Mifflin County Conservation District
EROSION CONTROL FOR TIMBER HARVEST ACTIVITIES

Introduction

In an attempt to alleviate the continuing problems of controlling sediment pollution, the Commonwealth of Pennsylvania, through the Department of Environmental Protection (DEP), adopted Chapter 102, Erosion Control Rules and Regulations. Chapter 102 requires that anyone undertaking an earth disturbance activity develop and implement a written Erosion and Sedimentation (E&S) Control Plan for any earth disturbances 5,000 sq. ft. or greater as well as *any* earth disturbance when a project is located in a special protection watershed. The plan must be submitted to the County Conservation District for review if required by the local municipality, or if requested by the District. The E&S plan must be available at all times at the site of the earth disturbance activity, regardless of the size of the project. Failure to have an E&S plan on site is a violation of Chapter 102. It is important to remember that both landowners and contractors may be held responsible for any violation of the Chapter 102 Regulations.

Use of This Guide

This guide is intended to be used for timber harvest activities disturbing less than 25 acres. Timber harvests disturbing 25 acres or more require an Erosion and Sediment Control Permit. Contact your local Conservation District if there are any questions regarding the suitability of this guide for your project. In addition, check with your local municipality regarding specific ordinances.

IMPORTANT! - Any activity within 50 feet of a water course may require additional permitting with Chapter 105! Contact the Conservation District or Regional DEP office if your timber harvest crosses a stream / wetland or is located within 50 feet from a stream.

Considerations in Plan Development

*References to Standard Construction Details and Tables can be found in the DEP Erosion and Sediment Control Program Manual (abbreviated as 'DEP ESCPM' from hereon after)

HAUL ROADS

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

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

1. Construct only as much road as necessary. Minimize clearing. Keep road width to the minimum necessary for safe and efficient operation.

2. 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 stabilized entrances, as shown in Standard Construction Detail #3-1, 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.

3. Grades - Roads with a maximum slope of 10 percent and a minimum of 2 percent are usually the easiest to maintain. Where absolutely necessary, grades of 15 to 20 percent can be used for short distances. Follow the contour as much as possible.

4. Topography - Roads on moderate side hills are easiest to build and maintain. Avoid steep slopes wherever possible.

5. Drainage - Construct roads to drain at all times, such as using crowned or insloped surfaces. Install ditch relief culverts at specified intervals, as shown in Table 3.3 or 3.4 (DEP ESCPM). Provide outlet protection at all culvert outfalls. Turnouts, as shown in Figure 3.3, may be used on low-side ditches to direct flow into vegetative filter areas.

6. Grading - Minimize cut and fill work, and keep slopes at stable angles. Remove trees from tops of cuts, and seed and mulch cut and fill slopes promptly. Do not place fill into open sinkholes, waterways, wetlands, floodways, or other sensitive areas.

7. Obstacles - Design the road system to go around springs, seeps, wetlands, poor drainage areas, ledges, and rocky areas wherever possible.

8. Soils - Be aware of soil texture, drainage class, and slope position as outlined in Appendix E. 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.

9. Distances from Streams - Buffer areas 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 wood chip berms, silt fence, etc., as the roadway progresses. See Table 14.1 (DEP ESCPM) for minimum filter strip widths.

10. Stream Crossings - Minimize the number of stream crossings. Cross at a 90-degree angle and approach the stream at as gentle a slope as possible. Consider all stream crossings temporary. Only bridge crossings, as shown in Figure 3.5 (DEP ESCPM), or culvert type crossings, as shown in Standard Construction Details 3-11, 3-12, and 3-13 (DEP ESCPM), may be used. Ford crossings are not acceptable. An encroachment permit or Army Corps of Engineers (ACOE) permit may be required.

11. Old roads - It is often possible to use existing roads and thereby lessen the soil disturbance. However, to avoid problems, carefully evaluate the road's suitability for upgrading.

12. Size and duration of sale and the anticipated season of harvest.

13. Floodways and wetlands - Avoid encroaching on wetlands. Roadway construction within floodways — typically 50 feet from top of streambank — and wetlands require encroachment permits.

14. 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. Figure 14.1 (DEP ESCPM) shows a typical haul road layout.

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:

1. Landings - Locate landings in relation to the main haul road. Then, lay out the skid road and trail approaches on a low grade to the landings.

2. 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.

3. Avoid Streams, Wetlands, Rocky Slopes, and Steep Grades. Skid trails and skid roads should be located at least 50 feet from stream channels and wetlands wherever possible.

4. Stream Crossings - Use temporary bridges or culverts and obtain all appropriate permits/authorizations.

5. Use waterbars wherever it is not possible to avoid going straight up or down slopes.

6. NEVER SKID THROUGH OR ACROSS STREAM CHANNELS, WETLANDS, SPRINGS, OR SEEPS. SAVE EXISTING VEGETATION – Vegetation cover is the best and most economical protection against soil erosion. Protect existing vegetation during the timber harvest activity process. Trees and shrubs should be marked and roped off to protect them from damage by construction equipment. Filling and soil compaction around trees should be avoided.

LOG LANDINGS

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, springs, seeps, and open sinkholes. Allow adequate undisturbed buffer strips between the landing and streams or sensitive areas, as shown in Table 14.1.

Disturb only the area needed for safe operations. If the topography warrants, use a diversion channel, as described in Chapter 6, 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. 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.

Heavy equipment quickly compacts soils on landings, preventing water from infiltrating. Therefore, 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.

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:

1. 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.
2. Wherever haul roads and skid roads are constructed over soils with low strength, as identified in Appendix E (DEP Erosion and Sediment Control Program 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.
3. During cold weather, snow should be plowed from haul roads and skid roads to facilitate freezing of the road grade before hauling.
4. Operations should be suspended during thaw cycles, winter rains, and during times of heavy snow melt when soils tend to be saturated.
5. During times of heavy snow, provide breaks in snow berms along plowed roads to facilitate drainage.

RETIREMENT OF HAUL ROADS, SKID ROADS, SKID TRAILS, AND LANDINGS

When a tract or parcel within a harvest area has been completed, all haul 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:

1. Regrade all road and landing surfaces to approximate original contour. Scarify compacted soils in preparation for seeding.
2. Remove ditch relief culverts and replace them with waterbars or broad-based dips.
3. 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.
4. Seed and mulch disturbed areas with seed mixtures appropriate for site conditions, such as shade tolerant, steep slope mixture, acid tolerant, etc. are further identified in Tables 11.4 and 11.5. Blanket disturbed areas within 50 feet of stream channels or wetlands.

PROTECT DITCHES, STREAMS, OR OTHER BODIES OF WATER – Maintain vegetated buffers where possible. Install temporary controls, such as compost sock, filter fabric fence, mulch berms, straw bale barriers, or rock filters to keep sediment pollution out of streams and other water bodies.

PLAN TO MAINTAIN EROSION CONTROL MEASURES – Straw bale barriers deteriorate; filter fabric fences clog, and seeded areas wash out. Schedule regular maintenance to ensure properly functioning control measures. Continuous maintenance problems and failure of E&S controls indicate a need to consider upgraded controls or assistance from a professional design consultant.

TEMPORARY STABILIZATION

Recommended Seed Mixtures for Temporary Stabilization

Mixture & Seeding Season	Species	Seeding Rate – lb/A
1 – Spring Seeding *(up to June 15)*	Annual ryegrass Or spring oats, Or spring oats plus ryegrass, Or winter wheat, Or winter rye	40 96 (3 bu) 64 (2 bu) plus 20 lb annual or perennial ryegrass 180 (3 bu) 168 (3 bu)
2 – Late Spring and Summer Seeding *(June 16 to August 15)*	Annual ryegrass, Or Japanese or foxtail millet Or sudangrass, Or spring oats, Or winter wheat, Or winter rye	40 35 40 96 (3 bu) 180 (3 bu) 168 (3 bu)
3 – Late Summer and Fall Seeding (*August 16 and later*)	Annual Ryegrass Or winter rye, Or winter wheat, Or spring oats (can be used, but winter kills)	40 168 (3 bu) 180 (3 bu) 96 (3 bu)
• **Mulching:** mulches alone help protect areas from erosion. Mulches also provide initial protection if area is to be seeded later. Use hay or straw at a rate of 3 tons per acre. • **Site preparation:** Apply 1 ton of agricultural-grade limestone per acre, plus fertilizer at the rate of 05-50-50 per acre, and work in where possible. After seeding, mulch with hay or straw at a rate of 3 tons per acre.		

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

PERMANENT STABILIZATION

TABLE 11.4

Recommended Seed Mixtures for Permanent Stabilization

*Utilize Table 11.5 to determine what seed mixture is most appropriate for the individual site

Mixture Number	Species	Seeding Rate - Pure Live Seed 1	
		Most Sites	Adverse Sites
1 [2]	Spring oats (spring), or 64 96 Annual ryegrass (spring or fall), or Winter wheat (fall), or Winter rye (fall)	64 10 90 56	96 15 120 112
2 [3]	Tall fescue, or 75 Fine fescue, or 40 Kentucky bluegrass, plus 25 30 Redtop4, or Perennial ryegrass	60 35 25 3 15	75 40 30 3 20
3	Birdsfoot trefoil, plus 6 10 Tall fescue	6 30	10 35
4	Birdsfoot trefoil, plus Reed canarygrass	6 10	10 15
5 [7]	Crownvetch, plus Tall fescue, or Perennial ryegrass	10 20 20	15 25 25
6 [5,7]	Crownvetch, plus Annual ryegrass	10 20	15 25
7 [7]	Birdsfoot trefoil, plus Crownvetch, plus Tall fescue	6 10 20	10 15 30
8	Flatpea, plus Tall fescue, or Perennial ryegrass	20 20 20	30 30 25
9	Tall fescue, plus Fine fescue	40 10	60 15
10	Deertongue, plus Birdsfoot trefoil	15 6	20 10
11 [6]	Switchgrass, or Big Bluestem, plus Birdsfoot trefoil	15 15 6	20 20 10
12	Orchardgrass, or Smooth bromegrass, plus Birdsfoot trefoil	20 25 6	30 35 10

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

1. 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.
2. If high-quality seed is used, for most sites seed spring oats at a rate of 2 bushels per acre, winter wheat at 11.5 bushels per acre, and winter rye at 1 bushel per acre. If germination is below 90%, increase these suggested seeding rates by 0.5 bushel per acre.
3. This mixture is suitable for frequent mowing. Do not cut shorter than 4 inches.
4. 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 such as weeping lovegrass and redtop, dilute with dry sawdust, sand, rice hulls, buckwheat hulls, etc.
5. Use for highway slopes and similar sites where the desired species after establishment is crownvetch.
6. Do not mow shorter than 9 to 10 inches.
7. Seed mixtures containing crown vetch should not be used in areas adjacent to wetlands or stream channels due to the invasive nature of this species.

TABLE 11.5
Recommended Seed Mixtures for Permanently Stabilizing Disturbed Areas

Site Condition	Nurse Crop	Seed Mixture (Select one mixture)
Slopes and Banks (not mowed)	1 plus	3, 5, 8, or 11[6]
Well-drained	1 plus	3 or 7
Variable drainage		
Slopes and Banks (mowed)	1 plus	2 or 9
Well-drained	1 plus	2, 3, or 13
Slopes and Banks (grazed/hay)		
Well-drained		
Gullies and Eroded Areas	1 plus	3, 5, 7, or 11[6]
Erosion Control Facilities (BMPs)	1 plus	2, 3, or 4
Sod waterways, spillways, frequent water flow areas	1 plus	2, 3, or 4
Drainage ditches	1 plus	5 or 7
Shallow, less than 3 feet deep	1 plus	2 or 3
Deep, not mowed	1 plus	5 or 7
Pond banks, dikes, levees, dams, diversion channels,	1 plus	3 or 12
And occasional water flow areas		
Mowed areas		
Non-mowed areas		
For hay or silage on diversion channels and occasional water flow areas		

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

1. For seed mixtures 11 and 12, only use spring oats or weeping lovegrass (included in mix) as nurse crop.
2. Contact the Pennsylvania Department of Transportation district roadside specialist for specific suggestions on treatment techniques and management practices.
3. Seed mixtures containing crown vetch should not be used in areas adjacent to wetlands or stream channels due to the invasive nature of this species.

What to Include in a Timber Harvest Erosion & Sedimentation Control Plan

- **The existing topography of the site – Roads, slope or grade of the land, location of any water (streams, ponds, wetlands, springs, etc.) and any other significant features of the site.**
- **The location and distance to any waters of the Commonwealth of which the project is located, including its classification pursuant to Chapter 93, which can be found at http://www.depgis.state.pa.us/emappa/**
- ***IMPORTANT!* - A watershed classification of HQ (high quality) or EV (exceptional value) is a special protection watershed requiring ABACT BMPs. These BMPs are identified in their descriptions.**
- **Types of soils on the site with depths, slopes, locations, and limitations – http://websoilsurvey.nrcs.usda.gov/ (Web soil survey link) or refer to County Soil Survey, available at Conservation District office.**
- **A separate narrative description of the past/present land uses and proposed alterations to the site.**
- **The staging of earth disturbance activities. Determine the sequence in which the earth disturbance will occur, always keeping in mind that the most effective method of controlling erosion is to disturb only those areas necessary for harvesting timber. Disturbed areas should be stabilized immediately after earth disturbance has been completed or earth disturbance activities cease.**
- **Types of control measures, non-discharge or *ABACT approved erosion control measures must be utilized in all special protection watersheds*, both temporary (such as compost sock/log/tube, mulch berms, straw bale barriers, filter fabric fences, stone filters (with compost), etc.) and permanent (such as seeding and mulching, rock-lined or geotextile-lined channels). Provide calculations/table for demonstrated use. (*see attached details/E&S manual)***
- **A maintenance plan for all of the control measures being used (*see standard details*)**
- **A Plan Drawing *(template provided on last page)* – The limits of the harvesting area must be shown on plan drawing(s). Such information as the limits of clearing and grubbing and the areas of cuts and fills for roads and landings, and other proposed disturbances for the timber harvesting area are to be included. Roads, skid roads, and landings located within 50 ft. of a stream bank may require a Department Chapter 105 Water Obstruction and Encroachment. The following should be clearly shown on the sketch map:**
  - **Dimensions**
  - **North Arrow**
  - **Landings**
  - **Haul Roads**
  - **Skid Roads**
  - **E&S BMP Installation Locations**
  - **Wetland Crossings**
  - **Stream Crossings**
  - **Equipment Maintenance/Fueling Areas**
  - **Existing Roads**
- **Procedures to ensure the proper measures for recycling and disposal of materials associated with the project site will be managed lawfully. *(see standard notes @ http://Mifflincd.com/erosion-and-sediment-control-2/es-program-npdes/ go to bottom of page)***
- **If there are any potential thermal impacts to surface waters of the Commonwealth from the earth disturbance activities, they will need to be identified, along with any methods proposed for avoidance/mitigation of these thermal impacts.**
- **Identify any existing and proposed riparian forest buffers.**

Example Sequence of Earth Disturbance Activity

1. **Install a tire cleaning, rock construction entrance (see detail).**
2. **Install temporary control measures such as compost sock, waterbars, turnouts, etc. (see details)**
3. **Protect (flag/rope/fence) any sensitive areas such as tree protection, wetlands, springs and stormwater ditches.**
4. **Prepare site to the minimum needed, stockpile topsoil and provide temporary stabilization.**
5. **Conduct Timber Harvest Activities.**
6. **Finish grade and permanently stabilize (seed and mulch, sod, stone, etc.) the site. Maintain erosion controls until permanent stabilization has been achieved on all disturbed areas.**

Seeding and Mulching Specifications

Time of Seeding –Through proper seed selection and seeding methods, disturbed sites may be re-vegetated at almost any time from spring to fall. Check for recommended spring and fall seeding dates in your area.

Surface Preparation – Spread topsoil and prepare smooth seed bed by rolling and/or raking.

Lime and Fertilizer – Lime and fertilizer should be applied in accordance with soil test recommendations. If soil test results are not available, apply at least 6 tons of agricultural grade limestone and 1000 pounds of 10-20-20 fertilizer per acre.

Seeding Methods – Apply seed at required rates. Seed may be broadcast on the surface and a layer of mulch applied at the necessary rates. Seed to soil contact is required for successful germination.

Mulching – All earth disturbance areas, regardless of seeding method, should be mulched to reduce erosion and aid seed germination. Hay or straw are the preferred mulches and should be applied to produce a layer ¾ to 1-inch deep. Generally, 3 tons of mulch per acre (approximately 3 bales per 100 sq.) is sufficient.

For more information – Consult the *Penn State Agronomy Guide* or your local Extension Office.

******IMPORTANT – ONLY INCLUDE THOSE BMPs THAT ARE BEING USED ON YOUR PROJECT******

TIMBER HARVEST EROSION CONTROL PLAN

Property Owner Information:

Owner: _____ _____
Signature of Property Owner

Address: _____

City: _____ **State:** _____ **Zip:** _____ **Phone:** _____

Person(s) Responsible for Construction and Maintenance of Erosion and Sediment Control BMPs:
(NOTE: If duties are assigned to more than one party, list all others with their signatures in an attachment to this application)

Name(s): _____ _____
Signature of Person(s) Responsible

Address: _____

City: _____ **State:** _____ **Zip:** _____ **Phone:** _____

Erosion and Sediment Control Plan Prepared By:

Preparer: _____ _____
Signature of Plan Preparer

Address: _____

City: _____ **State:** _____ **Zip:** _____ **Phone:** _____

Harvest Location (include copy of topographic map): _____ **Municipality:** _____

Name of nearest receiving stream or body of water: _____

Estimated dates for start-up and completion: Start: _____ **End:** _____

Estimated Disturbed Area:

	Total Length (ft)		Average Width (ft)		Area (sq ft)
Haul Roads	_____	**x**	_____	**=**	_____
Skid Roads	_____	**x**	_____	**=**	_____
Landings	_____	**x**	_____	**=**	_____
			Total Area (sq ft)	**=**	_____

÷ 43,560 sq ft/A = _____ *
Total Disturbed Area

****If the total area of earth disturbance activities (sum of area disturbed by haul roads, skid roads, and landings) consists of 25 acres or more, an Erosion and Sediment Control Permit must be obtained.***

Project acres (entire property): _____

Disturbed acres (from above): _____

Present site conditions (vegetative cover, existing disturbance, type of land use, etc.): _____

_____

_____

Soil type(s) (include Soil Map): _____

_____

Leave this Space Blank for Conservation District Stamp

NARRATIVE (Discuss the past & present land uses and give detailed description of proposed work. Identify whether there will be any thermal impacts to surface waters, and any methods taken to avoid/minimize potential thermal impacts.)

SEQUENCE OF CONSTRUCTION (Label each step in numerical order – be specific.)

TEMPORARY E&S CONTROLS

Detail any temporary erosion control practices that will be implemented. List each control practice separately, explain why it is needed, and when it can safely be removed. Drawings and designs for any practice not illustrated in this guide should be attached and referenced in this section.

PERMANENT E&S CONTROLS

Prior to completion of the project, state law requires that steps be taken to provide permanent stabilization. Re-establishment of vegetation, riprap, pavement, etc. are examples of permanent controls. Descriptions for re-vegetating should include the seeding mixture to be used, top soil applications, and lime and fertilizer instructions.

MAINTENANCE PROGRAM

All erosion control practices require maintenance to junction properly. Straw bale dikes deteriorate and clog with sediment. Newly seeded areas may fail to germinate or be washed out by heavy rain. Straw bale barriers and filter fabric fences should be cleaned when they are at half their capacity. Please describe efforts you will make to ensure that all erosion control practices will continue to function properly and specify who will be responsible for maintenance.

_____

_____

_____

_____

_____

IMPORTANT!!

Keep a copy of this plan for your records and PROVIDE A COPY TO YOUR CONTRACTOR, if applicable. This plan must be on site at all times during earth disturbances.

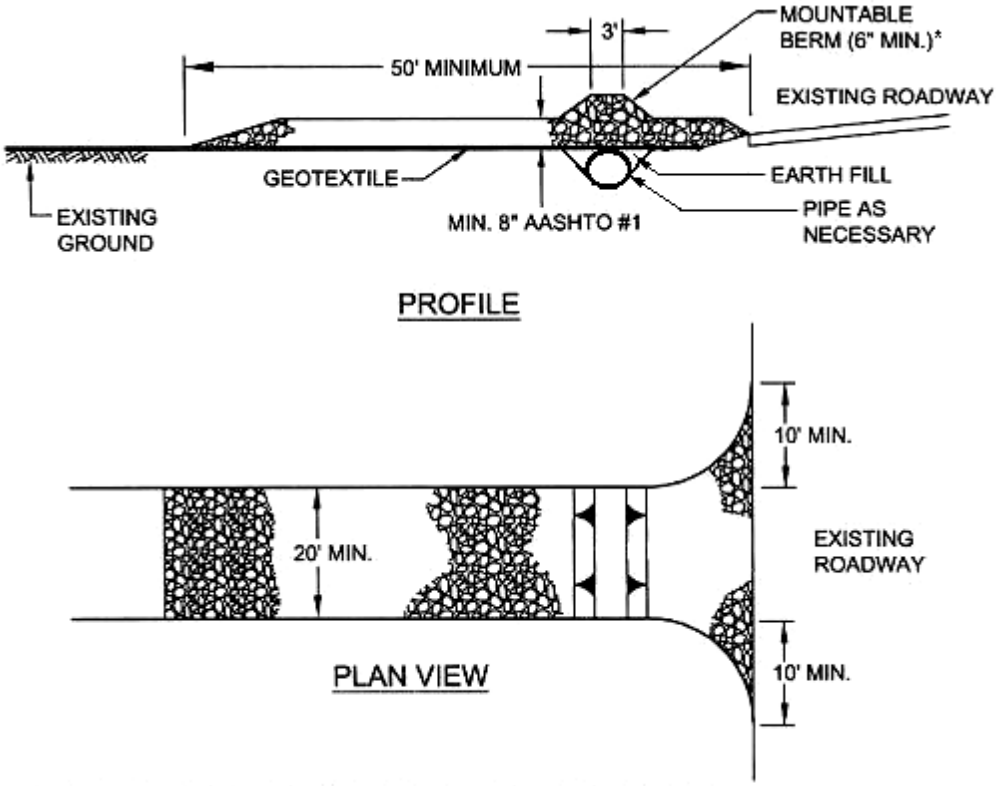
The Best Management Practices (BMPs) provided in this guide are those that are most common for Timber Harvests in low hazard settings. Other BMPs may be utilized from the Erosion and Sediment Pollution Control Program Manual at the web address below.

http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-88925/363-2134-008.pdf

ROCK CONSTRUCTION ENTRANCE - **Sediment Removal Efficiency: LOW. This device is not an ABACT for special protection watersheds.** 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. Access to the site should be limited to the stabilized construction entrance(s).

Rock construction entrances are not effective sediment removal devices for runoff coming off the roadway above the entrance. Surface runoff should be directed off the roadway by means of appropriate drainage devices described later in this chapter. Where these devices do not discharge to a suitable vegetative filter strip, an appropriately sized sediment trap should be provided. For locations not having sufficient room for a conventional sediment trap, consideration should be given to use of a compost sock sediment trap. Compost sock traps may also be used instead of conventional sediment traps at other points of discharge. Where used, care should be taken to provide continuous contact between the sock and the underlying soil in order to prevent undermining. It is also important to properly anchor the sock (Standard Construction Detail #3-1).

STANDARD CONSTRUCTION DETAIL # 3-1
Rock Construction Entrance



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

Remove topsoil prior to installation of rock construction entrance. Extend rock over full width of entrance.

Runoff shall be diverted from roadway to a suitable sediment removal BMP prior to entering rock construction entrance.

Mountable berm shall be installed wherever optional culvert pipe is used and proper pipe cover as specified by manufacturer is not otherwise provided. Pipe shall be sized appropriately for size of ditch being crossed.

MAINTENANCE: Rock construction entrance thickness shall be constantly maintained to the specified dimensions by adding rock. A stockpile shall be maintained on site for this purpose. All sediment deposited on paved roadways shall 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.

ROCK CONSTRUCTION ENTRANCE WITH WASH RACK - Sediment Removal Efficiency: HIGH. This device is an ABACT for HQ and EV watersheds. Rock construction entrances with wash racks should be considered wherever soil and/or traffic conditions require washing the construction vehicle wheels prior to exiting the site to avoid excessive tracking of mud onto a highway.

At a minimum, rock construction entrances with wash racks should be constructed to the length, width, and thickness dimensions shown on Standard Construction Detail #3-2.

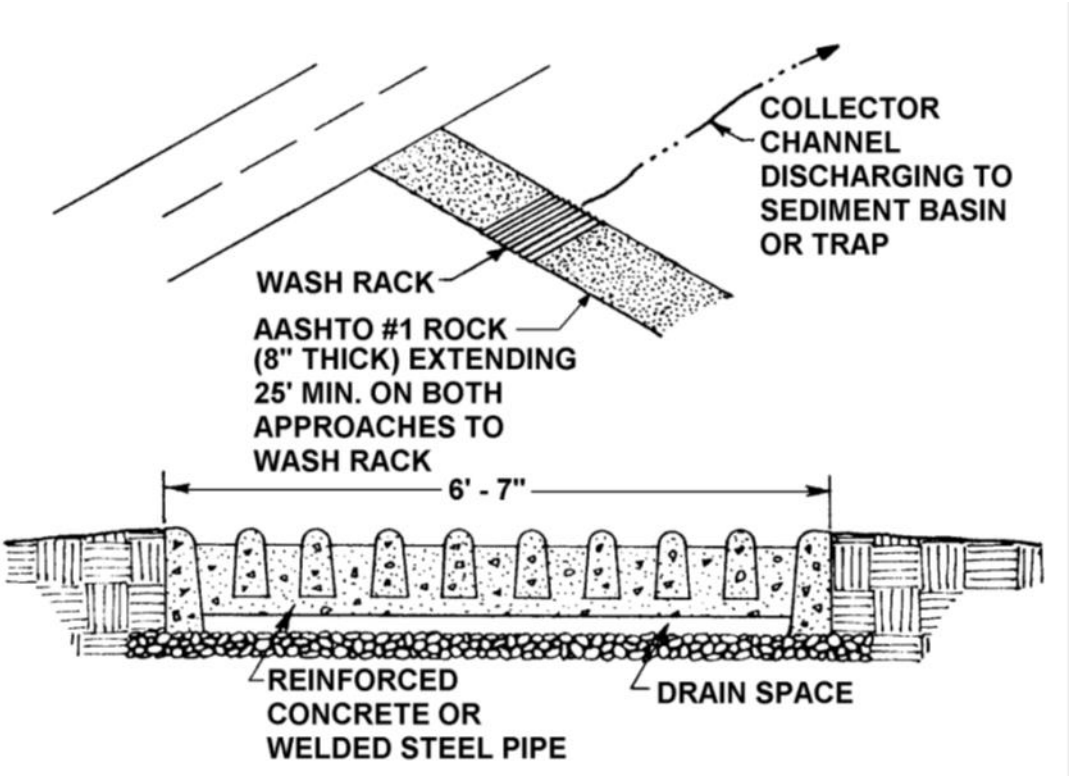
The wash rack should discharge to a sediment removal facility, such as a vegetated filter strip or into a channel leading to a sediment removal device (e.g. a sediment trap or sediment basin).

Rock construction entrances with wash racks should be maintained to the specified dimensions by adding rock when necessary at the end of each workday. A stockpile of rock material should be maintained on site for this purpose.

Sediment deposited on paved roadways should be removed and returned to the construction site. NOTE: Washing the roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses is not acceptable.

Damaged wash racks should be repaired as necessary to maintain their effectiveness.

STANDARD CONSTRUCTION DETAIL # 3-2
Rock Construction Entrance with Wash Rack



Wash rack shall be 20 feet (min.) wide or total width of access.

Wash rack shall be designed and constructed to accommodate anticipated construction vehicular traffic.

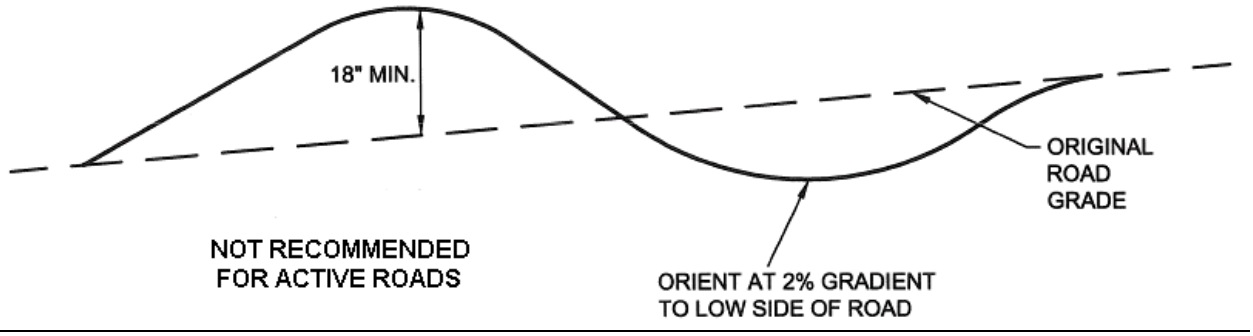
A water supply shall be made available to wash the wheels of all vehicles exiting the site.

MAINTENANCE: Rock construction entrance thickness shall be constantly maintained to the specified dimensions by adding rock. A stockpile of rock material shall be maintained on site for this purpose. Drain space under wash rack shall be kept open at all times. Damage to the wash rack shall be repaired prior to further use of the rack. All sediment deposited on roadways shall be removed and returned to the construction site immediately. Washing the roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses are not acceptable.

<u>WATERBAR</u> - Sediment Removal Efficiency: VERY LOW. This device by itself is not an ABACT for special protection watersheds. However, waterbars can be used to make ABACT such as vegetative filter strips work more effectively by reducing the volume of discharge to a filter strip at any one location.
Waterbars are typically used to control stormwater runoff on retired access roads and skid trails as well as pipeline and utility line right-of-ways. 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 used on active access roads, it is often necessary to provide reinforcement of the berm with a log, steel pipe, etc. to maintain the integrity of the waterbar between maintenance operations. All such waterbars should be restored to original dimensions at the end of each work day. Waterbars are not appropriate for incised roadways, where there is no opportunity to discharge runoff to either side.

Waterbars may be used to direct runoff to well-vegetated areas or sediment removal facilities (e.g. sediment traps or sediment basins). They should discharge to the downslope side of the access road, skid trail, or right-of-way so that runoff will flow away from, not back onto the roadway, skid trail, or right-of-way. A 2% maximum gradient is recommended to ensure proper discharge of water entering the waterbar. Steeper gradients should be avoided to prevent erosion of the waterbar. Wherever erodible soils are present, or where there is not a sufficient vegetative filter strip between the waterbar and a receiving surface water, the waterbar should be provided with a temporary protective liner. All waterbars should be vegetated. Obstructions, (e.g. straw bales, silt fence, rock filters, etc.) should not be placed in or across waterbars.

<u>STANDARD CONSTRUCTION DETAIL #3-5</u>
Waterbar



Waterbars shall discharge to a stable area.

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

Maintenance of waterbars shall be provided until roadway, skidtrail, or right-of-way has achieved permanent stabilization.

Waterbars on retired roadways, skidtrails, and right-of-ways shall be left in place after permanent stabilization has been achieved.

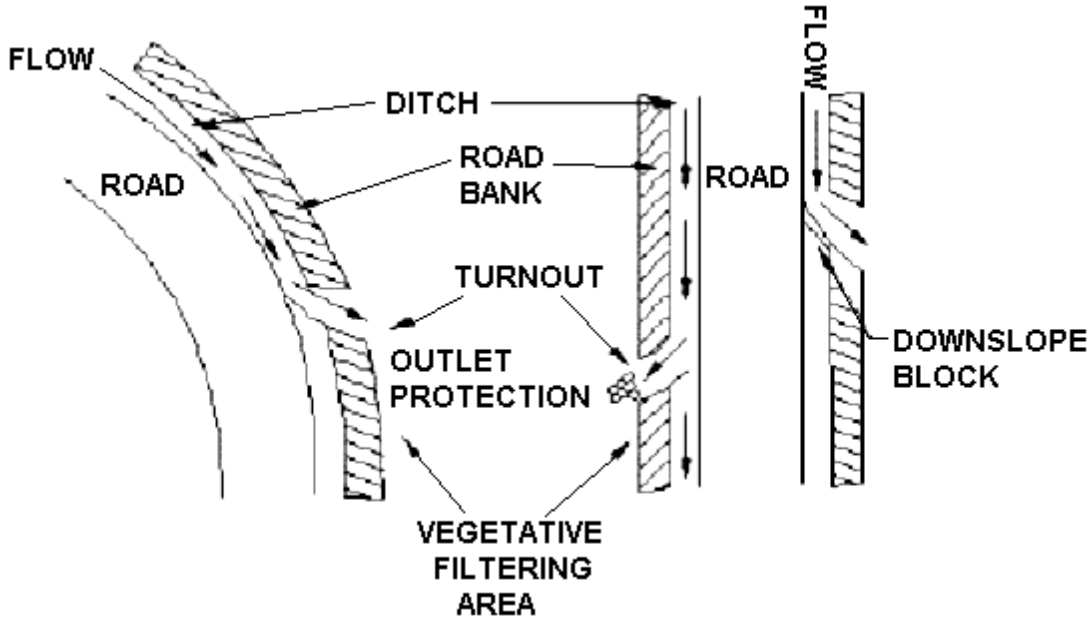
<u>TABLE 3.1 – Maximum Waterbar Spacing</u>

PERCENT (%) SLOPE	SPACING (FT)
<5	250
5-15	150
15-30	100
>30	50

<u>Adapted from USDA Forest Service</u>

<u>TURNOUT</u> - **Sediment Removal Efficiency: VERY LOW. This device is not an ABACT for special protection watersheds, but may be used to make other BMPs which are ABACT work more effectively.** Channels that drain water away from roads or roadside ditches into well-vegetated areas are known as turnouts. Turnouts (see Figure 3.3) are typically located along crowned roadways where runoff cannot sheet flow off the roadway. Like ditch relief culverts, the purpose of turnouts is to minimize the volume of water in a roadside ditch. Turnouts should be located so as to take advantage of natural drainage courses or buffer areas wherever 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 vegetative 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 3.3
Typical Turnout



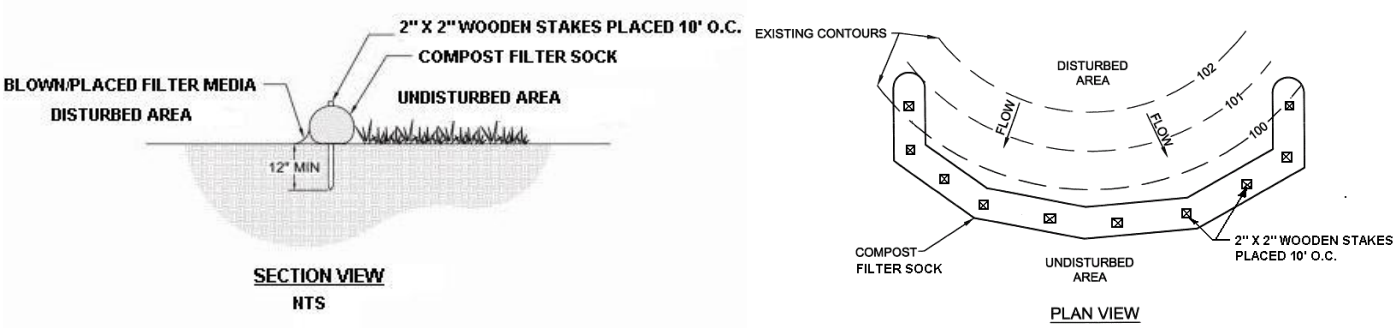
<u>COMPOST FILTER SOCK</u> - **Sediment Removal Efficiency: HIGH. This device is an ABACT for HQ and EV watersheds.** Compost filter socks are a type of contained compost filter berm. They consist of a biodegradable or photodegradable mesh tube filled, typically using a pneumatic blower, with a coarse compost filter media that meets certain performance criteria (e.g. hydraulic flow through rate, total solids removal efficiency, total suspended solids removal efficiency, turbidity reduction, nutrient removal efficiency, metals removal efficiency, and motor oil removal efficiency).
Compost filter socks are flexible and can be filled in place or in some cases filled and moved into position. They are especially useful on steep slopes. Heavy vegetation should be removed prior to installing the sock. Compost socks can also be used on rocky slopes if sufficient preparation is made to ensure good contact of the sock with the underlying soil along its entire length. They may also be used on pavement as a perimeter control. Socks used in this manner range in diameter from 8" to 32". **Note: The flat dimension of the sock should be at least 1.5 times the nominal diameter. Also, some settlement of the tube typically occurs after installation.** The nominal diameter of the tube is the dimension to be used for design purposes (i.e. Figure 4.2). Socks with diameters less than 12" should only be used for residential housing lots of ¼ acre or less that are tributary to a sediment basin or sediment trap.

As with other sediment barriers, filter socks should be placed parallel to contour with both ends of the sock extended upslope at a 45-degree angle to the rest of the sock to prevent end-arounds (Figure 4.1). Socks placed on earthen slopes should be anchored with stakes driven through the center of the sock (Standard Construction Detail #4-1) or immediately downslope of the sock at intervals recommended by the manufacturer. Where socks are placed on paved surfaces, concrete blocks should be used immediately downslope of the socks (at the same intervals recommended for the stakes) to help hold the sock in place.

The maximum slope length above a compost filter sock should not exceed those shown in Figure 4.2. NOTE: Slope length is not addressed by use of multiple rows of compost socks. The anticipated functional life of a biodegradable filter sock should be 6 months; for photodegradable socks, it is 1 year. Some other types may last longer. Projects with disturbances anticipated to last longer than the functional life of a sock should plan to replace the socks periodically or use another type of BMP.

Upon stabilization of the tributary area, the filter sock may be left in place and vegetated or removed. In the latter case, the mesh is typically cut open and the mulch spread as a soil supplement. In either case, the stakes should be removed.

STANDARD CONSTRUCTION DETAIL #4-1
Compost Filter Sock



Compost filter sock shall be placed at existing level grade. Both ends of the sock shall be extended at least 8 feet up slope at 45 degrees to the main sock alignment (Figure 4.1). Maximum slope length above any sock shall not exceed that shown on Figure 4.2. Stakes may be installed immediately downslope of the sock if so specified by the manufacturer.

Traffic shall not be permitted to cross filter socks.

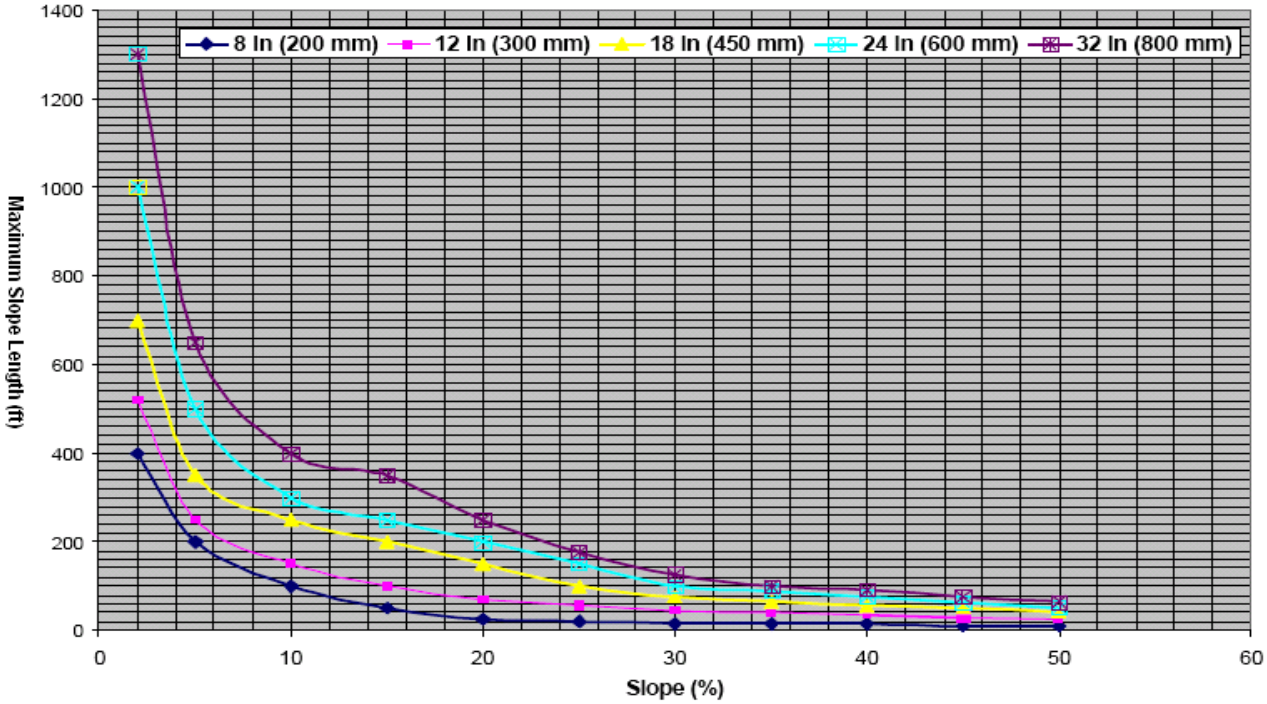
Accumulated sediment shall be removed when it reaches half the aboveground height of the sock and disposed in the manner described elsewhere in the plan.

Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Biodegradable filter socks shall be replaced after 6 months; photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations.

Upon stabilization of the area tributary to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh shall be cut open and the mulch spread as a soil supplement.

FIGURE 4.2
MAXIMUM PERMISSIBLE SLOPE LENGTH ABOVE COMPOST FILTER SOCKS



NOTE: 8" diameter socks should only be used to control small (< ¼ acre) disturbed areas on individual house lots).

<u>SILT FENCE (FILTER FABRIC FENCE)</u> - **Sediment Removal Efficiency: LOW. This device is not an ABACT for special protection watersheds. However, it may be used to increase the efficiency of another BMP which is an ABACT (e.g. vegetated filter strip).** Silt fence may be used to control runoff from small disturbed areas when it is in the form of sheet flow, and the discharge is to a stable area. Only those fabric types specified for such use by the manufacturer should be used. In order to provide sufficient fabric for proper anchoring of the fence, standard filter fabric width should be 30" min.; reinforced and super filter fabric width should be 42" min.

Do not use silt fence in areas of concentrated flows (e.g. channels, swales, erosion gullies, across pipe outfalls, as inlet protection, etc.). **Filter fabric should not be wrapped around the principal spillway risers of sediment basins or traps.**

Silt fence should not be used in areas where rock or rocky soils prevent the full and uniform anchoring of the fence. Forested areas are not recommended unless tree roots can be severed during excavation of the anchor trench.

Silt fence should not be installed on uncompacted fills or in extremely loose soils (e.g. sandy loam), since this will likely result in undermining of the fence.

Silt fence should be installed at existing level grade. Both ends of each fence section should be extended at least 8 feet upslope across undisturbed ground at 45 degrees to the main fence alignment to allow for pooling of water.

A 6" deep trench should be excavated, minimizing the disturbance on the downslope side. The bottom of the trench should be at level grade. **NOTE**: Standard silt fence may be installed using the slicing method provided manufacturer's recommendations are followed. Where this method is chosen, show all standard details and instructions provided by the manufacturer on the plan drawings.

Support stakes that are 2" X 2" (+ 3/8") hardwood (minimum cross-sectional area of 3.0 square inches) or equivalent steel (U or T weighing not less than 1.33 pound per linear foot) should be driven 18" below the existing ground surface at 8-foot (max.) intervals (see Standard Construction Detail # 4-7). The filter fabric should be stretched and fastened to the upslope side of the support stakes.

Wherever reinforced silt fence is installed, the reinforcement mesh should be fastened to the stakes prior to the fabric (Standard Construction Detail # 4-8).

At fabric ends, both ends should be wrapped around the support stake and stapled. If the fabric comes already attached to the stakes, the end stakes should be held together while the fabric is wrapped around the stakes at least one revolution (360 degrees) prior to driving the stakes.

The bottom of the fence should be anchored by placing the fabric in the bottom of the trench, then backfilling and compacting the fill material in the trench (an acceptable alternative is the use of a machine which slices the soil to a depth of at least 6 inches and inserts the fabric in a continuous operation.)

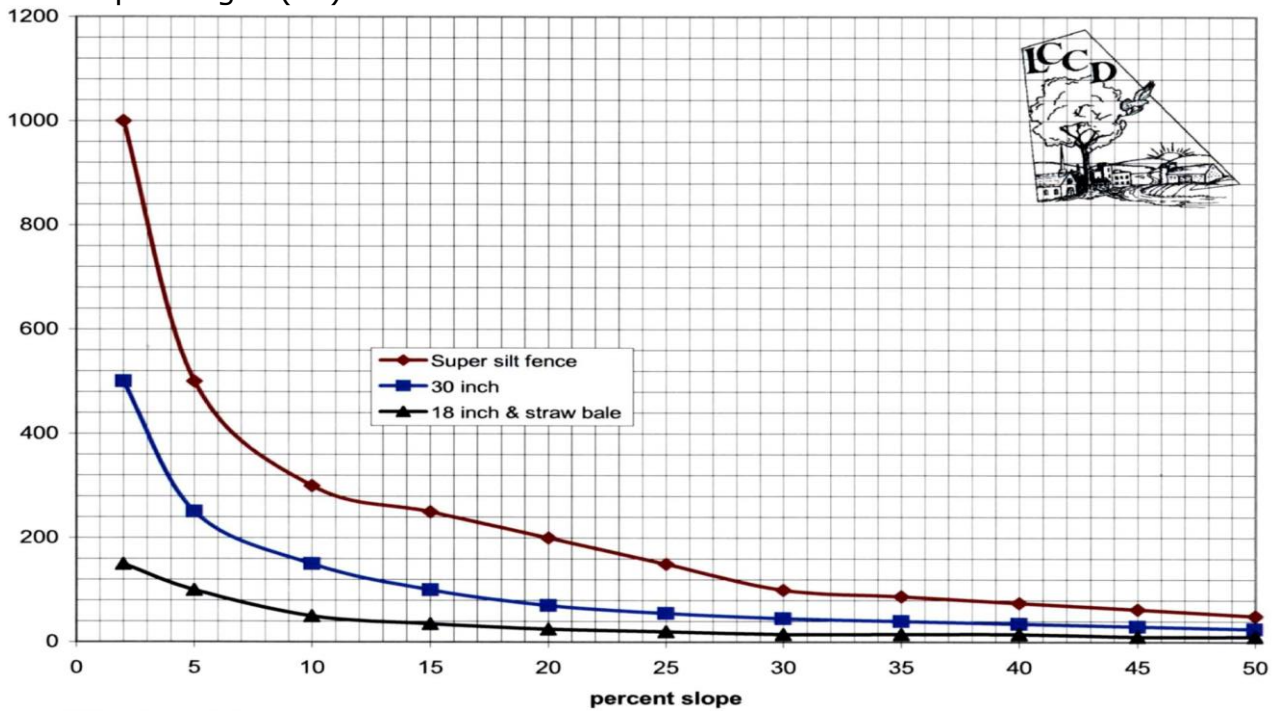
Guy wires should be attached to the support stakes of reinforced silt fence (Standard Construction Detail # 4-8). An acceptable alternative to the guy wires is to stake a continuous row of straw bales on the downslope side of the fence (Standard Construction Detail # 4-9).
Silt fence alignment should be at least 8' from the toe of fill slopes.
The maximum slope length — in both existing and final grade — above standard (18"), reinforced (30") or super silt fence should not exceed that shown in Table 4.4 or Figure 4.3. The slope length shown is the distance from the fence to the drainage divide or the nearest upslope channel. NOTE: Slope length cannot be addressed by use of multiple rows of silt fence.

TABLE 4.4
Maximum Slope Length (ft.) for Silt Fence

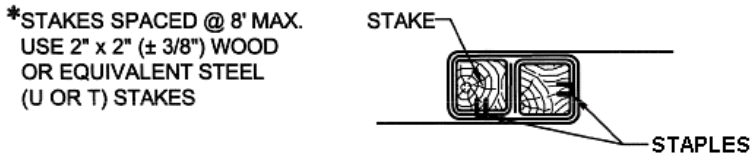
Slope - Percent	Standard (18" High) Silt Fence	Reinforced (30" High) Silt Fence	Super Silt Fence
2 (or less)	150	500	1000
5	100	250	550
10	50	150	325
15	35	100	215
20	25	70	175
25	20	55	135
30	15	45	100
35	15	40	85
40	15	35	75
45	10	30	60
50	10	25	50

Wherever there is a break or change in slope above the silt fence, the maximum allowable slope length should be determined by the following method:
(a) Determine the length and percent of the slope segment immediately above the fence.
(b) Subtract the length of this segment from the allowable slope length for that percent slope shown in Table 4.4. If the result is positive, find the percentage of the allowable slope length that has been used (slope length ÷ allowable slope length).
(c) Subtract the result from 1.00 to determine the unused percentage of allowable slope length.
(d) Determine the maximum allowable slope length for the percent slope of the remaining segment from Table 4.4.
(e) Multiply this allowable slope length by the remainder from step (c) above.
(f) Add the result from step (b) to that from step (e). This is the maximum allowable slope length for the entire slope.
Silt fence should be inspected weekly and after each runoff event. Needed repairs should be initiated immediately after the inspection.

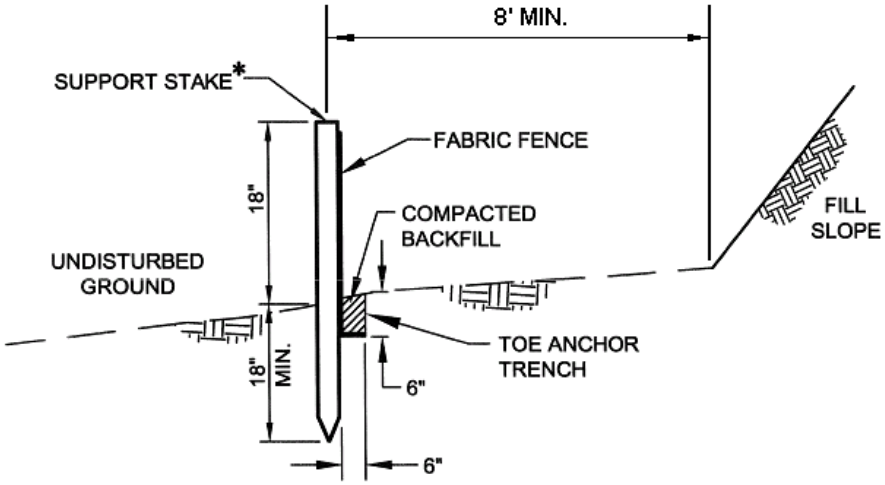
FIGURE 4.3
Maximum Permissible Slope Length above Silt Fence and Straw Bale Barriers



STANDARD CONSTRUCTION DETAIL # 4-7
Standard Silt Fence (18" High)



JOINING FENCE SECTIONS



ELEVATION VIEW

Fabric width shall be 30" minimum. Stakes shall be hardwood or equivalent steel (U or T) stakes.

Silt fence shall be placed at level existing grade. Both ends of the fence shall be extended at least 8 feet up slope at 45 degrees to the main fence alignment (see Figure 4.1).

Sediment shall be removed when accumulations reach half the aboveground height of the fence.

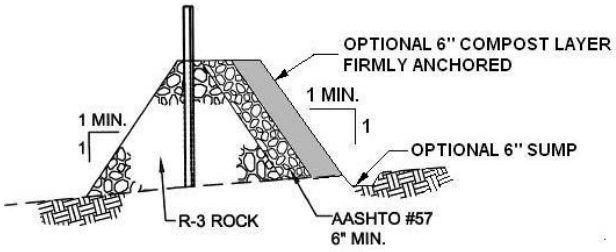
Any section of silt fence which has been undermined or topped shall be immediately replaced with a rock filter outlet (Standard Construction Detail # 4-6).

Fence shall be removed and properly disposed of when tributary area is permanently stabilized.

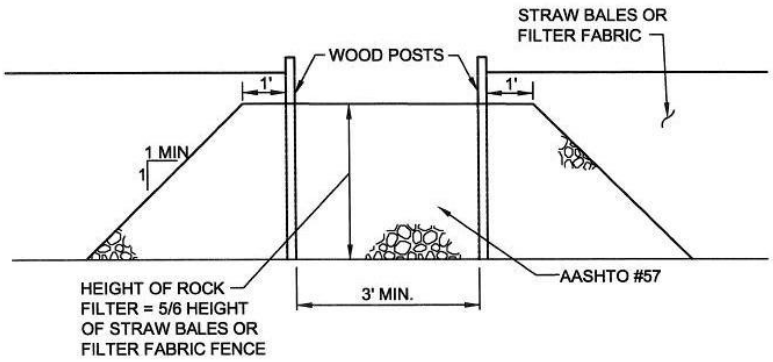
ROCK FILTER OUTLET - **Sediment Removal Efficiency: LOW. This device is not an ABACT for special protection watersheds.** Rock filter outlets may be used to address problems of concentrated flows to sediment barriers. Wherever a sediment barrier has failed due to an unanticipated concentrated flow, a rock filter outlet should be installed unless that concentrated flow can be otherwise directed away from the barrier.

In special protection watersheds — HQ or EV — or where additional water filtering is desired, a 6-inch layer of compost should be added and anchored on top of the upslope side of the AASHTO #57 stone. A 6-inch deep sump may be installed immediately upslope of the rock filter outlet to provide additional sediment removal capacity.

STANDARD CONSTRUCTION DETAIL # 4-6
Rock Filter Outlet



OUTLET CROSS-SECTION



UP-SLOPE FACE

A rock filter outlet shall be installed where failure of a silt fence or straw bale barrier has occurred due to concentrated flow.

Anchored compost layer shall be used on upslope face in HQ and EV watersheds.

Sediment shall be removed when accumulations reach 1/3 the height of the outlet.

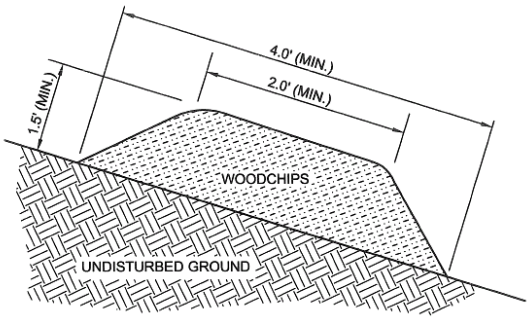
<u>WOOD CHIP FILTER BERM</u> - **Sediment Removal Efficiency: MODERATE. This device is an ABACT for HQ but not for EV watersheds.** Wood chip berms may be used on wooded or rocky slopes where staking and trenching of other BMPs is very difficult or impossible. Since they do not require trenching, wood chip filter berms disturb less soil during installation than silt fence or straw bale barriers. However, large obstructions such as tree limbs, boulders, etc. should be removed prior to placement of the wood chips. Once the tributary drainage area is permanently stabilized, the wood chip filter berm may either be leveled or left in place**.**

Wood chip filter berms should not be placed in areas of concentrated flow. They should be aligned parallel to existing contours and located below all disturbed areas. It is recommended that this BMP be used in conjunction with a vegetated filter strip as described later in this chapter. They are not recommended for use within 50 feet of receiving surface water.

The maximum slope length above a wood chip filter berm should not exceed those in Table 4.5.

Wood chip filter berms should be constructed as shown in Standard Construction Detail # 4-12.

STANDARD CONSTRUCTION DETAIL # 4-12
Wood Chip Filter Berm



Prior to placement of the berm, obstructions such as tree limbs, large rocks, etc. shall be removed.

Wood chip filter berm shall be placed at existing level grade. Both ends of the berm shall be extended at least 8 feet up slope at 45 degrees to the main berm alignment (Figure 4.1). Wood chip berms shall not be located in areas of concentrated flow or used to construct sediment traps or other impoundments.

A 6" thick layer of compost shall be added to the upslope side of any wood chip filter berm located in an HQ watershed. This BMP shall not be routinely used in EV watersheds.

Berms shall be inspected weekly and after each runoff event. Sediment shall be removed when accumulations reach half the height of the berm. Damaged or deteriorated portions of the berm shall be replaced immediately upon inspection.

Berms may be leveled when the tributary area has been permanently stabilized or left in place.

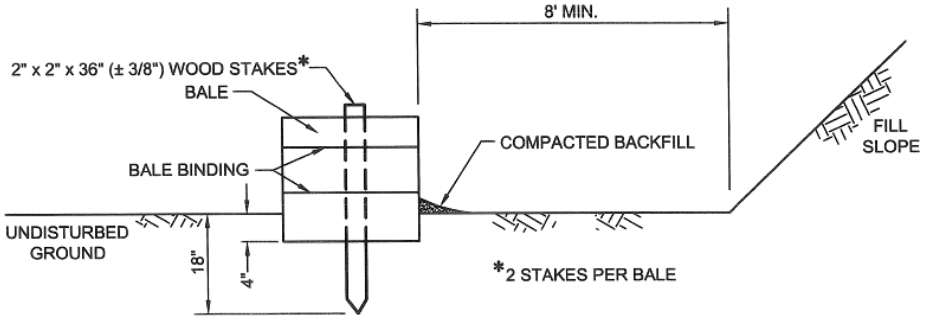
<u>STRAW BALE BARRIER</u> - **Sediment Removal Efficiency: LOW. This device is not an ABACT for special protection watersheds.** Straw bale barriers may be used to control runoff from small disturbed areas provided that runoff is in the form of sheet flow. Since straw bales tend to deteriorate within a 3-month period, they should be considered as short-term control measures. Straw bale barriers should not be used in areas of concentrated flows (e.g. channels, swales, erosion gullies, across pipe outfalls, as inlet protection, etc.) or in areas where they cannot be properly staked (e.g. paved areas).
The maximum slope length above any straw bale barrier should not exceed that shown in Table 4.5. The slope length shown is the distance from the barrier to the drainage divide or the nearest upslope channel. NOTE: Slope length is not increased by use of multiple rows of straw bale barriers. For non-uniform slopes use the method described following Table 4.4 to determine the slope length.

TABLE 4.5
Maximum Slope Length for Straw Bale Barriers and Wood Chip Filter Berms

Slope - Percent	Maximum Slope Length (ft.) Above Barrier
2 (or less)	150
5	100
10	50
15	35
20	25
25	20
30	15
35	15
40	15
45	10
50	10
> 50	Not Permitted

Straw bale barriers should not be used in areas where rock prevents full and uniform anchoring of the bales.
Straw bale barriers should be installed according to Standard Construction Detail # 4-13.
Bales should be installed in an anchoring trench. When improperly placed and installed (such as staking the bales directly to the ground with no soil seal or entrenchment), undercutting and other failures typically occur.
Two support stakes should be driven through each bale to a depth 18" below the ground surface.
The excavated soil should be backfilled and compacted on the upslope side of the bales.

STANDARD CONSTRUCTION DETAIL # 4-13
Straw Bale Barrier



Straw bale barriers shall not be used for projects extending more than 3 months.

Straw bale barriers shall be placed at existing level grade with ends tightly abutting the adjacent bales. First stake of each bale shall be angled toward adjacent bale to draw bales together. Stakes shall be driven flush with the top of the bale (see Figure 4.4). Both ends of the barrier shall be extended at least 8 feet up slope at 45 degrees to the main barrier alignment (see Figure 4.1).

Compacted backfill shall extend approximately 4 inches above ground level.

Sediment shall be removed when accumulations reach 1/3 the aboveground height of the barrier. Damaged or deteriorated bales shall be replaced immediately upon inspection.

Any section of straw bale barrier which has been undermined or topped shall be immediately replaced with a rock filter outlet (Standard Construction Detail # 4-6).

Bales shall be removed when the tributary area has been permanently stabilized.

VEGETATIVE FILTER STRIP - **Sediment Removal Efficiency: MODERATE when used in series with another sediment removal BMP that does not result in a concentrated discharge onto the vegetative filter strip. This device, when used in this way, is an ABACT for HQ but not for EV watersheds.** A vegetative filter strip consists of a well-vegetated, grassy area below a disturbed area that can be used to remove sediment from runoff prior to its reaching surface waters.

To be effective, runoff should be in the form of sheet flow, and the vegetative cover should be established prior to the disturbance. Due to the time required to establish vegetation and the need to control runoff from the areas disturbed while constructing filter strips, constructed vegetative filter strips are not recommended. The suitability of natural vegetative filter strips should be either field verified by the Department or conservation district or documented by photo(s) submitted by the applicant prior to approval. Vegetative filter strips on neighboring properties should not be proposed unless permission to use that area as a vegetative filter strip has been obtained from the owner of the property along with an agreement to leave the filter strip area undisturbed for as long as it is needed. Where control of the filter strip cannot be assured throughout its intended use, a substitute BMP that will be installed should the filter strip no longer be available should be specified in the E&S Plan.

Vegetative filter strips may be used to remove sediment from project runoff that is directed to the strip as sheet flow. The minimum filter strip width should be determined from Table 4.6.

Vegetation should be an existing, well-established, perennial grass. Wooded and brushy areas are not acceptable for purposes of sediment removal.

The total width of the filter strip should be at least half that of the disturbed area tributary to it. Minimum width of the filter strip should be:

Wmin = 2S + 25 ft. (50 ft. min. or ½ that of the disturbed area tributary to it, whichever is longer)

Where: Wmin = Minimum filter width in feet

S = Average slope (in percent) of the filter strip

If at any time, the width of the vegetative filter strip has been reduced by sediment deposition to half its original width, suitable alternative BMPs should be installed immediately. The E&S Plan should specify what BMPs will be installed should this occur. Specifications, typical details, locations, etc. should be included.

FIGURE 4.5
Vegetative Filter Strip

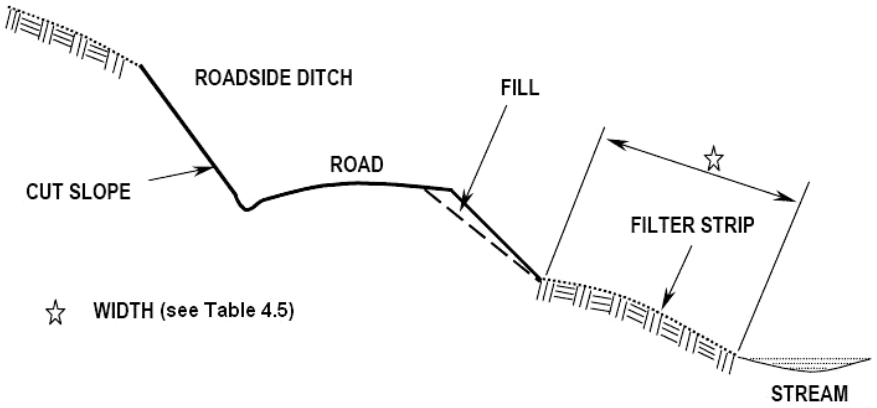


TABLE 4.6
Minimum Filter Strip Widths for Sediment Removal

Land Slope[1] (%)	Minimum Filter Strip Width (ft.) Meadow*	Minimum Filter Strip Width (ft.) Forest*
≤ 10	50	75
20	65	100
30	85	125
40	105	160
50	125	190
60	145	220
70	165	250

[1]Land Slope is at location of filter strip

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

http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-88925/363-2134-008.pdf

This guide was developed in effort to assist landowners and consultants in the harvesting of timber from a property. This guide contains common BMPs for Timber Harvest Activities. A basic understanding of the principles of Erosion and Sediment Control (and environmental protection) will prove beneficial to anyone utilizing this guide for the purpose of submitting an E&S plan for review. The introduction section of the Erosion and Sediment Pollution Control Program Manual (web address above) is recommended reading for those not familiar with the program and its principles. Further information pertaining to the Clean Stream Laws and Environmental Protection can be found at the following web address

http://www.pacode.com/secure/data/025/chapter102/chap102toc.html

This guide references other sources of information that may need to be utilized in performing due diligence for your project and providing complete and accurate information for adequacy reviews.

http://Mifflincd.com/erosion-and-sediment-control-2/

For more information about Erosion and Sediment Control contact:

Mifflin County Conservation District
20 Windmill Hill #4
Burnham, PA 17009
Telephone: 717-248-4695
www.mifflinccd.com

**A special thanks to the Berks CCD for developing this template*

PUBLIC ROAD

STREAM ...

PROPERTY BOUNDARY

SLOPE %

ROCK CONSTRUCTION ENTRANCE RCE

WETLANDS

POND

CULVERT

STRAW BALE BARRIER SBB

FILTER FABRIC FENCE FF

ROCK FILTER BERM

LIMIT OF DISTURBANCE

COMPOST SOCK ---CS---

WOODCHIP BERM ---WCB---

VEGETATED FILTER

WATERBAR ---W---

DIVERSION ---D----

NORTH ARROW N

SKID ROAD

SKID TRAIL ----------

TURN-OUT T-O

LANDING AREA LD#__

APPX. SCALE; 1" = _____

Sketch Map Requirements

The following should be clearly shown on the sketch map:

- Dimensions (limits of harvest)
- North arrow
- Landings
- Haul and Skid Roads
- Cuts and fills for roads and landings
- Existing Roads
- E&S BMP Installation Locations
- Wetland & Stream Crossings
- Equipment Maintenance & Fueling Areas