.

Skid roads, skid trails, and haul roads approaching the landing from above should have a waterbar, broad-based dip, or other means of diverting flow into a stable area before it reaches the landing.

Refer to Section III.B.3 of this booklet for additional log landing considerations related to wetlands.

### 4. Pollution from Geological Formations

Coal and black shale typically contain pyrite, a mineral composed of iron and sulfur. When pyrite is exposed to the atmosphere, it weathers, producing sulfuric acid and iron. The sulfuric acid can dissolve additional undesirable elements from the rocks, such as aluminum and manganese. If these acid-producing rocks (APR) are disturbed during timber harvesting earth disturbances and are not properly handled, streams and groundwater can become polluted.

The best way to avoid pollution is to avoid disturbing the materials that cause pollution and to ensure that these materials are not being brought to the project site for fill or aggregate. If it is known that APRs, such as coal, will be encountered, any excavation should either be moved to an area that does not contain these rocks or the rocks must be dealt with in a way that reduces the risk of pollution. However, typically the upper 25 to 35 feet of bedrock does not contain pyrite because pyrite is not stable under atmospheric conditions and will weather away. If excavations are shallower than 30 feet, as is the case on most timber harvesting operations, the risk of acid drainage is generally minimal. This is particularly true if a site is located south of the glacial margin. Within the glaciated regions of Pennsylvania weathered bedrock may have been removed by glaciers and pyrite may exist closer to the surface. Unconsolidated sediments, such as glacial till, sand, and gravel, are not acid-producing and can be dug into without risk of acidic drainage. Refer to DEP Fact Sheet, *How to Avoid and Handle Acid-Producing Rock Formations Encountered During Well Site Development* ([5600-FS-DEP4284](#)) for additional information.

E&S Plans for timber harvesting operations need to identify any known geologic formations or soil conditions on the site that may have the potential to cause pollution during earth disturbance activities and include BMPs, when necessary, to avoid or minimize potential pollution and its impacts from such formations (e.g., proper handling, isolation, disposal, etc.).

Bedrock or soil conditions which could result in significant slope failures resulting in mass soil movement into surface waters, property damage, or a public safety hazard should also be identified. The E&S Plan narrative should briefly state the methods incorporated into the plan which address such

hazards, when necessary. Plan maps should clearly mark the locations where potential for slope failures exist, and appropriate construction details should be provided on the plan drawings, when necessary.

## 5. Thermal Impacts to Surface Waters

Temperature is a significant water quality parameter. It strongly influences levels of oxygen and solids dissolved in streams. Temperature changes can induce algal blooms with subsequent changes in taste, odor, and color of a waterbody. Warm water is also conducive to the growth and development of many species of aquatic bacterial. In short, water temperature is a major determinant of the suitability of water for many uses and is regulated under the Clean Streams Law.

Removal of canopy cover might induce minor thermal impacts which can be mitigated by re-vegetation or reforestation of the area and maintaining or creating filter strips along surface waters and within wetlands. DEP's regulations in Chapter 102 require timber harvesting E&S Plans to address any potential thermal impacts to waters of the Commonwealth, and identify any treatment and/or mitigation plans, dependent on the type of impact.

## IV. SITE MANAGEMENT

Haul roads, skid roads, skid trails, and landing areas have the potential to affect water quality and hydrology. Extra care must be taken when carrying out these timber harvesting operations by implementing appropriate BMPs for the site before, during, and after the activity. These BMPs should be predetermined and clearly outlined in the timber harvesting E&S Plan for the site ahead of time. However, plans should also be adaptable and reflect any alterations resulting from unanticipated circumstances or changing conditions encountered after the operation begins.

As mentioned in Section I of this guide, it is important to remember that for every situation described, there may be more than one adequate method to minimize and prevent sediment pollution.

### A. BMP Responsibility

DEP regulations require that BMPs be implemented and maintained "before, during, and after earth disturbance activities" (25 Pa. Code §§ 102.1 and 102.4(b)(1)).

The landowner and the person responsible for the earth disturbance activity (e.g., timber harvesting operator) are responsible for complying with all regulations. E&S Plans must be prepared by a person trained and experienced in E&S control methods and techniques applicable to the size and scope of the project being designed (25 Pa. Code § 102.4(b)(3)). Therefore, landowners and operators are encouraged to seek out professional help when needed. Typically, a forester and in many cases a logger may have the training and expertise needed to develop a proper E&S Plan.

Implementation of the E&S Plan is usually the responsibility of the logger during the timber harvesting activity. The forester normally provides oversight of the operation by performing regular inspections and works with the logger to correct any existing or potential E&S issues found on the site. The forester or logger will also update the E&S Plan when any unanticipated circumstances or situations require a deviation from the original plan. When the timber harvesting activity is completed, responsibility for maintaining the BMPs on the site typically reverts back to the landowner. It is a good practice to request a final site inspection from the conservation district before this transfer of responsibility occurs to ensure that all regulatory and environmental obligations have been met.



E&S Control Plan Template for  
a Timber Harvest Operation

The E&S Plan should clearly identify the role and responsibilities of all entities involved in the sale. When using the *Erosion and Sediment Control Plan Template for a Timber Harvesting Operation* ([3800-FM-BCW0539](#)), it is advisable to list the logger in Section 1.D as the primary person responsible for construction and maintenance of erosion and sediment control BMPs, and to list the landowner in

Section 12 as another party assigned and include an explanation that responsibility will transfer to the landowner after the timber harvesting activity has been completed and the site has been properly retired.

## B. Recommended BMPs

The following standard BMP drawings and recommended spacings have been provided to fulfill the requirements of a timber harvesting E&S Plan and satisfy Chapter 102 regulations. The timber harvest E&S Plan should identify which BMPs will be used and identify their approximate location. If alternative BMPs are used the E&S Plan must include drawings showing the details, specifications, spacings, and other necessary information to demonstrate compliance with [25 Pa. Code § 102.11\(b\)](#). The standards and construction details referenced are from DEP's E&S Manual, which contains additional information and details. Additional approved BMPs and specifications can be found at DEP's website, Keyword Search: E&S Resources.

Timber harvesting projects that require a Chapter 102 permit and occur within a special protection watershed or discharge to an EV wetland will be required to implement non-discharge alternatives or antidegradation best available combination of technologies (ABACT) BMPs in accordance with 25 Pa. Code §§ 102.4(b)(6) and 102.8(h). Refer to Chapter 17 of the E&S Manual or to DEP's *Water Quality Antidegradation Implementation Guidance* ([391-0300-002](#)) for more information.



E&S Pollution Control Manual

### 1. Ditch Relief Culvert (Cross Drains)

#### Design Standards

- Minimum diameter for any culvert is 12"; otherwise culvert must be sized for anticipated peak flow. Place culvert so bottom is at same level as bottom of ditch or adjoining slope. Culverts must be placed with a slope of 2 to 4%. Lower end must be at least 2" below upper end and at ground level.
- Extend culvert 12" beyond base of road fill on both sides. Firmly pack fill around culvert, especially the bottom half.
- Provide suitable outlet protection and, where appropriate, inlet protection.
- NOTE: This detail may be used for ditch relief culverts and for crossings of roadside ditches. It is not appropriate for stream crossings.
- For steep slope (>2H:1V) outfalls, a minimum 20-foot long R-5 apron is recommended for temporary access roads where the recommended culvert spacing is used. For permanent access roads, a minimum R-6 rock size is recommended.

#### Maintenance

- Inspect culvert(s) weekly: remove any flow obstructions and make necessary repairs immediately.

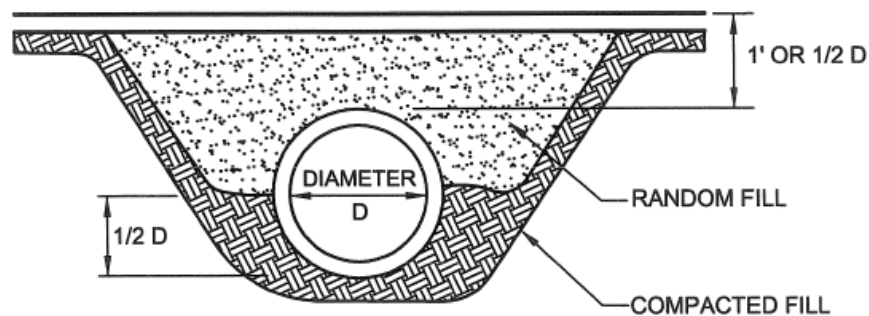
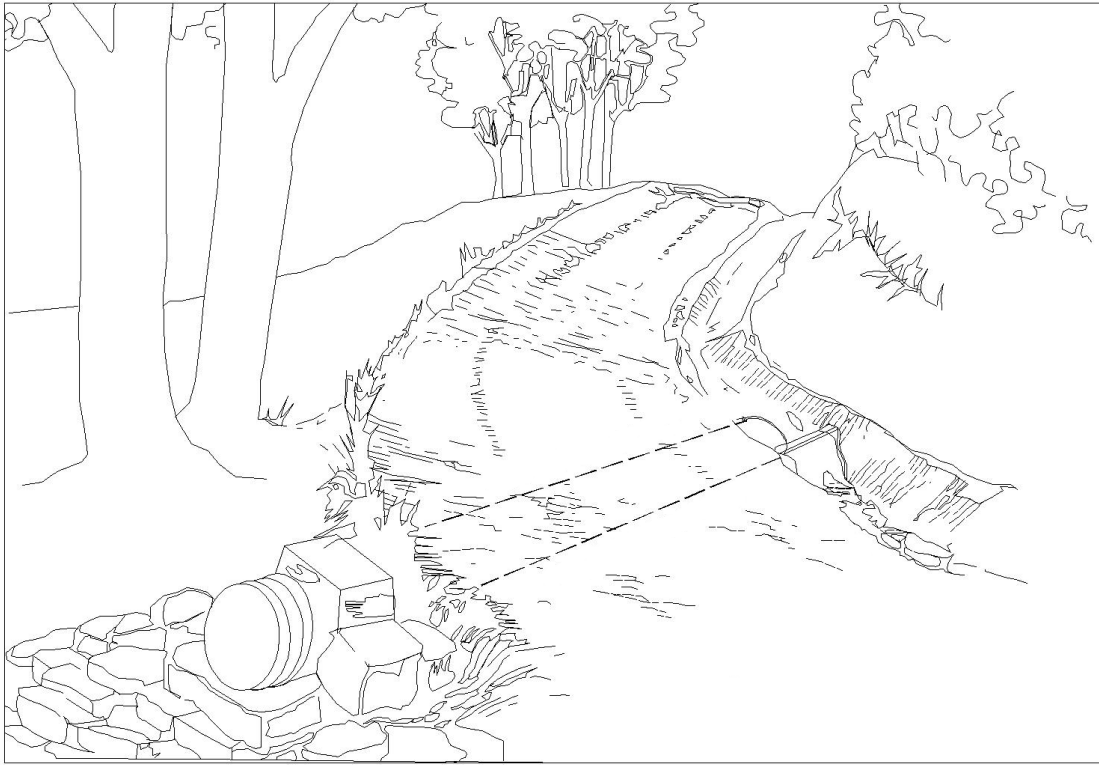
**Table 2. Ditch Relief Culvert Spacing for Temporary Access Roads**

Road Grade (% Slope)	Recommended Spacing (ft)
2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140
12	135

**Table 3. Ditch Relief Culvert Spacing for Permanent Access Roads**

Road Grade (% Slope)	Recommended Spacing (ft)
2	500
4	400
6	350
8	300
10	250
12	200
14	150

**Figure 6. Standard Construction Detail for Ditch Relief Culverts**



## **2. Waterbars**

### Design Standards

- Waterbars are typically used to control stormwater runoff on retired access roads, skid roads, and skid trails. They are not recommended for active access roads or skid trails due to the difficulty of moving equipment over them as well as the need for continual maintenance due to damage from traffic.
- Where waterbars are not practical on active access roads, skid roads, or skid trails, other BMPs such as Water Deflectors (Section IV.B.4) or Broad-based Dips (Section IV.B.5) can be used to control runoff.
- Waterbars must be placed at a slight angle to allow drainage and discharge to a stable area.

### Maintenance

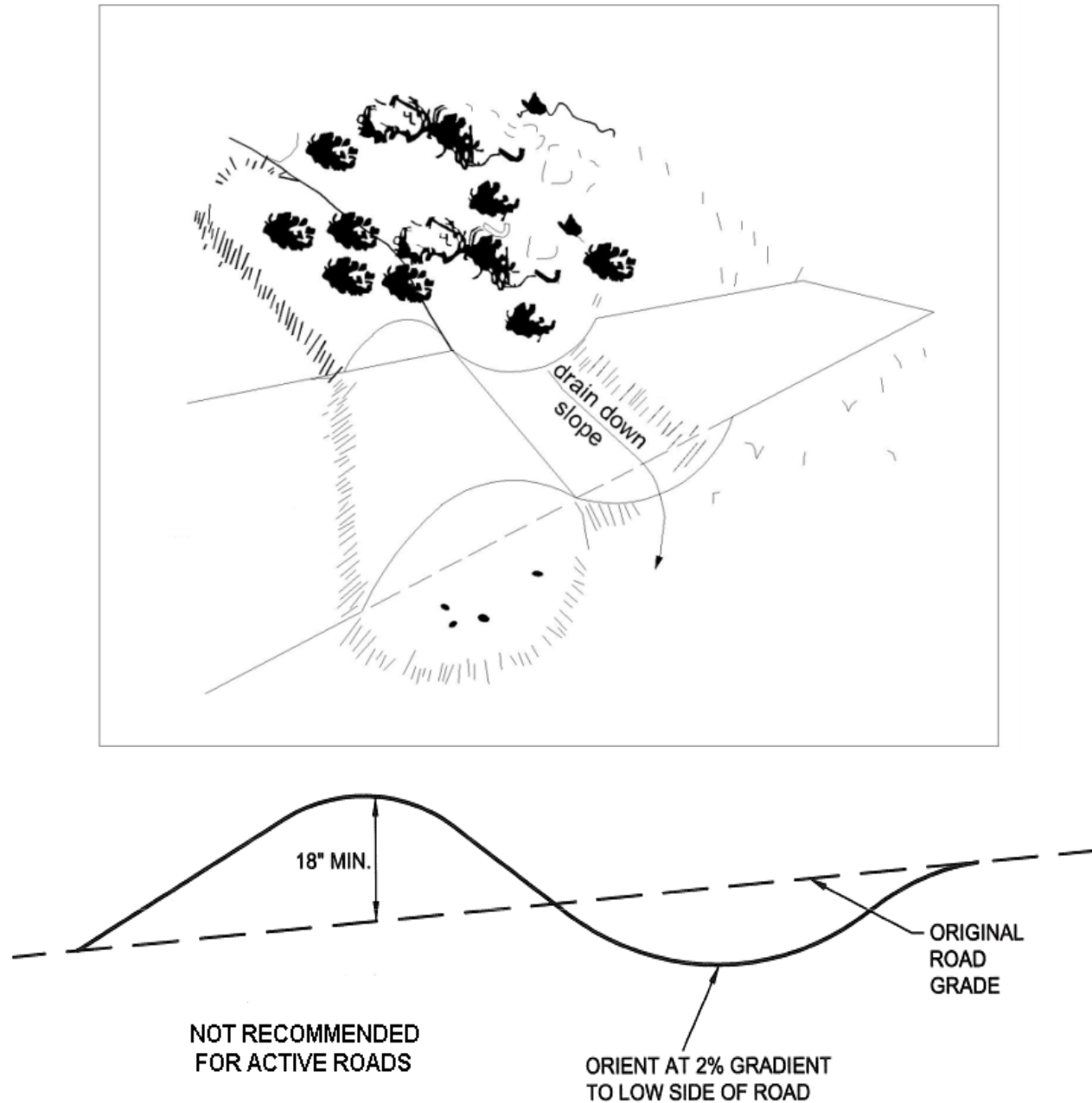
- Waterbars must be inspected weekly (daily on active roads) and after each runoff event. Damaged or eroded waterbars must be restored to original dimensions within 24 hours of inspection.

- Maintenance of waterbars must be provided until roadway, skid road, or right-of-way has achieved permanent stabilization.
- Waterbars on retired roadways, skid roads, and rights-of-way must be left in place after permanent stabilization has been achieved.
- Waterbars that need to be removed during operations should be replaced before leaving the site at the end of the day.

**Table 4. Waterbar Spacing**

Road Grade (% Slope)	Recommended Spacing (ft)
0 – 5	250
5 – 15	150
15 – 30	100
30 & above	50

**Figure 7. Standard Construction Detail for Waterbars**

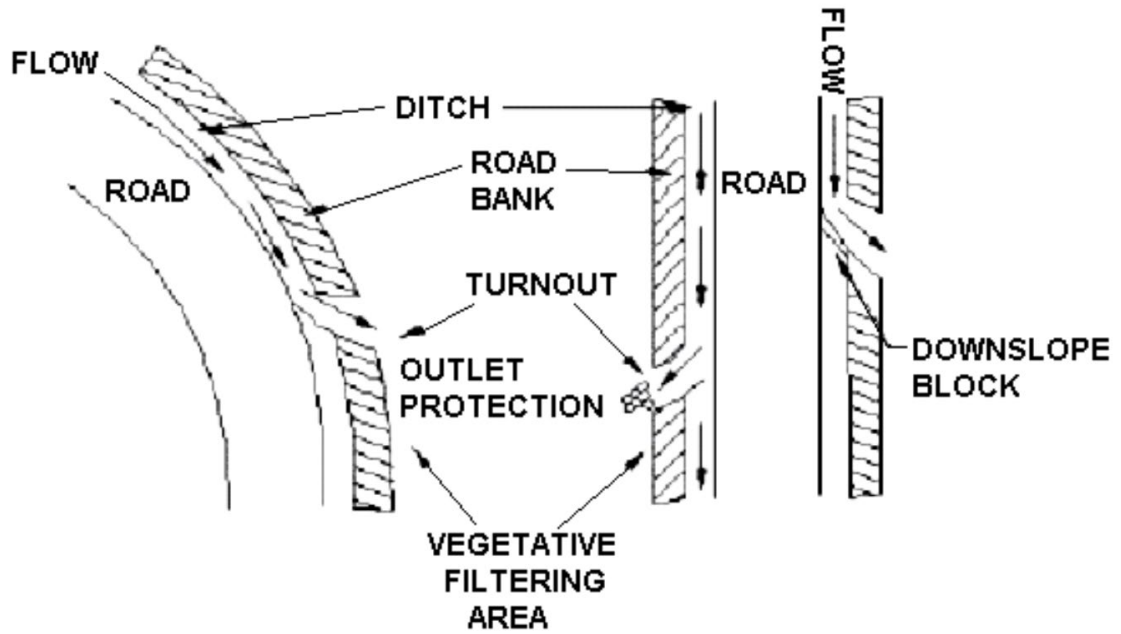


### **3. Turnouts**

#### Design Standards

- Turnouts should be located so as to take advantage of natural drainage courses or filter strips whenever possible.
- An excavated sump at the end of the turnout can be effectively used to pond and settle out sediment prior to discharging to a vegetated buffer.
- Where a suitable filter strip is not available, a compost filter sock, rock filter or other sediment removal BMP should be installed at the outlet of the turnout.

**Figure 8. Standard Construction Detail for Turnouts**



#### **4. Water Deflector**

##### Design Standards

- Maximum spacing of deflectors must be as shown in **Table 5**.

##### Maintenance

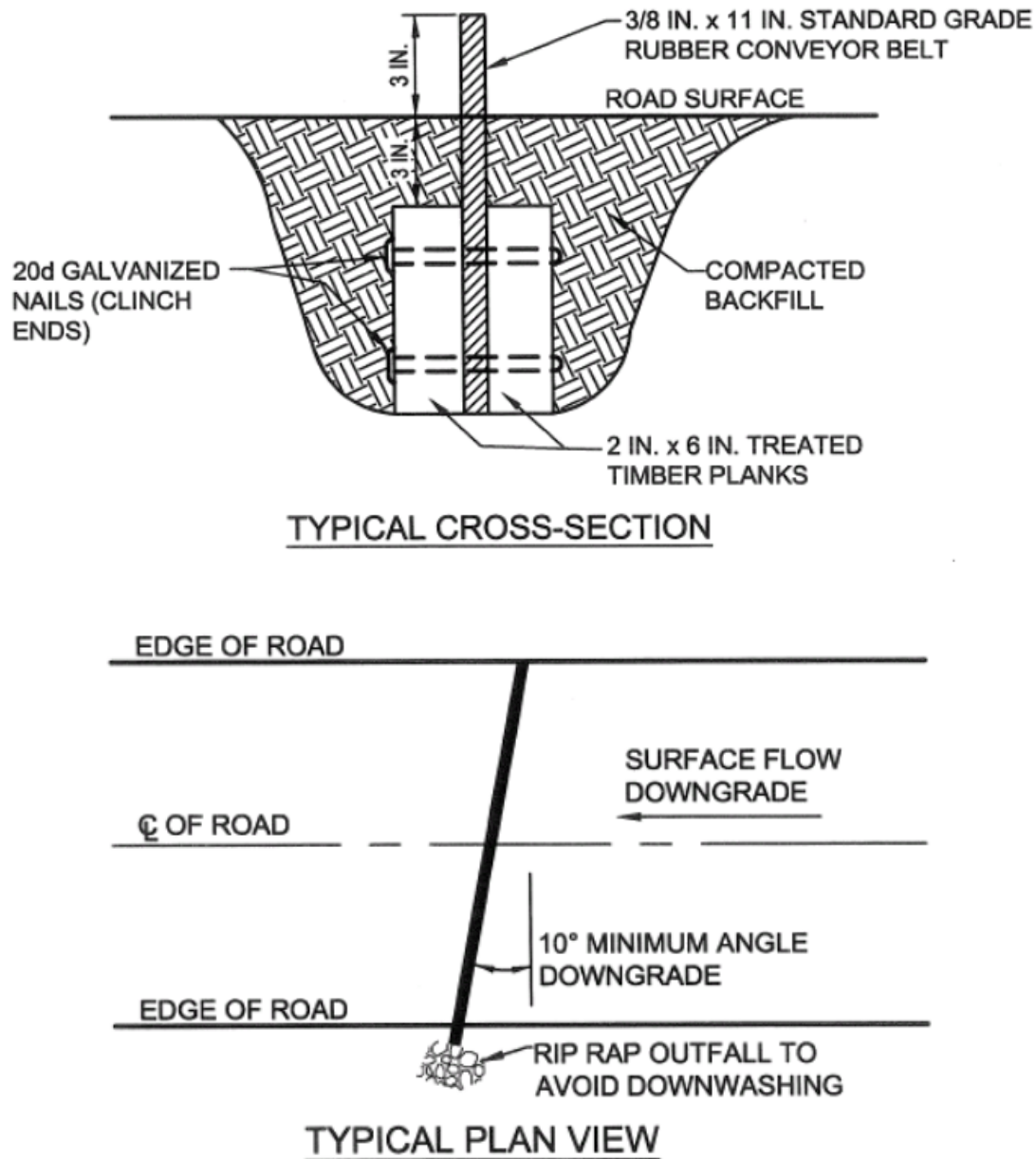
- Deflector must be inspected weekly and after each runoff event.
- Accumulated sediment must be removed from the deflector within 24 hours of inspection.
- Belt must be replaced when worn and no longer effective.

**Table 5. Water Deflector Spacing**

Road Grade (% Slope)	Recommended Spacing (ft)
< 2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140



**Figure 9. Standard Construction Detail for Water Deflectors**



## 5. Broad-based Dips

### Design Standards

- Broad-based dips must be constructed to the dimensions shown and at the locations shown on the sketch map (refer to Section III.C).
- Dips must be oriented so as to discharge to the low side of the roadway.
- Maximum spacing of broad-based dips must be as shown in **Table 6**.

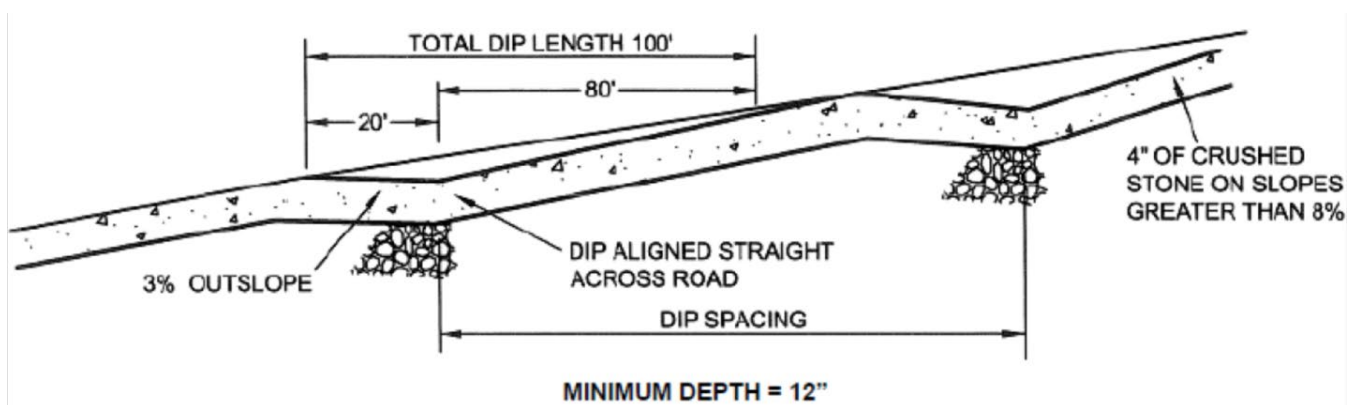
### Maintenance

- Dips must be inspected daily. Damaged or non-functioning dips must be repaired by the end of the workday.

**Table 6. Broad-based Dip Spacing**

Road Grade (% Slope)	Recommended Spacing (ft)
< 2	300
3	250
4	200
5	180
6	170
7	160
8	150
9	145
10	140

**Figure 10. Standard Construction Detail for Broad-based Dips**



## 6. Filter Strip

### Design Standards

- A filter strip is a strip or area of vegetation used for removing sediment, organic matter, and other pollutants from runoff and wastewater.
- To be effective, runoff should be in the form of sheet flow and the vegetative cover should be established prior to the earth disturbance activity.
- The suitability of natural filter strips should be documented by photo(s) as part of the plan.
- Meadow vegetation should be an existing, well-established, perennial grass.
- Forest filter strips consist of vegetation that is predominantly native trees, shrubs and forbs along surface waters that is maintained in a natural state or sustainably managed to protect and enhance water quality, stabilize stream channels and banks, and separate land use activities from surface waters. Trees can be harvested from forest filter strips but should be winched or otherwise removed in a way that avoids soil disturbance within these areas. Log landings, haul roads, skid roads and skid trails should be located outside of the filter strip except where stream crossing is necessary.

### Maintenance

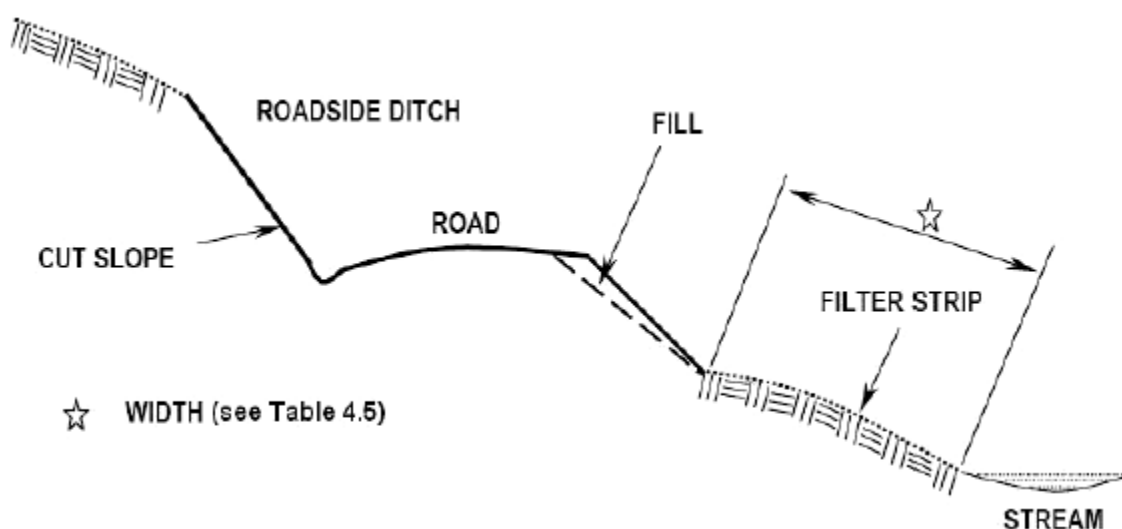
- If at any time, the width of the filter strip has been reduced by sediment deposition to half its original width, suitable replacement BMPs should be installed. The plan should specify what BMPs will be installed should this occur.

**Table 7. Filter Strip Widths**

Land Slope of Strip (%)	Recommended Width (ft)	
	Meadow	Forest*
≤ 10	50	75
20	65	100
30	85	125
40	105	160
50	125	190
60	145	220
70	165	250

\* Consideration should be given to placing a sediment barrier (e.g., wood chip berm, silt fence, straw bales, etc.) immediately below the disturbed area due to minimal sediment removal on typical forest floors.

**Figure 11. Standard Construction Detail for Filter Strips**



## 7. Silt Fence (Filter Fabric Fence)

### Design Standards

- Fabric must have the minimum properties as shown in Table 4.3 of DEP's E&S Manual.
- The maximum slope length above any silt fence may not exceed that shown in Table 4.4 of DEP's E&S Manual.
- Fabric width must be 30" minimum. Stakes must be hardwood or equivalent steel (U or T) stakes.
- Silt fence must be placed at level existing grade. Both ends of the fence must be extended at least eight feet up slope at 45 degrees to the main fence alignment (see Figure 12).
- Fences should not be installed in streams, ditches, or other areas of concentrated flow.

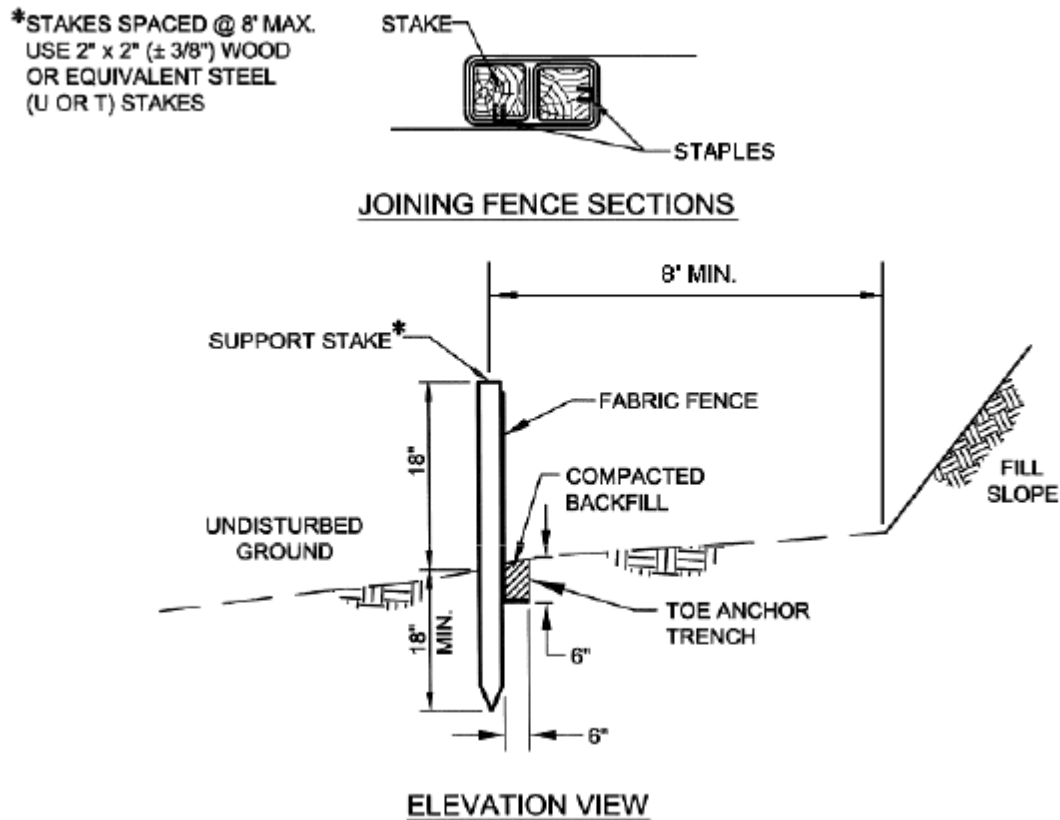


E&S Pollution Control Manual

### Maintenance

- Sediment must be removed when accumulations reach half the aboveground height of the fence.
- Any section of silt fence which has been undermined or topped must be immediately replaced with a rock filter outlet.
- Fence must be removed and properly disposed of when tributary area is permanently stabilized.

**Figure 12. Standard Construction Detail for Silt Fence**



## 8. Compost Filter Sock

### Design Standards

- Sock fabric must meet standards of Table 4.1, and compost must meet the standards of Table 4.2 (as revised) in DEP's E&S Manual.
- Compost filter sock must be placed at existing level grade. Both ends of the sock must be extended at least eight feet up slope at 45 degrees to the main sock alignment (Figure 13). Maximum slope length above any sock may not exceed that shown on Figure 4.2 in DEP's E&S Manual. Stakes may be installed immediately downslope of the sock if so, specified by the manufacturer.

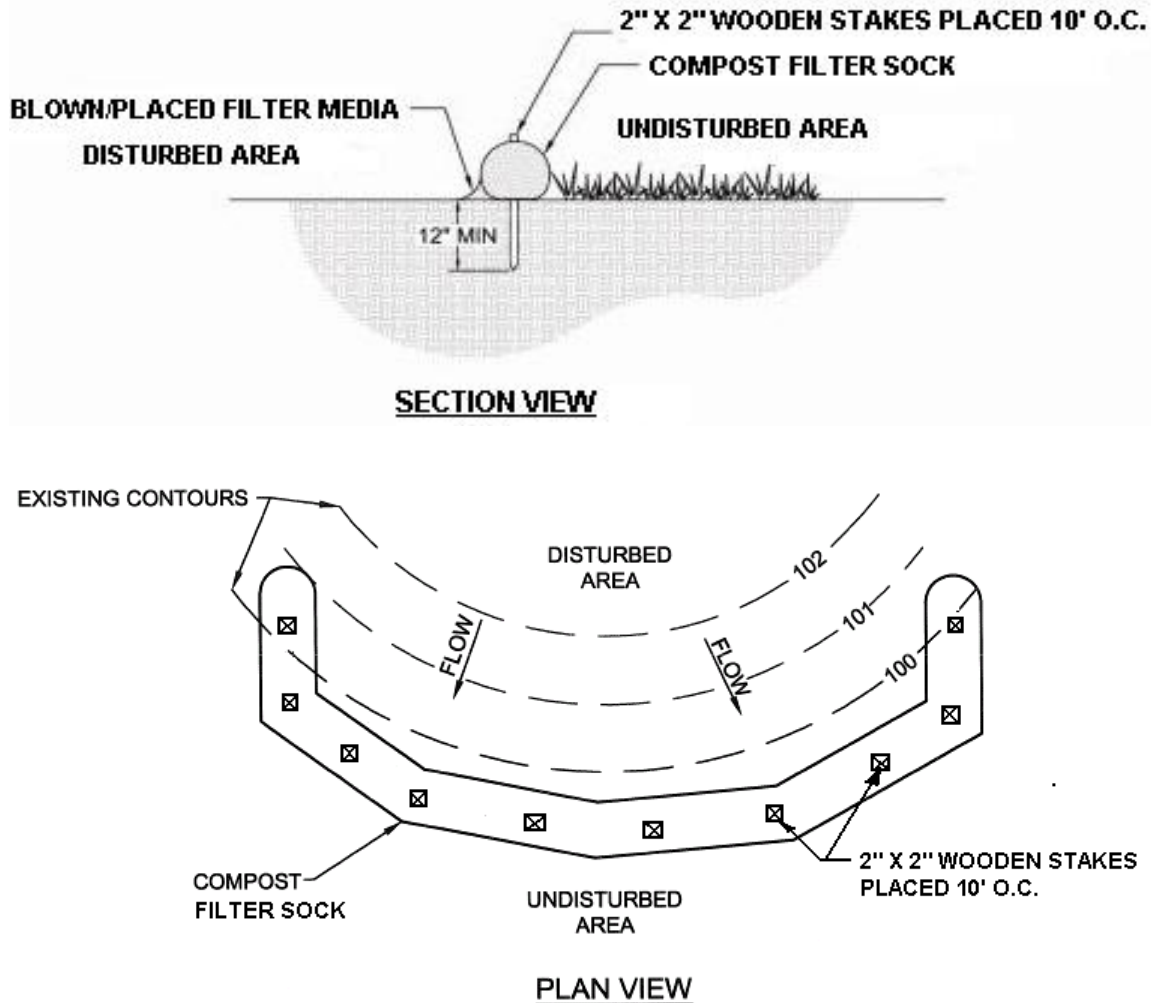


E&S Pollution Control Manual

### Maintenance

- Traffic may not be permitted to cross filter socks.
- Accumulated sediment must be removed when it reaches half the aboveground height of the sock and disposed in the manner described elsewhere in the plan.
- Socks must be inspected weekly and after each runoff event. Damaged socks must be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.
- Biodegradable filter socks must be replaced after six months; photodegradable socks after one year. Polypropylene socks must be replaced according to manufacturer's recommendations.
- Upon stabilization of the area tributary to the sock, stakes must be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh must be cut open and the mulch spread as a soil supplement.

**Figure 13. Standard Construction Detail for Compost Filter Sock**



## 9. Straw Bale Barrier

### Design Standard

- The maximum slope length above any straw bale barrier may not exceed that shown in Table 4.5 of DEP's E&S Manual.
- Straw bale barriers may not be used for projects extending more than three months.
- Straw bale barriers must be placed at existing level grade with ends tightly abutting the adjacent bales. First stake of each bale must be angled toward adjacent bale to draw bales together. Stakes must be driven flush with the top of the bale (see Figure 4.4 in DEP's E&S Manual). Both ends of the barrier must be extended at least eight feet up slope at 45 degrees to the main barrier alignment (see Figure 4.1 in DEP's E&S Manual).
- Compacted backfill must extend approximately four inches above ground level.
- They should not be installed in streams, ditches, or other areas of concentrated flow.

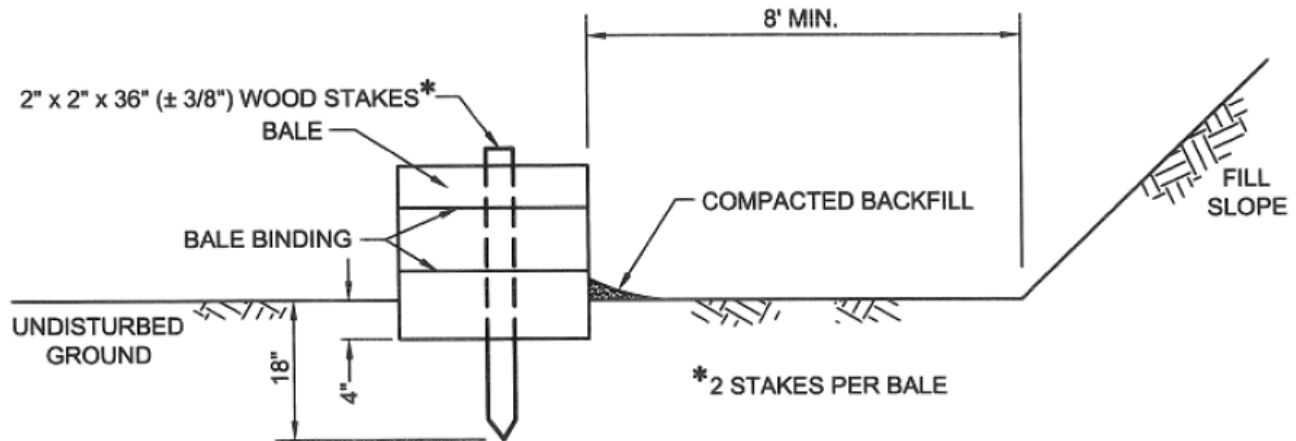


E&S Pollution Control Manual

### Maintenance

- Sediment must be removed when accumulations reach 1/3 the aboveground height of the barrier. Damaged or deteriorated bales must be replaced immediately upon inspection.
- Any section of straw bale barrier which has been undermined or topped must be immediately replaced with a rock filter outlet.
- Bales must be removed when the tributary area has been permanently stabilized.

**Figure 14. Standard Construction Detail for Straw Bale Barriers**



## **10. Wood Chip Filter Berm**

### Design Standards

- The maximum slope length above any wood chip filter berm may not exceed that shown in Table 4.5 of DEP's E&S Manual.
- Prior to placement of the berm, obstructions such as tree limbs, large rocks, etc. must be removed.
- Wood chip filter berm must be placed at existing level grade. Both ends of the berm must be extended at least eight feet up slope at 45 degrees to the main berm alignment (Figure 4.1 in DEP's E&S Manual). Wood chip berms may not be located in areas of concentrated flow or used to construct sediment traps or other impoundments.

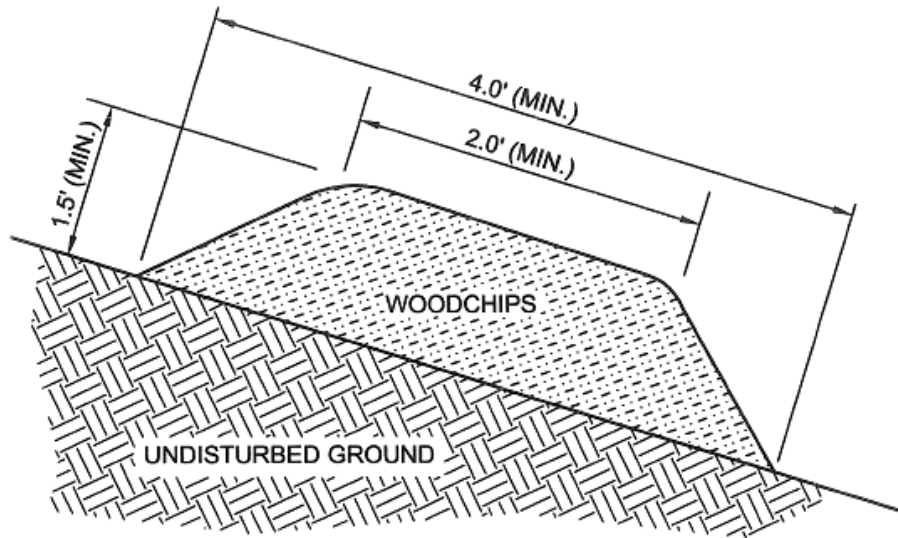


E&S Pollution Control Manual

### Maintenance

- Berms must be inspected weekly and after each runoff event. Sediment must be removed when accumulations reach half the height of the berm. Damaged or deteriorated portions of the berm must be replaced immediately upon inspection.
- Berms may be leveled when the tributary area has been permanently stabilized or left in place.

**Figure 15. Standard Construction Detail for Wood Chip Filter Berm**



## **11. Rock Construction Entrance**

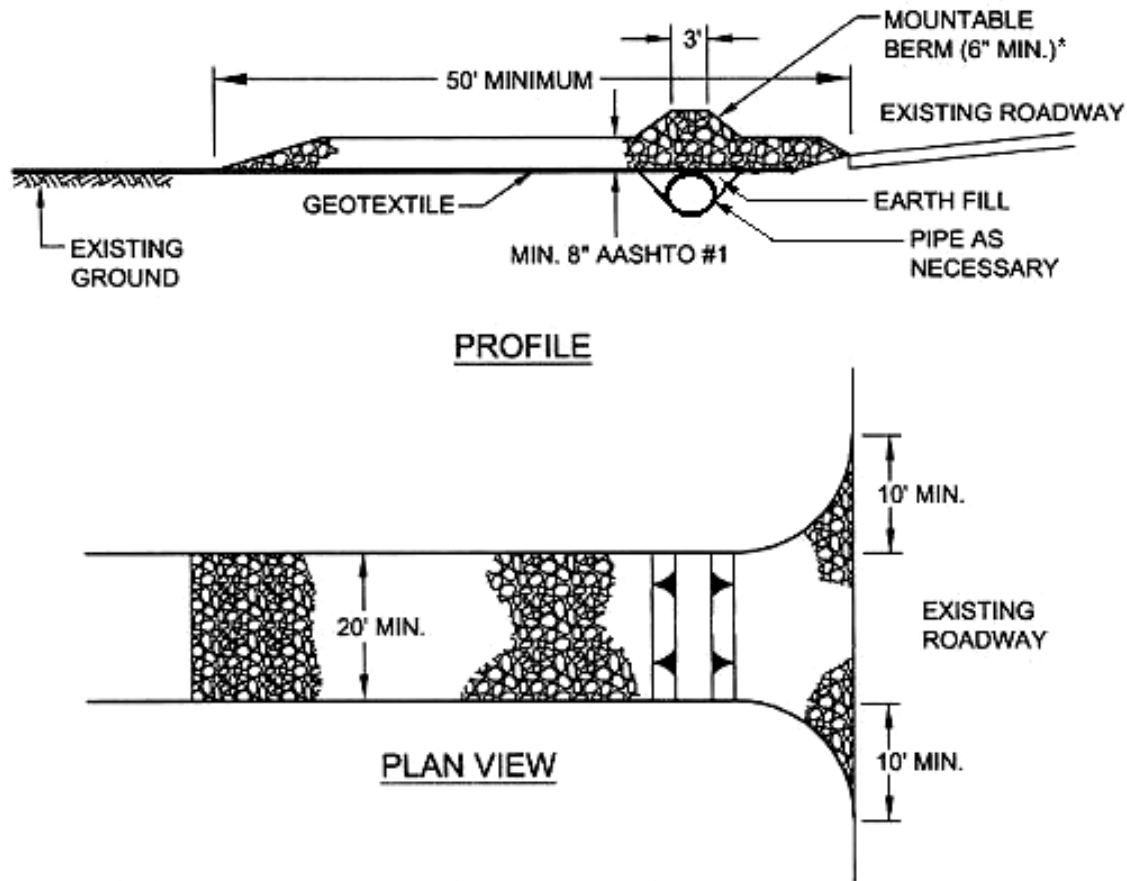
### Design Standards

- A rock construction entrance should be installed wherever it is anticipated that construction traffic will exit the project site onto any roadway, public or private.
- A geotextile underlayment should be placed over the existing ground prior to placing the stone to prevent stone from being driven into the ground.
- Remove topsoil prior to installation of rock construction entrance. Extend rock over full width of entrance.
- Runoff must be diverted from roadway to a suitable sediment removal BMP prior to entering rock construction entrance.
- Mountable berm must be installed wherever optional culvert pipe is used and proper pipe cover as specified by manufacturer is not otherwise provided. Pipe must be sized appropriately for size of ditch being crossed.

### Maintenance

- Rock construction entrance thickness must be constantly maintained to the specified dimensions by adding rock. A stockpile must be maintained on-site for this purpose. All sediment deposited on paved roadways must be removed and returned to the construction site immediately. If excessive amounts of sediment are being deposited on roadway, extend length of rock construction entrance by 50-foot increments until condition is alleviated or install wash rack. Washing the roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses is not acceptable.

**Figure 16. Standard Construction Detail for Rock Construction Entrance**



**\* MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE**

## **12. Disturbed Area Stabilization**

As soon as slopes, channels, ditches, and other disturbed areas reach final grade they must be stabilized. Upon completion or temporary cessation of the earth disturbance activity in a special protection watershed, that portion of the project site tributary to the special protection waters must be immediately stabilized. In all other watersheds, cessation of an activity for at least four days requires temporary stabilization. Keeping stabilization current with earthmoving is recommended for all projects, regardless of watershed classification.

All critical areas (disturbed areas that poses the greatest threat of sediment pollution to a receiving water; such as within floodways, within 50 ft of a wetland, slopes 3H:1V or steeper and erodible soils) that have not otherwise been stabilized and have significant potential for erosion should be stabilized with vegetation. Temporary erosion control BMPs that were installed for earthmoving activities must remain in place and be maintained in working order until permanent stabilization is achieved. NOTE: Areas that do not receive sufficient sunlight to support vegetation (e.g. under bridge decks) should be stabilized by some means other than vegetation.

Refer to **Table 8** and **Table 9** for recommended seed mix and seeding rate to be used on critical areas.



**Table 8. Recommended Seed Mixtures <sup>1</sup>**

Mixture Number	Species	Seeding Rate - Pure Live Seed <sup>2</sup>	
		Most Sites	Adverse Sites
1 <sup>3</sup>	Creeping red fescue, or Kentucky bluegrass, plus Redtop <sup>4</sup> , or Perennial ryegrass	20	25
		20	25
		3	5
		15	20
2	Birdsfoot trefoil, plus Tall fescue	6	10
		20	25
3	Orchardgrass, plus Perennial ryegrass, plus Birdsfoot trefoil	15	20
		15	20
		6	10
4 <sup>5</sup>	Switchgrass, or Indiangrass, plus Partridge pea	10	15
		10	15
		5	10
5 <sup>6</sup>	Birdsfoot trefoil, plus Timothy, or Perennial ryegrass	6	10
		20	25
		20	25

Penn State, "Erosion Control and Conservation Plantings on Noncropland"

<sup>1</sup> Seed and mulch disturbed areas with recommended seed mixtures appropriate for site conditions and further identified in Tables 11.3, 11.4 and 11.5 of DEP's *Erosion and Sediment Pollution Control Program Manual*

<sup>2</sup> PLS is the product of the percentage of pure seed times percentage germination divided by 100. For example, to secure the actual planting rate for switchgrass, divide 12 pounds PLS shown on the seed tag. Thus, if the PLS content of a given seed lot is 35%, divide 12 PLS by 0.35 to obtain 34.3 pounds of seed required to plant one acre. All mixtures in this table are shown in terms of PLS.

<sup>3</sup> This mixture is suitable for frequent mowing. Do not cut shorter than four inches.

<sup>4</sup> Keep seeding rate to that recommended in table. These species have many seeds per pound and are very competitive. To seed small quantities of small seeds, mix with equal parts sand or cat litter to ensure even spreading.

<sup>5</sup> This mix contains only species that are native to Pennsylvania.

<sup>6</sup> Do not mow shorter than nine to ten inches.

**Table 9. Recommended Seed Mixtures for Stabilizing Disturbed Areas**

Site Condition	Nurse Crop <sup>1</sup>	Seed Mixture (Select one mixture)
<b>Slopes and Banks (not mowed)</b>		
Well-drained	1 plus	1, 2, 3, 4 or 5
Variable drainage	1 plus	1, 3 or 5
<b>Slopes and Banks (mowed)</b>		
Well-drained	1 plus	1 or 2
<b>Slopes and Banks (grazed/hay)</b>		
Well-drained	1 plus	3, 4 or 5
<b>Gullies and Eroded Areas</b>	1 plus	1 or 2
<b>Erosion Control Facilities (BMPs)</b>		
Sod waterways, spillways, frequent water flow areas	1 plus	1 or 2
Drainage ditches		
Shallow, less than three feet deep	1 plus	1, 2 or 5
Deep, not mowed	1 plus	1 or 2
Pond banks, dikes, levees, dams, diversion channels and occasional water flow areas		
Mowed areas	1 plus	1, 2 or 3
Non-mowed areas	1 plus	4 or 5
For hay or silage on diversion channels and occasional water flow areas	1 plus	2 or 9

Penn State, "Erosion Control and Conservation Plantings on Noncropland"

<sup>1</sup> Nurse Crops should be added to all mixes to improve soil stabilization and increase the chance of establishment. Nurse crops can be mixed in with the desired seed mix. When using in combination with another mix, they should be applied at a rate of one bushel (~30 lbs) per acre. If used alone on a site, they should be applied at two bushels (~60 lbs) per acre. Use Spring oats (*Avena fatua*) if seeding prior to August 15<sup>th</sup> and use Winter rye (*Secale cereale*) if seeding after August 15<sup>th</sup>. Annual rye (*Lolium multiflorum*) may be used instead of oats or winter rye if desired.

### C. Site Maintenance

DEP's regulations in Chapter 102 require that the E&S Plan include a maintenance program. That maintenance program must require that all BMPs be inspected and maintained on a weekly basis and after each stormwater event (e.g., precipitation in an amount of 0.25 inch or greater over a 24-hour period) to ensure effective and efficient operation. Follow the maintenance criteria specified for each BMP listed in Section IV.B. of this guide or as identified on the E&S Plan. Note that maintenance requirements must be specified in written E&S Plans. Written documentation of these inspections and any maintenance/replacements must be maintained. A timber harvesting BMP inspection template is available online through the Pennsylvania SFI Implementation Committee (<https://www.sfiopa.org/forms.php>). Individuals should review this template before use to ensure that their operations will meet the requirements of DEP regulations.



SFI of PA Website

- Protection should be maintained around seeps, wetlands, soaks, and springs near earth disturbance areas.
- Haul roads and skid roads will be repaired where signs of accelerated erosion are detected. Maintenance of haul roads may be reduced if they are allowed to settle a few months between construction and use, and if overhanging trees are removed to enable sunlight and wind to dry the haul roads.
- Seeding and mulching will be repeated in those areas that appear to be failing or have failed.
- Materials removed from BMPs should be replaced outside any floodways, wetlands, or waters of the Commonwealth.
- Inspect drainage structures frequently. Immediately make necessary repairs and clear any obstruction.

- Grade occasionally with a motor grader, bulldozer or road drag to maintain haul road surfaces. Proper grading will reshape dips, improve and reestablish side ditches, and remove ruts from the haul road surface.
- Reducing or eliminating traffic on haul roads, skid roads, skid trails and landings during unfavorable weather is important. Controlling erosion on unsurfaced roads is impossible if the roads are used during excessively wet weather. The most likely time for excessive road damage is when a frozen road surface thaws. Suspending or minimizing hauling operations during this period helps to avoid severe damage to the road surface.
- Consider adding an access gate to limit traffic, if necessary. A durable gate can be one of the most important structures for protecting a haul road system.

#### **D. Winter Harvests**

Timber harvests are often conducted during the winter months to take advantage of frozen ground. While this practice is encouraged, there are a few concerns that should be addressed:

- Before it snows, mark existing culverts and other drainage structures as well as waterways and wetlands, which can be obscured by snowfall. Keep all drainage structures open and functioning properly.
- Wherever haul roads and skid roads are constructed over soils with low strength, as identified in Appendix E in DEP's E&S Manual, hauling and skidding should be limited to periods when temperatures are below freezing unless these roads have been engineered to withstand the equipment weights involved.
- During cold weather, snow should be plowed from haul roads and skid roads to facilitate freezing of the road grade before hauling.
- Operations should be suspended during thaw cycles, winter rains, and during times of heavy snow melt when soils tend to be saturated.
- During times of heavy snow, provide breaks in snow berms along plowed roads to facilitate drainage.
- Compact skid trail snow before skidding logs. This will help protect soils that are not completely frozen.

#### **V. SITE RETIREMENT**

When a tract or parcel within a harvest area has been completed, all haul roads, skid roads, skid trails, and landings associated with that tract or parcel should be retired; even while timbering continues on other tracts and parcels. To do so, the following guidelines are recommended:

- Regrade all road and landing surfaces to approximate original contour. Scarify compacted soils in preparation for seeding.
- Remove ditch relief culverts and replace them with waterbars or broad-based dips.
- Remove all temporary stream and wetland crossings and stabilize disturbed areas. Install or restore waterbars at appropriate distances on the approaches to the stream crossings.
- Seed and mulch disturbed areas with seed mixtures appropriate for site conditions, such as shade tolerant, steep slope mixture, acid tolerant, etc., and further identified in Tables 11.3, 11.4 and 11.5 in DEP's E&S Manual. Blanket disturbed areas with a slope of 3H:1V or steeper, within 50 feet of stream channels or wetlands, and within 100 feet of a special protection surface water.

Individuals responsible for earth disturbance activities must ensure that proper mechanisms are in place to control waste materials. Measures should be planned and implemented for housekeeping, materials management, and litter control. Whenever possible, recycling of excess materials is preferred, rather than disposal. Timber harvesting E&S Plans should address procedures which ensure proper measures for recycling or disposal of materials associated with or from the project site.

Wherever heavy equipment will be used during timber harvesting activities, a Preparedness, Prevention and Contingency (PPC) plan must be available on-site. The purpose of these plans is to prevent and control accidental discharges of polluting materials to surface or groundwater. These plans address the storage, use, or transportation of materials including: fuels, chemicals, solvents, pesticides, fertilizers, lime, petrochemicals, wastewater, wash water, solid wastes, or hazardous materials onto, on, or from the project site during earth disturbance activities. The PPC plan must be available upon request by DEP or conservation district. A sample PPC plan template for timber harvesting activities is available online through the Pennsylvania SFI Implementation Committee (<https://www.sfiopa.org/forms.php>). Individuals should review this template before use to ensure that their operations will meet the requirements of DEP regulations. The template plan is designed to be used in conjunction with DEP's *Erosion and Sediment Control Plan Template for a Timber Harvesting Operation* ([3800-FM-BCW0539](#)). Additional information related to PPC plans can be found in DEP's *Guidelines for the Development and Implementation of Environmental Emergency Response Plans* ([400-2200-001](#)).

## **APPENDIX A: Checklist for Wetlands Protection**

### **REFER TO TOPOGRAPHICAL MAPS, WETLAND MAPS, AERIAL IMAGERY, AND SOIL SURVEYS**

\_\_\_\_\_ Note any areas that indicate the presence of wetlands or hydric soils.

### **CONDUCT AN ON-SITE INSPECTION**

\_\_\_\_\_ Determine the boundaries of any wetlands indicated on the maps and aerial images.

\_\_\_\_\_ Confirm wetland presence and identify additional wetlands (Most are not depicted on maps) using the Army Corps of Engineers Wetland Delineation Manual and the appropriate [regional supplements](#).

\_\_\_\_\_ Determine the approximate boundaries of any additional wetlands; include stream locations.

\_\_\_\_\_ Consult your DEP Regional Office if you have questions.

### **INCORPORATE WETLANDS INTO HARVESTING PLAN**

\_\_\_\_\_ Follow Pennsylvania's erosion and sediment control requirements.

\_\_\_\_\_ Avoid crossing wetlands and stream channels.

\_\_\_\_\_ Consult your DEP Regional Office if wetland and stream crossings cannot be avoided.

\_\_\_\_\_ Minimize timber harvest in wetland, avoid harvesting in EV wetlands and vernal pools.

### **DEVELOP A WORKING KNOWLEDGE OF FEDERAL AND STATE REGULATIONS**

\_\_\_\_\_ Know regulations prior to start-up of operations.

\_\_\_\_\_ Understand the permitting process to determine if any permits are required.

\_\_\_\_\_ Avoid wetlands and streams to minimize regulatory permit requirements.

### **USE BEST MANAGEMENT PRACTICES**

\_\_\_\_\_ To maintain forest productivity.

\_\_\_\_\_ To protect valuable wetlands.

\_\_\_\_\_ To ensure compliance with state and federal regulation.

\_\_\_\_\_ To improve public acceptance of forest management and harvesting.

## APPENDIX B: List of Common Pennsylvania Wetland Plants

### LIST OF TREES AND SHRUBS

Common Name	Scientific Name
alder	<i>Alnus rugosa</i>
arrow-wood, northern	<i>Viburnum recognitum</i>
ash, green	<i>Fraxinus pennsylvanica</i>
birch, river	<i>Betula nigra</i>
blueberry, highbush	<i>Vaccinium corymbosum</i>
dogwood, red-osier	<i>Cornus stolonifera</i>
dogwood, silky	<i>Cornus amomum</i>
elderberry, common	<i>Sambucus canadensis</i>
elm, American	<i>Ulmus americana</i>
leatherleaf	<i>Chamaedaphne calyculata</i>
maple, silver	<i>Acer saccharinum</i>
maple, box elder	<i>Acer negundo</i>
meadowsweet, broad-leaved	<i>Spiraea latifolia</i>
meadowsweet, narrow-leaved	<i>Spiraea alba</i>
oak, pin	<i>Quercus palustris</i>
oak, swamp white	<i>Quercus bicolor</i>
spicebush, northern	<i>Lindera benzoin</i>
steeple-bush	<i>Spiraea tomentosa</i>
sumac, poison	<i>Toxicodendron vernix</i>
sycamore	<i>Platanus occidentalis</i>
willow, black	<i>Salix nigra</i>
willow, silky	<i>Salix sericea</i>

## Appendix B (Continued)

### LIST OF HERBACEOUS SPECIES

Common Name	Scientific Name
arrow arum	<i>Peltandra virginica</i>
arrowhead, broad-leaved	<i>Sagittaria latifolia</i>
blue vervain	<i>Verbena hastata</i>
boneset, common	<i>Eupatorium perfoliatum</i>
bulrush, green	<i>Scirpus atrovirens</i>
button bush	<i>Cephalanthus occidentalis</i>
bur-reed, eastern	<i>Sparganium americanum</i>
cardinal flower	<i>Lobelia cardinalis</i>
cattail, broad-leaved	<i>Typha latifolia</i>
common reed	<i>Phragmites australis</i>
fern, sensitive	<i>Onoclea sensibilis</i>
grass, bluejoint	<i>Calamagrostis canadensis</i>
grass, manna	<i>Glyceria canadensis</i>
grass, reed canary	<i>Phalaris arundinacea</i>
grass, rice cut-	<i>Leersia oryzoides</i>
grass, wool	<i>Scirpus cyperinus</i>
iris, blue flag	<i>Iris versicolor</i>
jack-in-the-pulpit	<i>Arisaema triphyllum</i>
jewelweed, spotted	<i>Impatiens capensis</i>
Joe-Pye-weed, spotted	<i>Eupatorium maculatum</i>
lily, yellow pond	<i>Nuphar lutea</i>
lily, white water	<i>Nymphaea odorata</i>
marsh marigold	<i>Caltha palustris</i>
nettle, false	<i>Boehmeria cylindrical</i>
pickerelweed	<i>Pontederia cordata</i>
pitcher plant, northern	<i>Sarracenia purpurea</i>
Pondweeds	<i>Potamogeton spp.</i>
rush, soft	<i>Juncus effusus</i>
sedge, three-way	<i>Dulichium arundinaceum</i>
sedge, tussock	<i>Carex stricta</i>
skunk cabbage	<i>Symplocarpus foetidus</i>
smartweed, arrow-leaved tearthumb	<i>Polygonum sagittatum</i>
smartweed, mild water pepper	<i>Polygonum hydropiperoides</i>
sphagnum moss	<i>Sphagnum spp.</i>
spikerush, blunt	<i>Eleocharis obtusa</i>
Sundews	<i>Drosera spp.</i>
sweetflag	<i>Acorus calamus</i>
water shield	<i>Brasenia schreberi</i>
water calla	<i>Calla palustris</i>
wild rice	<i>Zazania aquatica</i>



## APPENDIX C: Contact Information

### STATE

#### **Pennsylvania Department of Environmental Protection - Central Office**

Bureau of Clean Water  
Division of NPDES Permitting  
PO Box 8774  
Harrisburg, PA 17105-8774  
(717) 787-5017

Bureau of Waterway Engineering and Wetlands  
Division of Wetlands, Encroachments and Training  
P.O. Box 8554  
Harrisburg, PA 17105-8554

The Waterways and Wetlands Program in DEP regional offices process all permits, register general permits, handle enforcement and coordinate with county conservation districts.

#### **Pennsylvania Department of Environmental Protection - Regional Offices**

##### **Southeast Region**

2 East Main Street  
Norristown, PA 19401  
(484) 250-5970

**Counties:** *Bucks, Chester, Delaware, Montgomery, and Philadelphia*

##### **Northeast Region**

2 Public Square  
Wilkes-Barre, PA 18711-0790  
(570) 826-2511

**Counties:** *Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne, and Wyoming*

##### **Northcentral Region**

208 W. Third Street, Suite 101  
Williamsport, PA 17701  
(570) 327-3574

**Counties:** *Bradford, Cameron, Clearfield, Centre, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga, and Union*

##### **Southwest Region**

400 Waterfront Drive  
Pittsburgh, PA 15222-4745  
(412) 442-4000

**Counties:** *Allegheny, Beaver, Cambria, Fayette, Greene, Somerset, Washington, and Westmoreland*

##### **Northwest Region**

230 Chestnut Street  
Meadville, PA 16335-3481  
(814) 332-6984

**Counties:** *Armstrong, Butler, Clarion, Crawford, Elk, Erie, Forest, Indiana, Jefferson, Lawrence, McKean, Mercer, Venango, and Warren*

##### **Southcentral Region**

909 Elmerton Avenue  
Harrisburg, PA 17110  
(717) 705-4707

**Counties:** *Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry, and York*

## Appendix C (Continued)

### Additional Bureaus and Agencies of State Government

**Pennsylvania Department of  
Conservation and Natural  
Resources - Bureau of Forestry**

PO Box 8552  
Harrisburg, PA 17105-8552  
(717) 787-3444  
*Administers Pennsylvania Natural  
Diversity Inventory*

**Pennsylvania Game  
Commission**

2001 Elmerton Ave.  
Harrisburg, PA 17110-9797  
(717) 787-4250  
Regulates the harvest and control  
of wild animal species and  
manages their habitat and  
comments on major permit  
applications

**Pennsylvania Fish and Boat  
Commission**

PO Box 67000  
Harrisburg, PA 17106  
(717) 705-7800  
*Enforces Clean Stream Law,  
conducts waterways  
conservation, comments on  
major permit applications*

### LOCAL AND OTHER

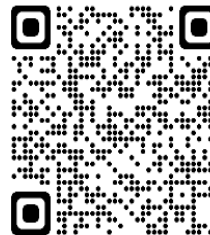
**County Conservation Districts**

*Consult PACD's website  
([www.pacd.org](http://www.pacd.org), Find Your  
Conservation District), for contact  
information*

**Cartographic Information  
Research Center**

102-D Hasbrouck Lab  
University of Massachusetts  
Amherst, MA 01003  
(413) 545-0359  
*Distributes NWI maps for PA*

Chapter 105 Delegated County Conservation Districts can be found here:  
<http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=4055>



## APPENDIX D: Matrices for Calculating Acres of Disturbance

	Width of Disturbed Area(ft)								
	20	40	60	80	100	120	140	180	200
20	0.009	0.018	0.028	0.037	0.046	0.055	0.064	0.083	0.092
30	0.014	0.028	0.041	0.055	0.069	0.083	0.096	0.124	0.138
40	0.018	0.037	0.055	0.073	0.092	0.110	0.129	0.165	0.184
50	0.023	0.046	0.069	0.092	0.115	0.138	0.161	0.207	0.230
60	0.028	0.055	0.083	0.110	0.138	0.165	0.193	0.248	0.275
70	0.032	0.064	0.096	0.129	0.161	0.193	0.225	0.289	0.321
80	0.037	0.073	0.110	0.147	0.184	0.220	0.257	0.331	0.367
90	0.041	0.083	0.124	0.165	0.207	0.248	0.289	0.372	0.413
100	0.046	0.092	0.138	0.184	0.230	0.275	0.321	0.413	0.459
110	0.051	0.101	0.152	0.202	0.253	0.303	0.354	0.455	0.505
120	0.055	0.110	0.165	0.220	0.275	0.331	0.386	0.496	0.551
130	0.060	0.119	0.179	0.239	0.298	0.358	0.418	0.537	0.597
140	0.064	0.129	0.193	0.257	0.321	0.386	0.450	0.579	0.643
150	0.069	0.138	0.207	0.275	0.344	0.413	0.482	0.620	0.689
160	0.073	0.147	0.220	0.294	0.367	0.441	0.514	0.661	0.735
170	0.078	0.156	0.234	0.312	0.390	0.468	0.546	0.702	0.781
180	0.083	0.165	0.248	0.331	0.413	0.496	0.579	0.744	0.826
190	0.087	0.174	0.262	0.349	0.436	0.523	0.611	0.785	0.872
200	0.092	0.184	0.275	0.367	0.459	0.551	0.643	0.826	0.918
210	0.096	0.193	0.289	0.386	0.482	0.579	0.675	0.868	0.964
220	0.101	0.202	0.303	0.404	0.505	0.606	0.707	0.909	1.010
230	0.106	0.211	0.317	0.422	0.528	0.634	0.739	0.950	1.056
240	0.110	0.220	0.331	0.441	0.551	0.661	0.771	0.992	1.102
250	0.115	0.230	0.344	0.459	0.574	0.689	0.803	1.033	1.148
260	0.119	0.239	0.358	0.478	0.597	0.716	0.836	1.074	1.194
270	0.124	0.248	0.372	0.496	0.620	0.744	0.868	1.116	1.240
280	0.129	0.257	0.386	0.514	0.643	0.771	0.900	1.157	1.286
290	0.133	0.266	0.399	0.533	0.666	0.799	0.932	1.198	1.331
300	0.138	0.275	0.413	0.551	0.689	0.826	0.964	1.240	1.377
310	0.142	0.285	0.427	0.569	0.712	0.854	0.996	1.281	1.423
320	0.147	0.294	0.441	0.588	0.735	0.882	1.028	1.322	1.469
330	0.152	0.303	0.455	0.606	0.758	0.909	1.061	1.364	1.515
340	0.156	0.312	0.468	0.624	0.781	0.937	1.093	1.405	1.561
350	0.161	0.321	0.482	0.643	0.803	0.964	1.125	1.446	1.607
360	0.165	0.331	0.496	0.661	0.826	0.992	1.157	1.488	1.653
370	0.170	0.340	0.510	0.680	0.849	1.019	1.189	1.529	1.699
380	0.174	0.349	0.523	0.698	0.872	1.047	1.221	1.570	1.745
390	0.179	0.358	0.537	0.716	0.895	1.074	1.253	1.612	1.791
400	0.184	0.367	0.551	0.735	0.918	1.102	1.286	1.653	1.837

Areas listed in the table are in acres

## Appendix D (Continued)

	Width of Skid Road or Haul Road (ft)									
	8	10	12	14	16	20	25	30	35	40
50	0.009	0.011	0.014	0.016	0.018	0.023	0.029	0.034	0.040	0.046
100	0.018	0.023	0.028	0.032	0.037	0.046	0.057	0.069	0.080	0.092
150	0.028	0.034	0.041	0.048	0.055	0.069	0.086	0.103	0.121	0.138
200	0.037	0.046	0.055	0.064	0.073	0.092	0.115	0.138	0.161	0.184
250	0.046	0.057	0.069	0.080	0.092	0.115	0.143	0.172	0.201	0.230
300	0.055	0.069	0.083	0.096	0.110	0.138	0.172	0.207	0.241	0.275
350	0.064	0.080	0.096	0.112	0.129	0.161	0.201	0.241	0.281	0.321
400	0.073	0.092	0.110	0.129	0.147	0.184	0.230	0.275	0.321	0.367
450	0.083	0.103	0.124	0.145	0.165	0.207	0.258	0.310	0.362	0.413
500	0.092	0.115	0.138	0.161	0.184	0.230	0.287	0.344	0.402	0.459
550	0.101	0.126	0.152	0.177	0.202	0.253	0.316	0.379	0.442	0.505
600	0.110	0.138	0.165	0.193	0.220	0.275	0.344	0.413	0.482	0.551
650	0.119	0.149	0.179	0.209	0.239	0.298	0.373	0.448	0.522	0.597
700	0.129	0.161	0.193	0.225	0.257	0.321	0.402	0.482	0.562	0.643
750	0.138	0.172	0.207	0.241	0.275	0.344	0.430	0.517	0.603	0.689
800	0.147	0.184	0.220	0.257	0.294	0.367	0.459	0.551	0.643	0.735
850	0.156	0.195	0.234	0.273	0.312	0.390	0.488	0.585	0.683	0.781
900	0.165	0.207	0.248	0.289	0.331	0.413	0.517	0.620	0.723	0.826
950	0.174	0.218	0.262	0.305	0.349	0.436	0.545	0.654	0.763	0.872
1000	0.184	0.230	0.275	0.321	0.367	0.459	0.574	0.689	0.803	0.918
1050	0.193	0.241	0.289	0.337	0.386	0.482	0.603	0.723	0.844	0.964
1100	0.202	0.253	0.303	0.354	0.404	0.505	0.631	0.758	0.884	1.010
1150	0.211	0.264	0.317	0.370	0.422	0.528	0.660	0.792	0.924	1.056
1200	0.220	0.275	0.331	0.386	0.441	0.551	0.689	0.826	0.964	1.102
1250	0.230	0.287	0.344	0.402	0.459	0.574	0.717	0.861	1.004	1.148
1300	0.239	0.298	0.358	0.418	0.478	0.597	0.746	0.895	1.045	1.194
1350	0.248	0.310	0.372	0.434	0.496	0.620	0.775	0.930	1.085	1.240
1400	0.257	0.321	0.386	0.450	0.514	0.643	0.803	0.964	1.125	1.286
1450	0.266	0.333	0.399	0.466	0.533	0.666	0.832	0.999	1.165	1.331
1500	0.275	0.344	0.413	0.482	0.551	0.689	0.861	1.033	1.205	1.377
1550	0.285	0.356	0.427	0.498	0.569	0.712	0.890	1.067	1.245	1.423
1600	0.294	0.367	0.441	0.514	0.588	0.735	0.918	1.102	1.286	1.469
1650	0.303	0.379	0.455	0.530	0.606	0.758	0.947	1.136	1.326	1.515
1700	0.312	0.390	0.468	0.546	0.624	0.781	0.976	1.171	1.366	1.561
1750	0.321	0.402	0.482	0.562	0.643	0.803	1.004	1.205	1.406	1.607
1800	0.331	0.413	0.496	0.579	0.661	0.826	1.033	1.240	1.446	1.653
1850	0.340	0.425	0.510	0.595	0.680	0.849	1.062	1.274	1.486	1.699
1900	0.349	0.436	0.523	0.611	0.698	0.872	1.090	1.309	1.527	1.745

Areas listed in the table are in acres

## APPENDIX E: Key Federal Regulations for Section 404 of the Clean Water Act

For the most recent definition of Waters of the United States and other Clean Water Act and the National Waters Protection Rules see the following website:

<https://www.epa.gov/cwa-404>.



EPA Website on Section 404  
of the Clean Water Act  
[epa.gov/cwa-404](https://www.epa.gov/cwa-404)

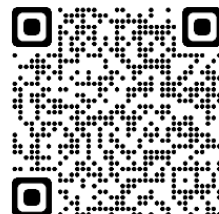
For the most recent Section 404 regulations administered by the USACOE see

<https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Federal-Regulation/> and [33 CFR Part 323](#).



USACOE Website on  
Section 404 permitting

EPA's website also contains the Clean Water Act Section 404(b)(1) guidelines at the following link: <https://www.epa.gov/cwa-404/cwa-section-404b1-guidelines-40-cfr-230>.



USEPA Website on  
Section 404 permitting

## ACRONYMS

<b>AASHTO:</b>	American Association of State Highway and Transportation Officials
<b>ABACT:</b>	Antidegradation Best Available Combination of Technologies
<b>ACRE:</b>	Agriculture, Communities and Rural Environment
<b>APR:</b>	Acid-Producing Rock
<b>BMP:</b>	Best Management Practices
<b>CFRL:</b>	Code of Federal Regulations
<b>CWA:</b>	Clean Water Act
<b>DCNR:</b>	Department of Conservation and Natural Resources
<b>DEP:</b>	Department of Environmental Protection
<b>E&amp;S:</b>	Erosion and Sediment Control
<b>EPA:</b>	Environmental Protection Agency
<b>EV:</b>	Exceptional Value Waters
<b>FEMA:</b>	Federal Emergency Management Agency
<b>GP:</b>	General Permit
<b>HQ:</b>	High Quality Waters
<b>MPC:</b>	Municipalities Planning Code
<b>NOI:</b>	Notice of Intent
<b>NPDES:</b>	National Pollutant Discharge Elimination System
<b>NRCS:</b>	United States Department of Agriculture Natural Resources Conservation Service
<b>PASPGP:</b>	Pennsylvania State Programmatic General Permit
<b>PFBC:</b>	Pennsylvania Fish and Boat Commission
<b>PGC:</b>	Pennsylvania Game Commission
<b>PLS:</b>	Pure Live Seed
<b>PNDI:</b>	Pennsylvania Natural Diversity Inventory
<b>PNHP:</b>	Pennsylvania Natural Heritage Program
<b>PPC:</b>	Preparedness, Prevention, and Contingency
<b>SFI:</b>	Sustainable Forestry Initiative
<b>T&amp;E:</b>	Threatened and Endangered
<b>USACOE:</b>	United States Army Corps of Engineers
<b>USFWS:</b>	United States Fish and Wildlife Service
<b>USGS:</b>	United States Geological Survey

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