EROSION AND SEDIMENT POLLUTION CONTROL

SMALL PROJECTS GUIDE

A PUBLICATION OF
DAUPHIN COUNTY
CONSERVATION DISTRICT

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DAUPHIN COUNTY CONSERVATION DISTRICT
SMALL PROJECTS GUIDE FOR EROSION AND SEDIMENT POLLUTION CONTROL

CONTENTS

GLOSSARY

ACCELERATED EROSION - Erosion that is more rapid than the natural rate, primarily due to human activity.

BMP - Best Management Practice - Activities, facilities, measures, planning or procedures used to minimize accelerated erosion and sedimentation and manage stormwater to protect, maintain, reclaim, and restore the quality of waters and the existing and designated uses of waters within this Commonwealth before, during, and after earth disturbance activities.

CONCENTRATED FLOW - Overland flow of runoff that has been concentrated

CHAPTER 102 - The Department's regulations concerning Erosion and Sediment Control.

DEP - Department of Environmental Protection

DISTRICT - Dauphin County Conservation District

EARTH DISTURBANCE - A construction or other human activity which disturbs the surface of the land, including land clearing and grubbing, grading, excavations, embankments, land development, agricultural plowing or tilling, operation of animal heavy use areas, timber harvesting activities, road maintenance activities, oil and gas activities, well drilling, mineral extraction, and the moving, depositing, stockpiling, or storing of soil, rock or earth minerals.

EROSION - The loosening and removal by wind and/or water of soil and/or rock from its location and moving it to a place of deposition.

ESPC- Erosion and Sediment Pollution Control

ESCP PLAN - A site-specific plan identifying BMPs to minimize accelerated erosion and sedimentation and which meets the requirements of 25 Pa. Code Chapter 102 regulations.

HQ OR EV WATER BODY – a body of water (including streams, wetlands, lakes, etc) classified as High Quality (HQ) or Exceptional Value (EV). See Section 7 – Resources for HQ and EV streams in Dauphin County

NPDES - National Pollutant Discharge Elimination System - The national system for the issuance of permits under s33 U.S.C.A. § 1342 including a state or interstate program that has been approved in whole or in part by the EPA, including the regulations codified in Chapter 92a (relating to National Pollution Discharge Elimination System Permitting, Monitoring and Compliance), and as specified in Chapter 102 (relating to Erosion and Sediment Control).

PERIMETER CONTROLS - Those BMPs that will be installed at or near the project boundaries to prevent runoff from entering the disturbed area or to capture and treat runoff from disturbed areas prior to leaving the disturbed area.

SHEET FLOW - Shallow overland flow of runoff that has not been concentrated

STABILIZATION - The proper placing, grading, constructing, reinforcing, lining, and covering of soil, rock or earth to ensure its resistance to erosion, sliding or other movement.

SURFACE WATER - Perennial and intermittent streams, rivers, lakes, reservoirs, ponds, wetlands, springs, natural seeps and estuaries, excluding water at facilities approved for wastewater treatment such as wastewater treatment impoundments, cooling water ponds and constructed wetlands used as part of a wastewater treatment process.

TOPOGRAPHY - A general term that includes the characteristics of the ground surface such as plains, hills, mountains, degree of relief, steepness of slope, and physiographic features.

INTRODUCTION

WHY DO I NEED EROSION CONTROL

The single largest source of pollution by volume to the streams, rivers and lakes in the Commonwealth of Pennsylvania is sediment. Sediment reaches these water bodies by a process called erosion. Erosion is the dislocation and movement of sediment and rock from one place to another place where it is deposited. When this material is deposited in surface water bodies, there can be significant adverse impacts. These impacts include:

- Biological damage to surface waters and aquatic organisms living in them
- Stream channel and bank degradation
- Loss of storage in ponds, lakes and reservoirs
- Increased flooding
- Increased public cost to maintain infrastructure

While erosion is a natural process, it can be accelerated tremendously by projects that disturb the earth without the use of sufficient and effective BMPs. Examples of these projects include construction, grading, filling and road work. It is the accelerated process of erosion that causes the adverse impacts listed above.

This guide is intended to provide information for small projects in order to prevent sediment from washing onto neighboring properties or into streams.

WHAT ARE THE REGULATIONS

In Pennsylvania, earth disturbance projects are regulated under Chapter 102 of the Pennsylvania Code, Erosion and Sediment Pollution Control (ESPC). Chapter 102 also incorporates Federal NPDES (National Pollutant Discharge Elimination System) requirements into the Chapter 102 program. Under Chapter 102 for any project that where there is an earth disturbance:

1. If the earth disturbance is less than 5,000 square feet, erosion control BMPs must be used.

2. If the earth disturbance is equal to or more than 5,000 square feet but less than one acre, a written erosion control plan is required. The plan must be implemented but need not be approved unless required by the municipality.

3. If the earth disturbance is one acre or more, a written and approved erosion control plan is required as well as an NPDES permit.

4. If the project has the potential to discharge to a stream classified as High Quality (HQ) or Exceptional Value (EV) water body, a written plan is required regardless of the amount of disturbance.

Chapter 102 also provides for enforcement of the regulations. Failure to implement BMPs, to develop a written plan or to obtain a permit and plan approval where required are violations of Chapter 102 and may result in fines.

It is also important to be aware that some municipalities may have more stringent requirements at the local level. For example, some municipalities may require an approved ESPC plan before issuing any permits even though the plan approval is not required under Chapter 102. It is recommended that you contact your municipal government to find out if there are any applicable requirements.

Chapter 102 is administered by DEP. In Dauphin County, the Dauphin County Conservation District is delegated by DEP to administer portions of the Chapter 102 program.

WHAT APPROVALS DO I NEED

Under Chapter 102, any project that disturbs earth must do one of the following depending on the area disturbed.

AREA DISTURBED	REQUIREMENT
LESS THAN 5,000 SQUARE FEET	BMPs to control erosion must be used. No written plan or approval is needed.
5,000 SQUARE FEET TO AN ACRE	A written ESPC plan and BMPs must be used. The plan need not be approved.
1 ACRE OR MORE	An NPDES permit including an ESPC and Post Construction Stormwater Management Plan.
ANY DISTURBANCE WITH POTENTIAL DISCHARGE TO AN HQ OR EV WATER BODY	A written ESPC plan is needed and BMPs must be used. The plan need not be approved.

Please note the following:

1. While earth disturbances less than an acre do not need an ESPC plan approval under Chapter 102, some municipalities do require plan approval under municipal regulations.

2. Under Chapter 102, a written plan may be required if the disturbance is found to be a problem.

3. Approval of ESPC plans or NPDES permits does not eliminate the need for any municipal approvals or permits that may be needed.

4. Projects located within designated floodways or within 50 feet of a stream without designated floodways may need Water Obstruction and Encroachment Permits under Chapter 105 of the Pennsylvania Code. Contact your Regional DEP office for more information.

5. Projects located in designated floodplains may need to meet additional municipal floodplain requirements. Consult your municipality if your project is located in a floodplain.

6. Permits may be required under other DEP regulations.

HOW DO I USE THIS GUIDE

Large, complex projects typically require the services of a qualified professional, such as an engineer, soil scientist or landscape architect, to develop a satisfactory ESPC plan. This guide has been developed to assist in the development of ESPC plans for small projects. It is intended to assist landowners in developing an effective ESPC plan without needing professional services.

Small projects are defined here as projects that:

1. Disturb less than one acre. These projects require use of BMPs for projects disturbing less than 5,000 square feet and a written ESPC plan if the project disturbs 5,000 square feet but less than one acre. Projects that disturb one acre or more require an NPDES permit.

2. Are on slopes less than 10 percent.

3. Are not adjacent to surface waters or wetlands.

4. Projects that do not receive offsite runoff from large drainage areas

5. Projects that do not require complex ESPC measures.

If your project meets the conditions above, you may be able to use this guide. Conservation District staff may also be able to assist you to determine if you can use this guide and how to develop your plan. Please note that the District reserves the right to request a more formal plan where use of this guide is not sufficient to provide adequate ESPC measures.
This guide is divided into 7 sections.

SECTION 1 – FACTORS TO CONSIDER IN DEVELOPING A PLAN – This section will describe the various factors that affect erosion and should be considered in developing an ESPC plan.

SECTION 2 – COMMON ESPC BMPS – This section describes several common BMPs that are typically used on small project sites.

Vegetative stabilization
Fabric fence
Filter sock
Straw Bales
Rock construction entrance
Swales
Rock filters
Rock outlet protection
Sediment trap
Inlet Filter Bag

SECTION 3 – ESPC PLAN NARRATIVE – This is a "fill in the blank" type form that can be used to develop the narrative portion of an ESPC plan.

SECTION 4 – ESPC PLAN DRAWING – This section contains a sample drawing and a blank map that can be used to sketch the site features and location of BMPs.

SECTION 5 – ESPC PLAN REVIEW APPLICATION – This form is required for any plans submitted to the District for approval. Where a plan is required or voluntarily submitted for approval, the application and review fees are needed.

SECTION 6 – SLOPE TO SLOPE LENGTH CHARTS

SECTION 7 – RESOURCES – This section lists reference materials that may assist you in completing your application.

NOTE: THE INFORMATION CONTAINED IN THIS GUIDE IS GENERAL IN NATURE. GREATER DETAIL FOR APPLICABILITY, INSTALLATION AND MAINTENANCE OF THE BMPS DISCUSSED MAY BE NEEDED. THE PUBLICATION EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL, PADEP, MARCH 2012 IS RECOMMENDED FOR THIS ADDITIONAL INFORMATION. YOU MAY ALSO CONTACT THE DAUPHIN COUNTY CONSERVATION DISTRICT FOR MORE INFORMATION OR GUIDANCE.

FACTORS TO CONSIDER IN DEVELOPING A PLAN

The Topographic Features of the Project Area

Topography is the physical characteristics of the site. This includes natural features such as slopes and streams. It also includes other features such as buildings and roads. These are important factors that help determine the way water flows across your site.

Your plot plan or subdivision plan may show existing contour lines and other features. You may use this plan sheet as a base map for your ESPC plan or you may transfer the slopes to the blank plan supplied with this booklet. The Conservation District also has 7 1/2 minute USGS quadrangle maps available for Dauphin County. These maps show contours at 20' intervals and other topographic features. These may be useful in determining the amount of runoff your site receives from upslope areas but are not of sufficient detail to use as a base map.

The Type, Depth, Slope and Areal Extent of the Soils

The characteristics of the soils on your site are important. For example, some soils may indicate the presence of wetlands or floodplains. Highly erodible soils may not be good places to locate certain BMPs such as swales and are susceptible to erosion, especially if left exposed.

The Dauphin County Soil Survey contains data on the physical characteristics of the soil such as texture, resistance to erosion, and suitability for intended use. This information will help you to identify areas which are highly erodible, are seasonally wet or have other characteristics which limit use or require special consideration. Soil Survey information is available at the Conservation District.

The Proposed Alterations to the Area

What you intend to do, and how you intend to do it, will have an impact on how runoff flows across your site, how much runoff is generated and the potential for the runoff to cause erosion.

The most effective way to minimize the potential for erosion is to minimize the opportunity for erosion to occur. The risk of accelerated erosion increases in relationship to the amount of site alteration. You can limit the potential for erosion by:

1. Limiting the amount of grading. Construct buildings in a location that will minimize the need to grade for accesss. Work with the existing slopes and contours to provide drainage.

2. Limit the disturbance to vegetation, especially near streams or other water bodies. Vegetation is very effective at preventing erosion and filtering runoff.

The Amount of Runoff from the Project Area and the Upslope Drainage Area

Most sites will receive runoff from upslope areas. The amount of this runoff and how it flows across your site are critical in determining the potential for erosion. In general, potential erosion increases as the slope steepens and lengthens. This is because as slopes get steeper, the velocity of the runoff increases. As slopes get longer, the amount of runoff increases. In general, this guide may not be appropriate for projects with drainage areas that exceed five acres.

The use of a topographic map and field observation will allow you to identify the drainage patterns through your site. Look for concentrated runoff sources such as natural swales, road culverts and downspouts from roof gutters. Upslope runoff should be diverted safely around your site.

The Staging of Earthmoving Activities

Staging refers to the sequence of construction activities. Erosion control BMPs should be installed first to control sediment from the project. Exposing the smallest practical area of ground for the shortest possible time is the key to this consideration. Plan the construction so that only those areas that are actively being developed are exposed. All other areas should be covered with a good stand of temporary or permanent vegetation, or mulch if construction must take place during the non-growing season. Grading should be completed as soon as possible after it is initiated and the area stabilized. Applying a stone base to your driveway the same day as it is cut in is an excellent example.

Temporary Control Measures and Facilities for Use During Earthmoving

Temporary control measures are BMPs used to prevent erosion or capture and treat sediment laden runoff from the site on a temporary basis. These BMPs are usually used or installed during construction and removed after the site is stabilized. Control measures and facilities can be divided into three types - site management, vegetative control, and structural control.

Site management has to do with how the site is managed during construction. Several items discussed related to this were described above. Good site management will reduce the need for installed controls and maximize the effectiveness of installed controls.

The importance and effectiveness of vegetative controls cannot be overemphasized. Good vegetation reduces runoff, limits erosion and filters sediment from runoff. Vegetative controls will be considered in detail under the "Vegetation to Control Erosion." section of this guide.

Structural controls are generally perimeter controls used to capture sediment or divert clean water around the disturbed area and prevent off site damage. Perimeter controls generally work in one of two ways:

1. sediment is filtered from the water by use of a filter fabric, vegetation or other practice.

2. sediment laden runoff is impounded for a period of time allowing the sediment to settle out.

Other structural controls may include swales to facilitate the movement of water and structures to reduce velocity. Commonly used structural controls are discussed in the Common ESPC BMPs Section of this guide.

Permanent Control Measures and Facilities for Long Term Protection

Permanent controls are controls that are installed and intended to be permanent. For small projects, this generally means the establishment of a permanent vegetative cover for disturbed areas. Permanent stabilization should be performed as soon as possible after the grading of an area is completed. The Conservation District recommends the use of the Penn State Agronomy as a source for information on the selection of seed species and establishment of permanent vegetative cover. Other permanent control facilities may be permanent diversion swales to control upslope water or controls to reduce the velocity of the water leaving your site.

A Maintenance Program for Control Facilities

This consideration is vital to the success of all of the above. The maintenance program must include a schedule for the inspection of the various control measures and facilities. At a minimum, the control facilities should be inspected after each rain event as well as on a weekly basis. Repairs should be made immediately. The type of maintenance required can be found with the standards and specifications for each practice in the section titled "Common ESPC BMPs."

This section describes several common BMPs that are typically used on small project sites. This section will describe each BMP, its advantages and limitations, provide installation and maintenance information and provide diagrams of the BMP where applicable. These BMPs are listed below.

Vegetative stabilization
Sediment barriers such as filter fabric fence, filter socks and straw bales
Rock construction entrance
Swales
Rock filters
Rock outlet protection
Sediment trap
Inlet Filter Bag

These BMPs have been selected for use in this guide because they are:

- typically at the lower cost end of BMPs
- typically require minimal installation effort
- typically well suited for controlling runoff and sediment from small sites

It should be kept in mind that there are other BMPs that can be used. For example, large sediment basins are often used on larger projects. However, the intent of this guide is to provide simple and easy to understand guidance for small projects where the BMPs covered in this section should provide adequate erosion and sediment control. Where more complicated and larger BMPs are needed, this guide is not applicable.

VEGETATIVE STABILIZATION

Vegetated stabilization is the use of vegetation to stabilize disturbed areas. This includes areas where earth disturbance is final or temporarily completed. Vegetation is commonly some type of grass that is planted on areas that have been disturbed. The intent is to provide vegetative cover for disturbed areas as soon as possible after disturbance to protect exposed soil and reduce the potential for erosion of the soil.

ADVANTAGES:

-Relatively inexpensive

-Relatively simple

-Applicable on most situations

LIMITATIONS:

-May be difficult to establish vegetation during certain times of the year

-Soil amendments may be needed where existing ground is not suitable for growth

AN EXAMPLE OF VEGETATED STABILIZATION - Vegetation established on this slope prevents erosion. Courtesy of Dauphin County Conservation District

INSTALLATION:

-Grass should be planted as soon as possible after disturbance is permanently or temporarily completed

-Topsoil should have a minimum depth of 4 to 8 inches

-Compacted topsoil should be loosened to a depth of 6-12 inches before seeding

-If topsoil needs to be added, the area should be loosened to a depth of 3-5 inches before applying topsoil

-If soil amendments are needed add amendments as indicated by a soil test or the Penn State Agronomy Guide.

-Seed mixtures should be selected based on the site factors such as:

amount of sunlight soil pH moisture slope expected use

-The seeded area should be mulched immediately after seeding

-On slopes of 8% or more mulch should be held in place with an appropriate netting

-Erosion control blankets should be used where the site is close to surface water

There are a wide variety of methods for seeding and a wide variety of mulches, netting and control blankets available. For projects where this guide is applicable, it is likely that simple seeding and mulching will be sufficient. You may contact the Conservation District for more information.

SEDIMENT BARRIERS

Sediment barriers are typically installed at the perimeter of a site to prevent sediment from leaving the site. These kinds of BMPs are referred to as perimeter controls. There are many types of these controls available. Three common types are discussed here.

FABRIC FENCE

Also called silt fence, is typically used to control sediment from sheet flow on small project sites. There are different heights available for use, depending on site conditions.

ADVANTAGES:

-Relatively inexpensive

-Relatively simple

-Applicable on most situations

LIMITATIONS:

-Cannnot be used where flow is concentrated

-There are limitations on maximum slope length above the fence. See slope/slope length Table below and chart in section 6.

-Cannot be used in areas where the fence cannot be completely anchored

-Cannot be used in uncompacted fills or loose soils

AN EXAMPLE OF FILTER FABRIC FENCE – This is a 30 inch reinforced fence.
From Erosion and Sediment Pollution Control program Manual, PADEP, March 2012
Courtesy of York County Conservation District
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MAXIMUM SLOPE LENGTHS ABOVE FILTER FENCE BY TYPE
From Erosion and Sediment Pollution Control program Manual, PADEP, March 2012

MAXIMUM SLOPE LENGTH, IN FEET ABOVE FENCE (see chart in Section 6 for greater detail)			
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

INSTALLATION:

-Install perpendicular to slope on level grade to efficiently intercept surface flow

-Extend ends at least 8 feet upslope at 45 degree angles to prevent runoff from washing around the ends

-Fabric should be anchored firmly in a trench at least 6 inches deep to prevent underflow

-Backfill and compact the trench

-The ends of the fence should be wrapped around the end stakes and secured to the stake

-Fabric fence larger than 18 inches will require additional methods to secure the fence

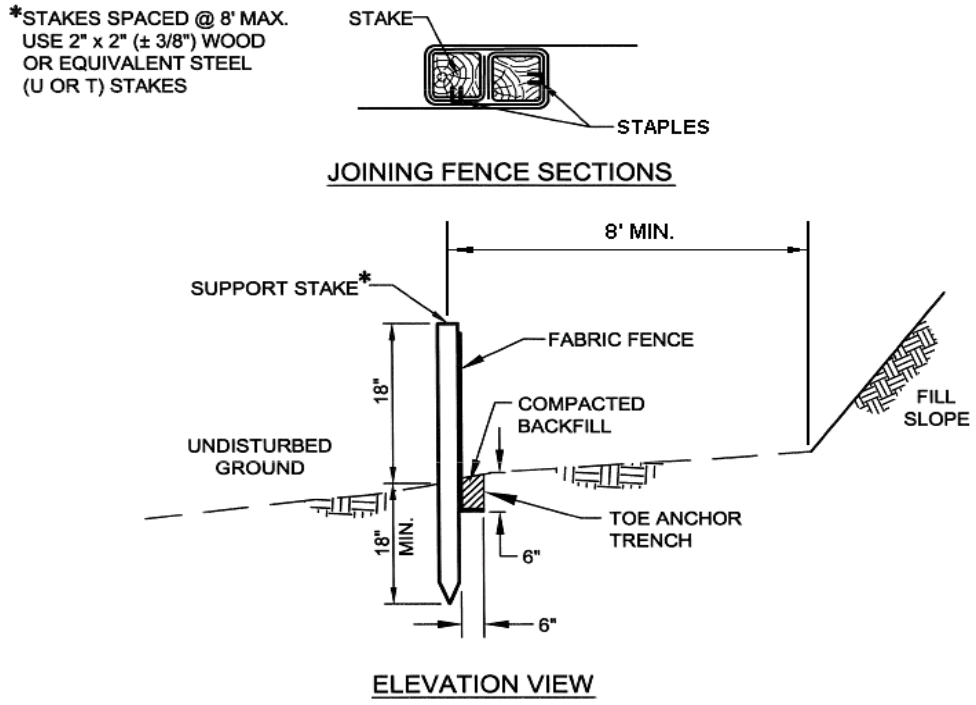
MAINTENANCE:

-Fence should be inspected on a regular basis and after each storm

-Remove accumulated sediment when the sediment reaches half the fence height

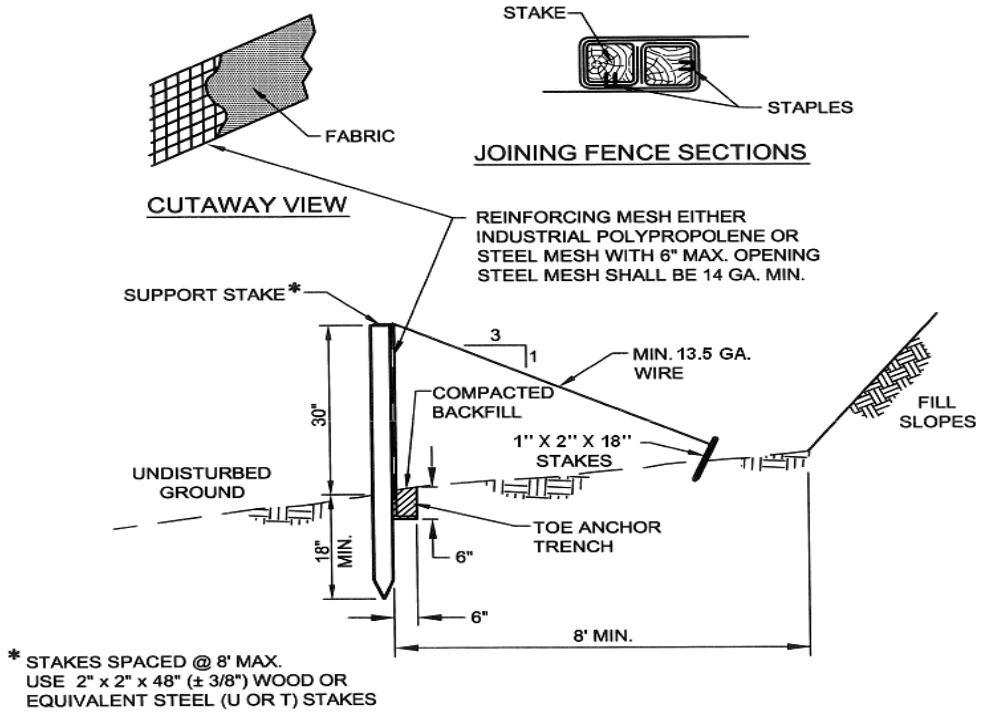
-If fence is undermined or topped, it should be repaired immediately. This may also indicate the need for other erosion control measures

STANDARD FILTER FABRIC FENCE INSTALLATION DIAGRAM



FILTER FABRIC FENCE INSTALLATION DIAGRAM – From Erosion and Sediment Pollution Control Program Manual, Pennsylvania Department of Environmental Protection, March 2012.

REINFORCED FILTER FABRIC FENCE INSTALLATION DIAGRAM



REINFORCED FILTER FABRIC FENCE INSTALLATION DIAGRAM – From Erosion and Sediment Pollution Control Program Manual, Pennsylvania Department of Environmental Protection, March 2012.

FILTER SOCK

A filter sock is similar to a fabric fence in that it is a perimeter control that acts as a barrier to sediment laden runoff from the site. However, the sock is a tube filled with a compost material. The filter sock has a slightly greater range of applicability and provides better pollutant removal.

AN EXAMPLE OF FILTER SOCK - From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012 Courtesy of York County Conservation District

ADVANTAGES:

-Relatively inexpensive

-Relatively simple

-Applicable on most situations

LIMITATIONS:

-Cannnot be used where flow is concentrated

-There are limitations on maximum slope length above the fence. See slope/slope length chart in section 6.

-Cannot be used in areas where the sock cannot be completely anchored

-Cannot be used in uncompacted fills or loose soils

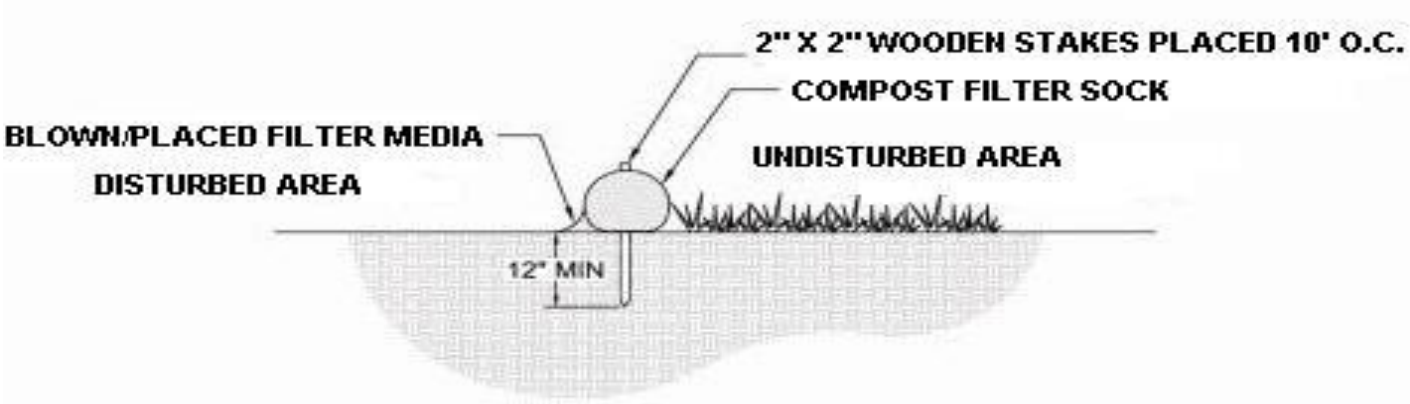
INSTALLATION:

-Install perpendicular to slope on level grade to efficiently intercept surface flow

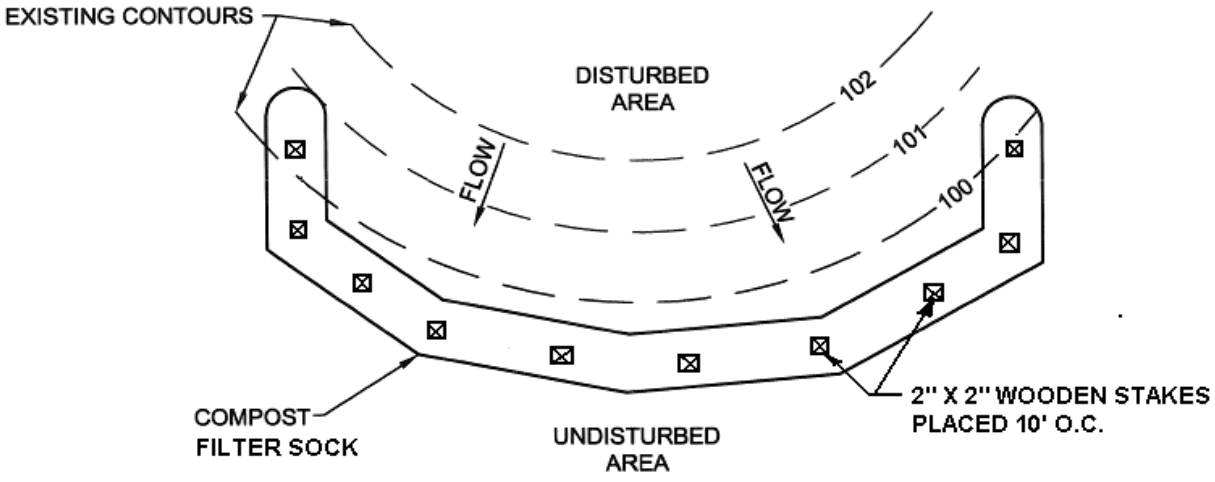
-Extend ends at least 8 feet upslope at 45 degree angles to prevent runoff from washing around the ends

-Remove heavy vegetation and large rock to ensure the sock contacts the ground to prevent runoff from flowing under the sock

-Secure the sock by driving stakes through the sock or immediately downslope of the sock



SECTION VIEW
NTS



PLAN VIEW

FILTER SOCK INSTALLATION DIAGRAM -
From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012

MAINTENANCE:

-The sock should be inspected on a regular basis and after each storm

-Remove accumulated sediment when the sediment reaches half the sock height

-If the sock is damaged it must be repaired immediately

STRAW BALES

Another type of perimeter control is straw bales. Straw bales can be an inexpensive way to control of runoff in the form of sheet flow.

ADVANTAGES:

-Relatively inexpensive

-Easy to install

LIMITATIONS:

-Maximum lifespan of straw bales is three months

-Applicable on very small sites only.

-Undercutting is common if not installed correctly

-Use of straw bales is limited based on the slope and length of slope above the bales. See slope/slope length Table below and chart in section 6.

AN EXAMPLE OF STRAW BALES – Note the sediment accumulation upslope of the bales
From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012
Courtesv of York Countv Conservation District

MAXIMUM SLOPE LENGTH FOR USE OF STRAW BALES
(see chart in Section 6 for greater detail)
From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012

SLOPE PERCENT	MAXIMUM SLOPE LENGTH ABOVE BALES
≤2	150
5	100
10	50
15	35
20	25
25	20
30	15
35	15
40	15
45	10
50	10
>50	NOT PERMITTED

INSTALLATION:

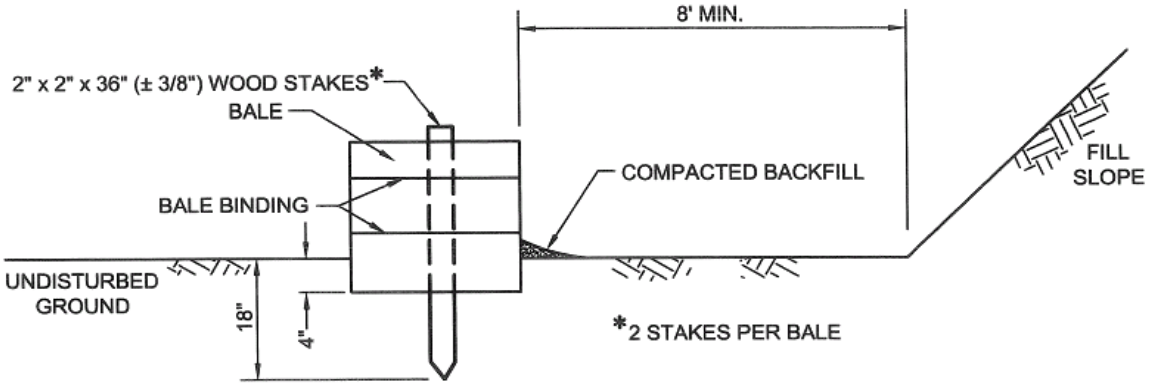
-Install on level grade

-The bottom of the bale should be at least four inches below grade to prevent undercutting

-Butt bales tightly together

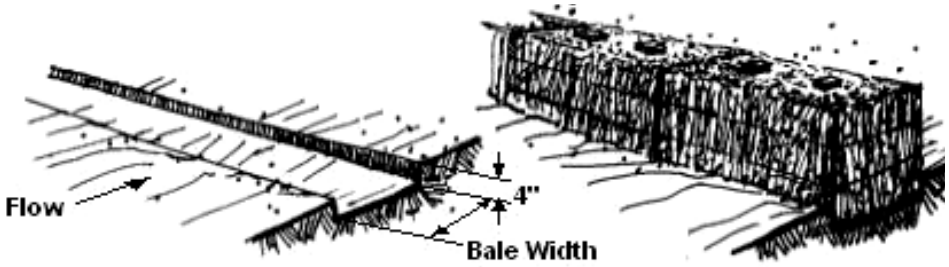
-Install 2 stakes per bale. The first stake should be angled toward the adjacent bale to force bales together

-Extend bales at least 8 feet upslope at 45 degree angles to prevent runoff from washing around the ends



STRAW BALE INSTALLATION DIAGRAM

From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012



1. EXCAVATE TRENCH

2. PLACE AND STAKE BALES

3. WEDGE STRAW IN JOINTS

4. BACKFILL AND COMPACT SOIL

INSTALLATION OF STRAW BALES

From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012

MAINTENANCE:

-Bales should be inspected on a regular basis and after each storm

-Remove accumulated sediment when the sediment reaches one third of the above ground bale height

-Undercut or overtopped bales may indicate the need for a different BMP

ROCK CONSTRUCTION ENTRANCE

When vehicles and equipment leave construction sites, sediment is often carried with them on tires. This sediment then washes into storm sewers or road side ditches where it is ultimately delivered to streams. A rock construction entrance helps to prevent the sediment from leaving the site by removing sediment from tires.

AN EXAMPLE OF ROCK CONSTRUCTION ENTRANCE - From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012
Courtesy Lake County Stormwater Management Department, Ohio

ADVANTAGES:

-Relatively inexpensive BMP for vehicular access to the site

-Effective at preventing most sediment transport to adjacent roads or streets

LIMITATIONS:

-Not 100 percent effective. Some sediment will still be transported from the site to roadways

-Must be maintained frequently

-Rock construction entrances are not used to remove sediment from runoff from areas above the entrance

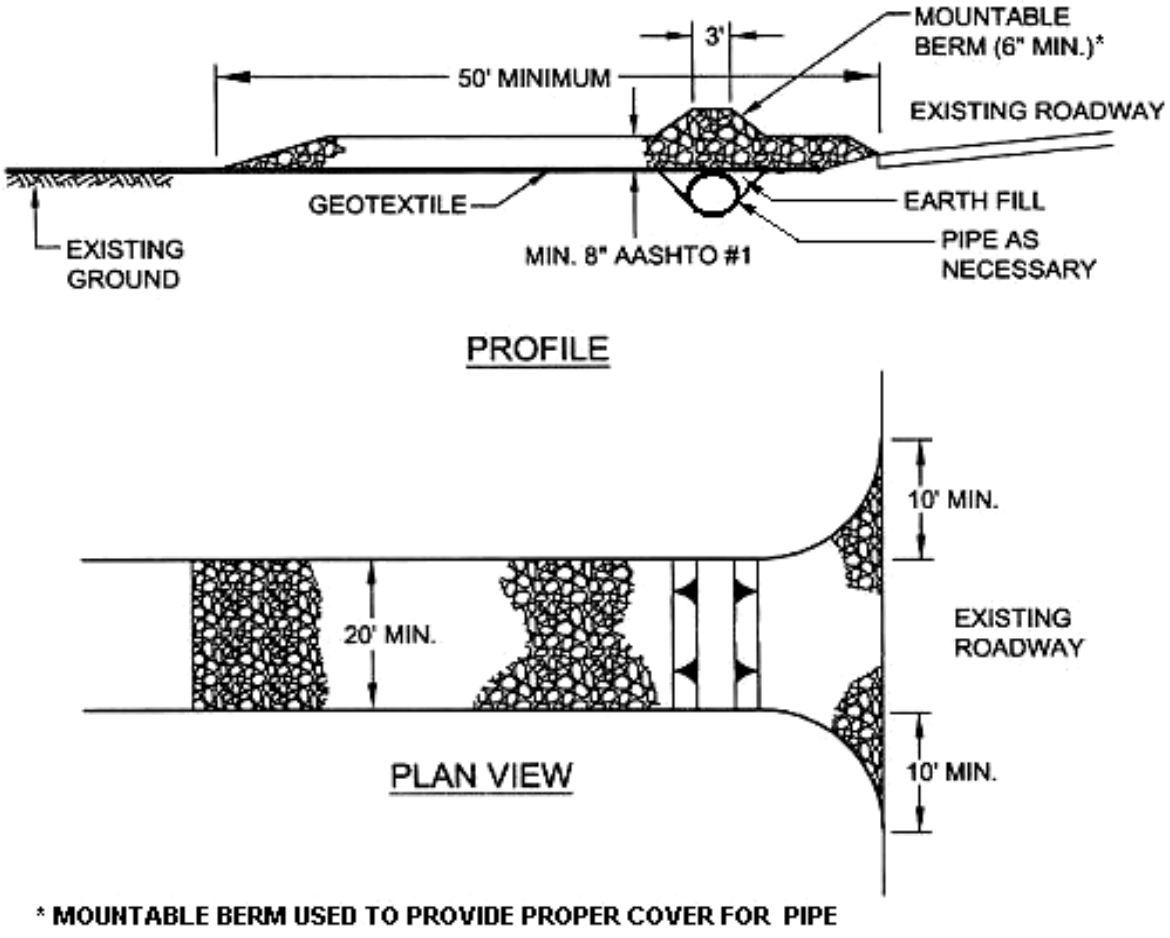
INSTALLATION:

-Topsoil should be removed prior to installing the rock construction entrance

-Place geotextile over existing ground

-Rock should cover the full width of the entrance. Twenty feet is the recommended minimum width

-If a culvert or pipe is needed to convey clean water, a berm is recommended to prevent crushing the pipe



ROCK CONSTRUCTION ENTRANCE DIAGRAM

From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012

MAINTENANCE:

-Entrance must be maintained to provide the specified depth of rock by adding rock when needed

-A stockpile of rock should be maintained on site for maintenance

-If the entrance becomes completely clogged, the entrance may need to be reinstalled

-Sediment that is deposited on roadways should be returned to the construction site

-Do not wash or sweep sediment on roadways, into gutters, ditches, inlets or other areas where it can be washed into streams or storm sewers

SWALES

Swales are conveyance channels that collect and convey runoff. For small sites, the typical use may be to capture and convey upslope runoff around disturbed areas. Swales are also used to convey runoff from disturbed areas to sediment removal BMPs such as a sediment basin. Swales can be lined with either vegetation or rock.

R(**VEGETATED SWALE** - Swales can intercept runoff and carry
a it safely around a project site. Courtesy of Dauphin County
C Conservation District.

ADVANTAGES:

-Swales can prevent upslope runoff from reaching disturbed areas. This reduces erosion and sediment transport.

-Swales may reduce or eliminate the need for additional controls

LIMITATIONS:

-Swale outlets may need additional stabilization

-Swales may not be practical on some sites

-Swale design may be complex

INSTALLATION:

Installation of swales is dependent on the design. Consult the DEP publication "Erosion and Sediment Pollution Control Program Manual, March 2012" for more information. General installation includes:

- swales should be stabilized immediately after installation

- Unless the sod is to be installed, a fabric will be needed to stabilize the swale until the grass is established

MAINTENANCE:

-Inspect swales frequently

-Damage to swales should be immediately repaired

-Grass should be maintained at two to three inches

-Swales should be cleaned out if channel depth is reduced by 25%

ROCK FILTERS

Rock filters are rock barriers typically used in swales or channels to slow runoff. This reduces the erosion potential of the flow and allows sediment to drop out.

ADVANTAGES:

-Rock filters can be used with swales to increase effectiveness

-Relatively inexpensive and easy to construct

LIMITATIONS:

-Rock filters are not a substitute for appropriate channel linings

-Rock filters may not be used where the channel depth is less than two feet

AN EXAMPLE OF A ROCK FILTER - Rock filters, such as the one above can be used to increase efficiency in swales. From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012
Courtesy of York County Conservation District

INSTALLATION:

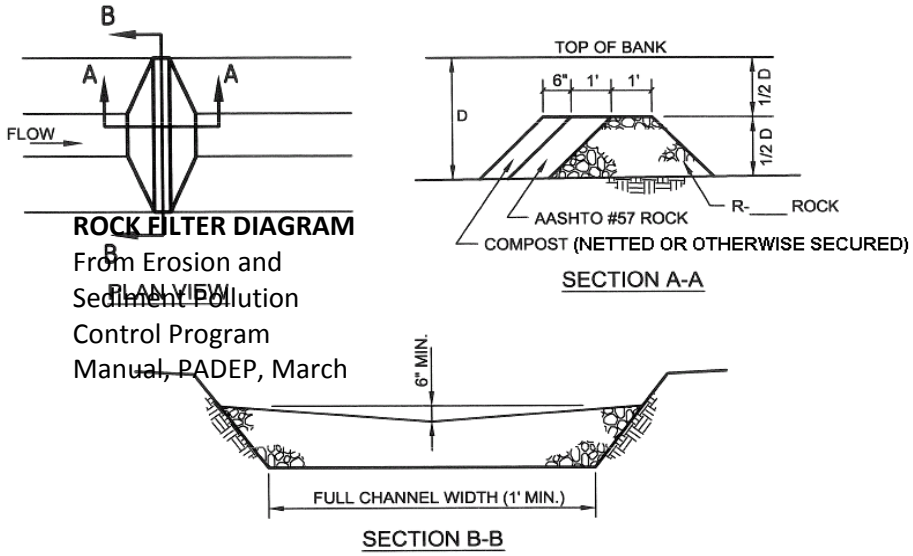
-The filter should be one half the channel depth

-Use R-3 rock for channels up to 3 feet deep

-Use R-4 rock for channels over 3 feet deep

-Construct the filter with a 6 inch depression in the center

-Place a 1 foot thick layer of small rock (AASHTO #57 or smaller) on the upstream side of the filter



ROCK FILTER DIAGRAM From Erosion and Sediment Pollution Control Program Manual, PADEP, March

MAINTENANCE:

-Inspect filters weekly and after each rain

-Repair filters immediately if needed

-If the filter is clogged, immediately replace the filter

-Sediment should be removed when it reaches one half the filter height

ROCK OUTLET PROTECTION

Rock outlet protection, also called rip-rap, is used to prevent erosion where channels or pipes discharge.

ADVANTAGES:

-Rock outlet protection is easy to install

-Rock outlet protection is relatively inexpensive

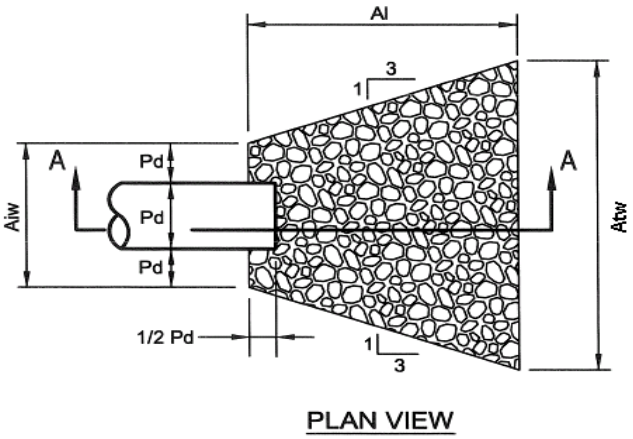
LIMITATIONS:

-Discharge velocity may not exceed 17 feet per second

-Sufficient area must be available for installation

-Must be installed on level grade

AN EXAMPLE OF ROCK OUTLET PROTECTION - From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012



ROCK OUTLET PROTECTION DIAGRAM - From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012

INSTALLATION:

-The diagram to the left is a general construction Diagram. The dimensions and rock size must be determined by calculating the discharge velocity. If not designed and installed correctly, it is likely that erosion will result. Consult the Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012 or contact the Conservation District for guidance.

MAINTENANCE:

-Inspect the outlet protection weekly and after each runoff event

-Replace displaced stone immediately

-Look for evidence of erosion around the structure

SEDIMENT TRAP

A sediment trap is a small ponding area which collects runoff from a disturbed area. Sediment in the collected runoff settles in the trap.

ADVANTAGES:

-Sediment traps are not dependent on slope

-Sediment traps can control areas up to five acres

-Sediment traps are less expensive than detention basins

LIMITATIONS:

-Depending on drainage area, sediment traps may need to be relatively large

-sediment traps should not be located on unstable

SEDIMENT TRAP - This sediment trap collects runoff from the disturbed site. Note the baffling to increase flow length. From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012 Courtesy of York County Conservation District

soils or steep slopes

INSTALLATION:

-Install sediment traps at the downslope most point of the site

-Discharge to a stable, erosion resistant area

-A rock berm may be used for an outlet structure

-The trap must have a minimum of 2,000 cubic feet of storage for each acre contributing runoff to the trap

-Areas with fine textured soils will require 5,300 square feet of surface area for each acre contributing runoff to the trap

-Minimum Flow lengths are 4 to 1 in special protection watersheds and 2 to 1 in other watersheds

-The minimum storage depth is three feet; one foot for sediment storage, one foot for runoff storage and one foot of freeboard

-The maximum embankment height is five feet with maximum slopes of 2H:1V

-Do not use fill material with roots, organic material, large stones or woody vegetation

-Compact the embankment in lifts of 9 inches or less

-Seed and mulch or provide other stabilization upon completion

-Trap should discharge outflow safely to receiving waters without causing erosion

MAINTENANCE:

-Access should be provided for sediment removal and other maintenance activities

-Inspect traps weekly and after each rain

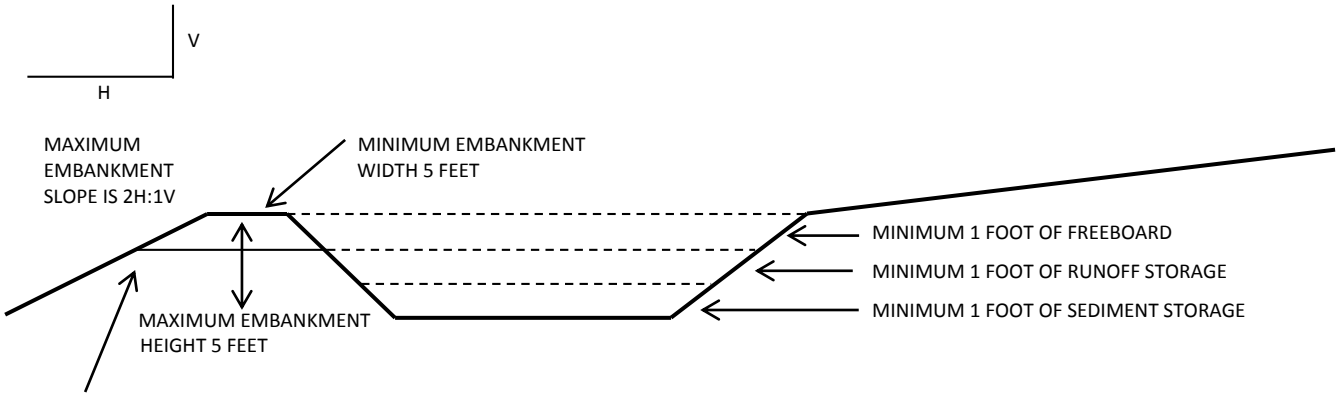
-Replace displaced rock from the outlet structure immediately

-Any damage, erosion or clogging of the components of the trap should be immediately repaired

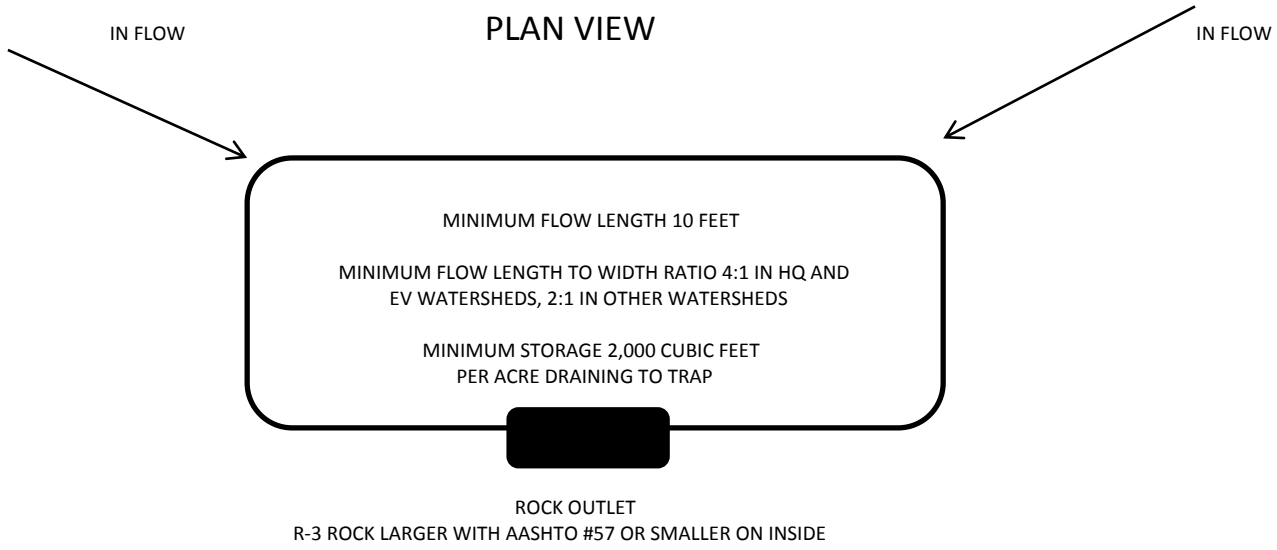
-Remove sediment from the trap when the sediment storage area is full. A cleanout stake placed in the middle of the trap can be used to determine when to remove sediment

TYPICAL DESIGN ELEMENTS OF A SEDIMENT TRAP

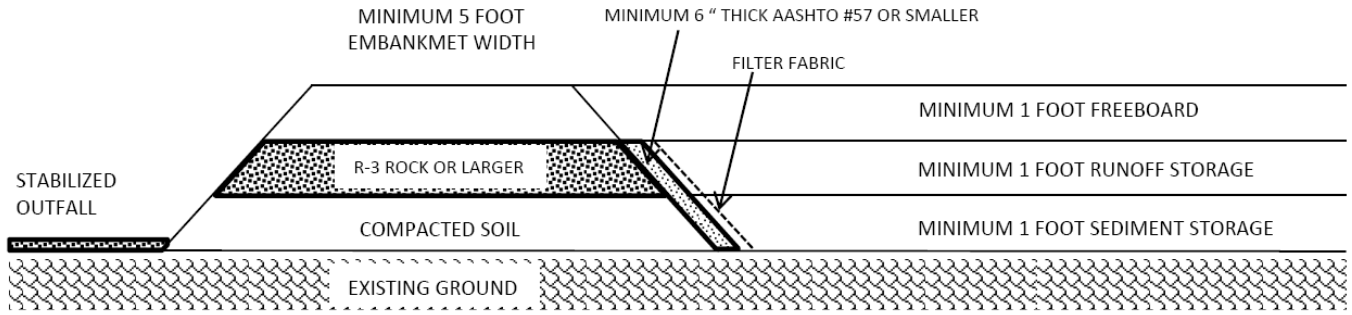
CROSS SECTION



ROCK OUTLET – EXTENDS TO BOTTOM OF TRAP WITH FILTER FABRIC COVERING ROCK TO TOP OF SEDIMENT STORAGE.



SEDIMENT TRAP SPILLWAY CROSS SECTION



THE ABOVE DIAGRAMS CONTAINS TYPICAL ELEMENTS OF A SEDIMENT TRAP FOR USE ON A SMALL PROJECT SITE. FOR FURTHER GUIDANCE ON DESIGN AND INSTALLATION CONTACT THE CONSERVATION DISTRICT.

INLET FILTER BAG

Inlet filter bags can be used to prevent Sediment from entering storm sewer Systems which discharge to surface waters such as streams or lakes. If the discharge is to a sediment basin or sediment trap, filter bags are not needed.

ADVANTAGES:

-Relatively inexpensive

-Easy to maintain

-Effective when maintained

LIMITATIONS:

-Should not be used on roads where

AN EXAMPLE OF AN INLET FILTER BAG - The edges of the bag can be seen around the grate. From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012
Courtesy Northampton County Conservation District

possible ponding could create a traffic hazard

-Maximum drainage area is one half acre

-Not recommended for use at edge of fill slopes

INSTALLATION:

-Fabric tensile strength must be a minimum of 120 pounds

-Burst strength must be a minimum of 200 pounds

-Tear strength must be a minimum of 50 pounds

-Bag must be capable of catching all particles not passing a number 40 sieve (0.4 millimeters)

-Filter bags that fit over the inlet grate are not recommended

-Install according to manufacturer's specifications

-Maintain extra bags on site for replacement

MAINTENANCE:

-Inspect weekly and after each rainfall

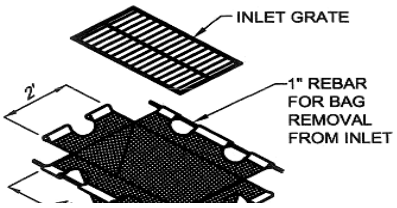
-Clean or replace the bag when half full

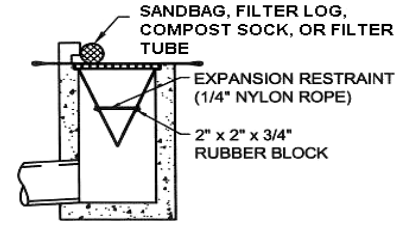
-Dispose of accumulated sediment properly

-Clean or replace the bag if clogged (indicated by ponding or runoff bypassing inlet)

-Replace torn or damaged bags immediately

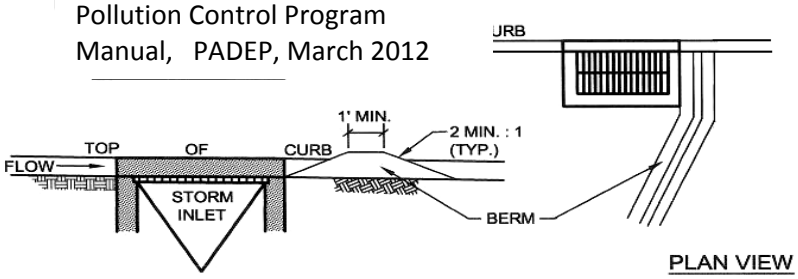
-If bag is to be reused, rinse to a sediment trap or basin





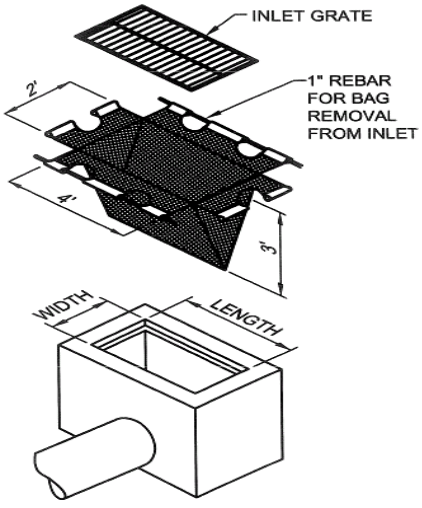
INSTALLATION DETAIL

INSTALLATION OF INLET FILTER BAG FOR A TYPE C INLET - Note the blocking of The upper inlet in the Installation Detail to prevent sediment laden runoff from entering the inlet unfiltered. From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012

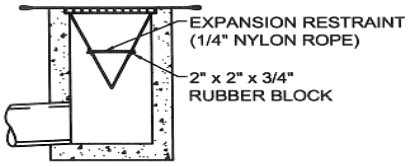


ELEVATION VIEW

PLAN VIEW

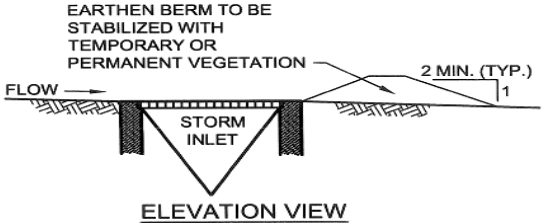


ISOMETRIC VIEW

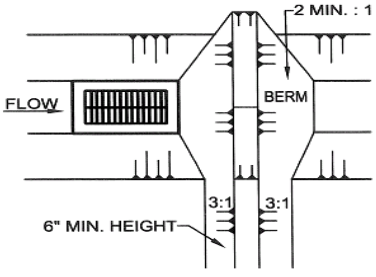


INSTALLATION DETAIL

INSTALLATION OF INLET FILTER BAG FOR A TYPE M INLET - From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012



ELEVATION VIEW



PLAN VIEW

ESPC PLAN NARRATIVE

1. GENERAL INFORMATION				
Name of project				
Name of person responsible				
Address				
Phone number				
Municipality where project is located				
Tax Parcel Number(s) of project site				
Is the project to be constructed on a lot purchased in a larger development				YES NO
If yes, name of development				
Have you contacted the municipality	YES NO	NOTE: MUNICIPAL PERMITS MAY BE REQUIRED		
Brief description of project				
Please provide written directions to the site and attach a general location map				
Estimated start and end dates	Start Date		End date	
Name of nearest receiving stream			Distance	Feet
Have wetlands been delineated	YES NO	Do you have a copy of the delineation		YES NO
Is project located in a floodway	YES NO	Is project located in a floodplain		YES NO

2. SOILS INFORMATION						
SOIL NAME	SLOPE		DEPTH		IS SOIL HYDRIC	YES NO
LIMITATIONS						
SOIL NAME	SLOPE		DEPTH		IS SOIL HYDRIC	YES NO
LIMITATIONS						
SOIL NAME	SLOPE		DEPTH		IS SOIL HYDRIC	YES NO
LIMITATIONS						
SOIL NAME	SLOPE		DEPTH		IS SOIL HYDRIC	YES NO
LIMITATIONS						
SOIL NAME	SLOPE		DEPTH		IS SOIL HYDRIC	YES NO
LIMITATIONS						
SOIL NAME	SLOPE		DEPTH		IS SOIL HYDRIC	YES NO
LIMITATIONS						

3. CONSTRUCTION SEQUENCE

In order for an ESPC plan to be effective, construction must take place in an organized sequence that integrates the ESPC BMPs into the sequence in a timely manner. The first step in nearly all projects is the installation of sediment barriers below the project, that is downslope and installation of BMPs to control off site runoff that drains to the site. The sequence would then include other needed BMPs and end with the removal of temporary controls. Please describe below the sequence of construction in a numbered step by step sequence.

4. TEMPORARY CONTROLS

Check temporary controls that will be implemented for your project. Attach a drawing or design for any practice that is not listed in this guide.

Vegetated stabilization		Vegetated swale	
Vegetated filter strip		Rock lined Swale	
Silt fence		Rock filter	
Filter sock		Rock outlet protection	
Straw bales		Sediment trap	
Rock construction entrance		Inlet filter bag	
Other			
Other			
Other			

5. PERMANAENT CONTROLS

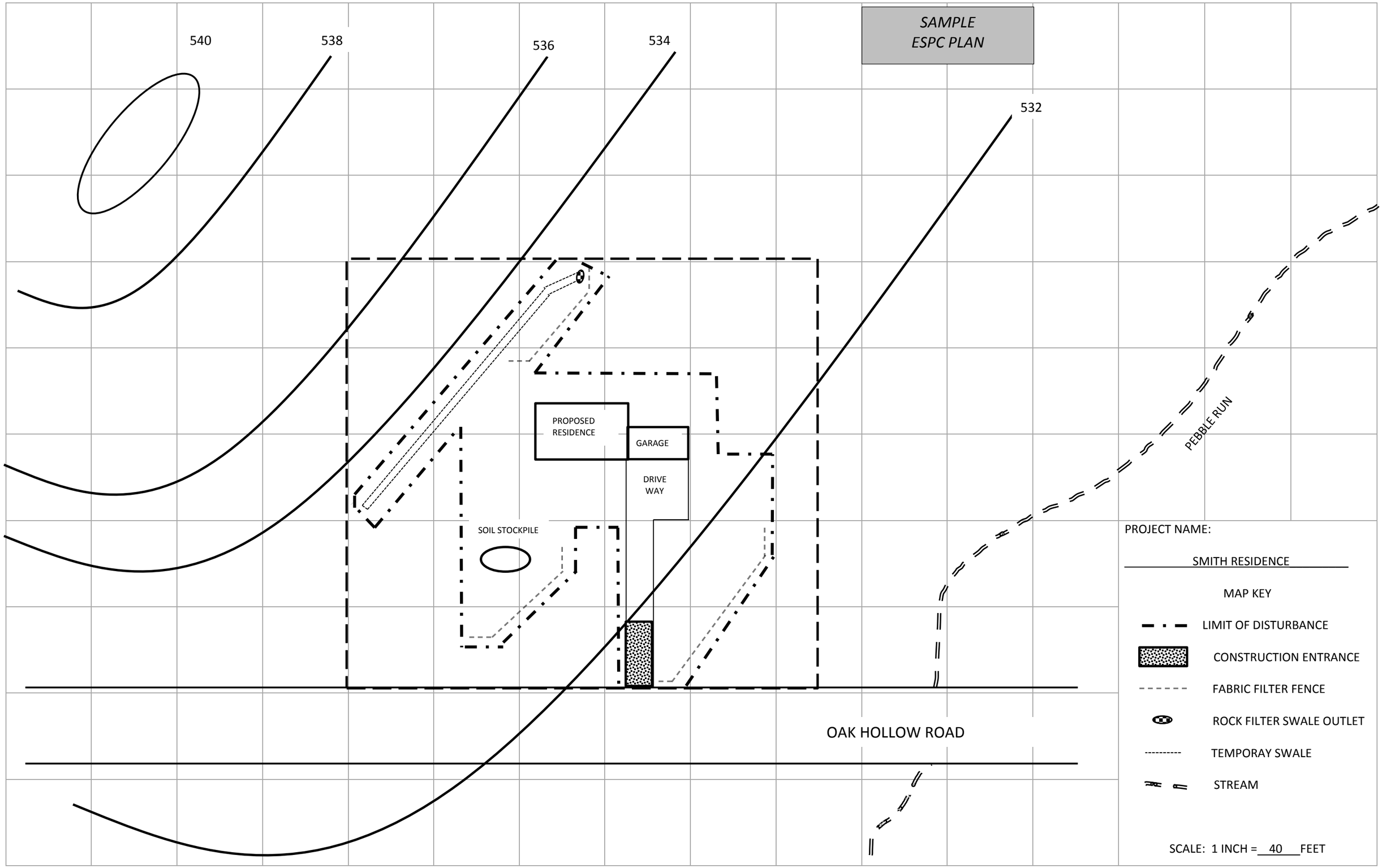
When a project is completed, it is necessary to ensure permanent stabilization of the site. This entails the stabilization of all exposed soil areas through revegetation, stone, pavement or other stabilization practice. List the permanent stabilization BMPs to be used below. Permanent stabilization BMPs should follow appropriate recommendations.

6. MAINTENANCE PROGRAM	
All ESPC BMPs must be properly maintained in order to ensure that they function properly. Maintenance practices are described in the common BMP descriptions in section 2 of this guide. List maintenance measures to be implemented below. The first four are general measures and are required. Common maintenance practices are also listed. Check those that apply. For maintenance practices not listed, describe the practice in the blank lines below and check.	
Until final site stabilization, all ESPC BMPs will be properly inspected weekly and after each rainfall	X
All maintenance for ESPC BMPs will be conducted according to the recommendations in this guide	X
If any ESPC practice proves to be inadequate, additional measures will be immediately implemented	X
Upon final stabilization, all temporary ESPC BMPs will be removed	X
Sediment will be removed from silt fence when it accumulates to one half the height of the fence	
Sediment will be removed from silt sock when it accumulates to one half the height of the silt sock	
Sediment will be removed from straw bales when it accumulates to one third the height of the straw bale	
Rock construction entrances will be maintained to adequate stone depth	
Rock construction entrances will be cleaned out if clogged	
Swales will be cleaned out when channel depth is reduced by 25%	
Sediment will be removed from rock filters when it reaches one half the filter height	
Displaced stone at rock outlet protection will be replaced immediately	
Sediment will be removed from sediment traps when storage is reduced to 1300 cubic feet per drainage acre	
Inlet filter bags will be cleaned out or replaced when half full	
Filter bags will be immediately replaced if damaged	
All accumulated sediment removed from any practice will be disposed of properly	

7. EROSION CONTROL PLAN DRAWING			
A plan or drawing illustrating your ESPC plan is required. Section four is a blank sheet which may be used for this purpose. If you have a copy of a subdivision plan, blueprint or other document showing your site, you may use that as well. Ensure the following, if applicable, are shown on the illustration in sufficient detail.			
Name of project		Location and type of ESPC practice	
North arrow		Property lines	
Scale		Legend or key	
Streams or ponds (include name if known)			
Existing features such as buildings or roads			
Proposed features			
Direction of slopes			
Soil types			

SECTION 4
ESPC PLAN DRAWING

SAMPLE
ESPC PLAN



PROJECT NAME:

SMITH RESIDENCE

MAP KEY

- LIMIT OF DISTURBANCE
- CONSTRUCTION ENTRANCE
- FABRIC FILTER FENCE
- ROCK FILTER SWALE OUTLET
- TEMPORAY SWALE
- STREAM

SCALE: 1 INCH = 40 FEET

PROJECT NAME:

_____

MAP KEY

SCALE: 1 INCH = _____ FEET

DAUPHIN COUNTY CONSERVATION DISTRICT 1451 PETER'S MOUNTAIN ROAD DAUPHIN, PA 17018

EROSION AND SEDIMENT POLLUTION CONTROL PLAN REVIEW APPLICATION

This application must be completed by the project owner or the owner's agent and submitted with the required plans, information, narratives and applicable fees. Fees must be submitted with the initial review application. The application will not be considered complete for review without the correct fees . See Applicant Resources for information on fees and checks.

1. PROJECT INFORMATION			
PROJECT NAME			
MUNICIPALITY			
DCCD PROJECT NUMBER IF ASSIGNED		ANTICIPATED START DATE	
TOTAL ACRES OF ENTIRE PROJECT SITE		TOTAL DISTURBED ACRES	
IF PROJECT IS PHASED, TOTAL DISTURBED ACRES OF ENTIRE SUBMITTED PHASE			

2. SUBMISSION REQUIREMENTS AND FEES				
NO NPDES PERMIT REQUIRED	2 COPIES - ESPC PLAN AND NARRATIVE		ESPC PLAN REVIEW FEE	
NPDES PERMIT REQUIRED	3 COPIES - ESPC PLAN AND NARRATIVE		ESPC PLAN REVIEW FEE	
	3 COPIES - NPDES PERMIT APPLICATION PACKAGE		$100.00 PER DISTURBED ACRE FEE	
	3 COPIES - PCSM PLAN AND NARRATIVE		$500.00 PERMIT FILING FEE	
PNDI SEARCH	IF REQUESTING DCCD TO CONDUCT SEARCH		$500.00	

3. PROJECT OWNER OF RECORD						
NAME						
ADDRESS	STREET					
	STREET					
	CITY		STATE		ZIP	
RESPONSIBLE OFFICIAL						
TELEPHONE		EMAIL				

4. PROJECT DESIGNER						
NAME						
ADDRESS	STREET					
	STREET					
	CITY		STATE		ZIP	
RESPONSIBLE OFFICIAL						
TELEPHONE		EMAIL				

5. PROJECT CONTRACTOR /DEVELOPER						
NAME						
ADDRESS	STREET					
	STREET					
	CITY		STATE		ZIP	
RESPONSIBLE OFFICIAL						
TELEPHONE		EMAIL				

6. LAND USES – SEE APPLICANT RESOURCES							
EXISTING		CODE		PROPOSED		CODE	

7. NEAREST RECEIVING STREAM – SEE APPLICANT RESOURCES			
NEAREST NAMED STREAM		CODE	
DISTANCE TO NEAREST NAMED OR UNNAMED STREAM IN FEET			

Members of the DCCD Board and staff are authorized to enter project site for site inspection, if necessary.

_____

SIGNATURE OF APPLICANT OR AGENT DATE

DCCD USE ONLY:

DCCD File Number: _____

Date Received:_____

ESPC Plan Review Fee Paid:_____ Check Number_____

NPDES Admin. Fee Paid:_____Check Number_____

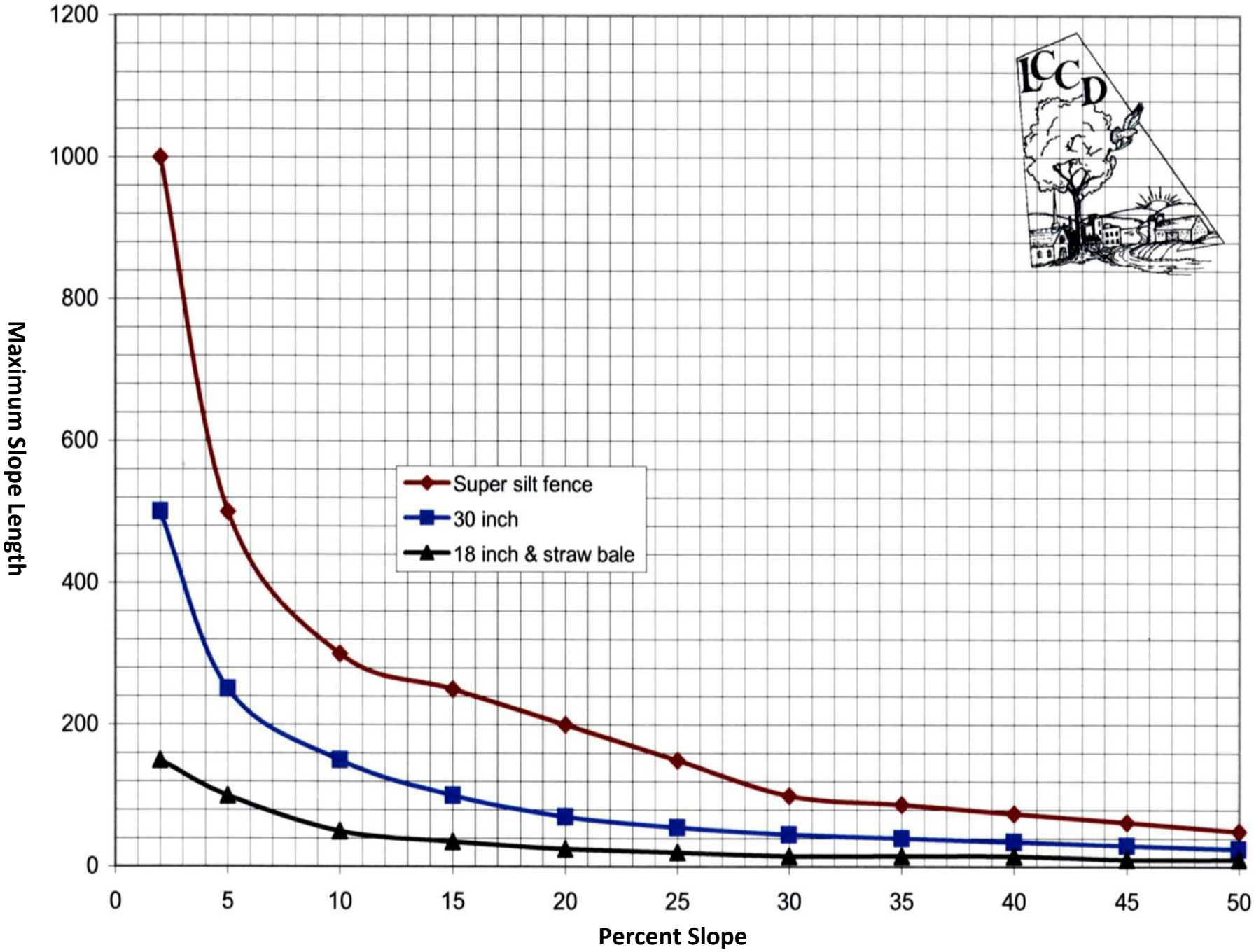
NPDES Per Acre fee Paid:_____ Check Number_____

PNDI Search fee Paid:_____ Check Number_____

MAXIMUM SLOPE LENGTHS FOR FABRIC FENCE ANS STRAW BALES

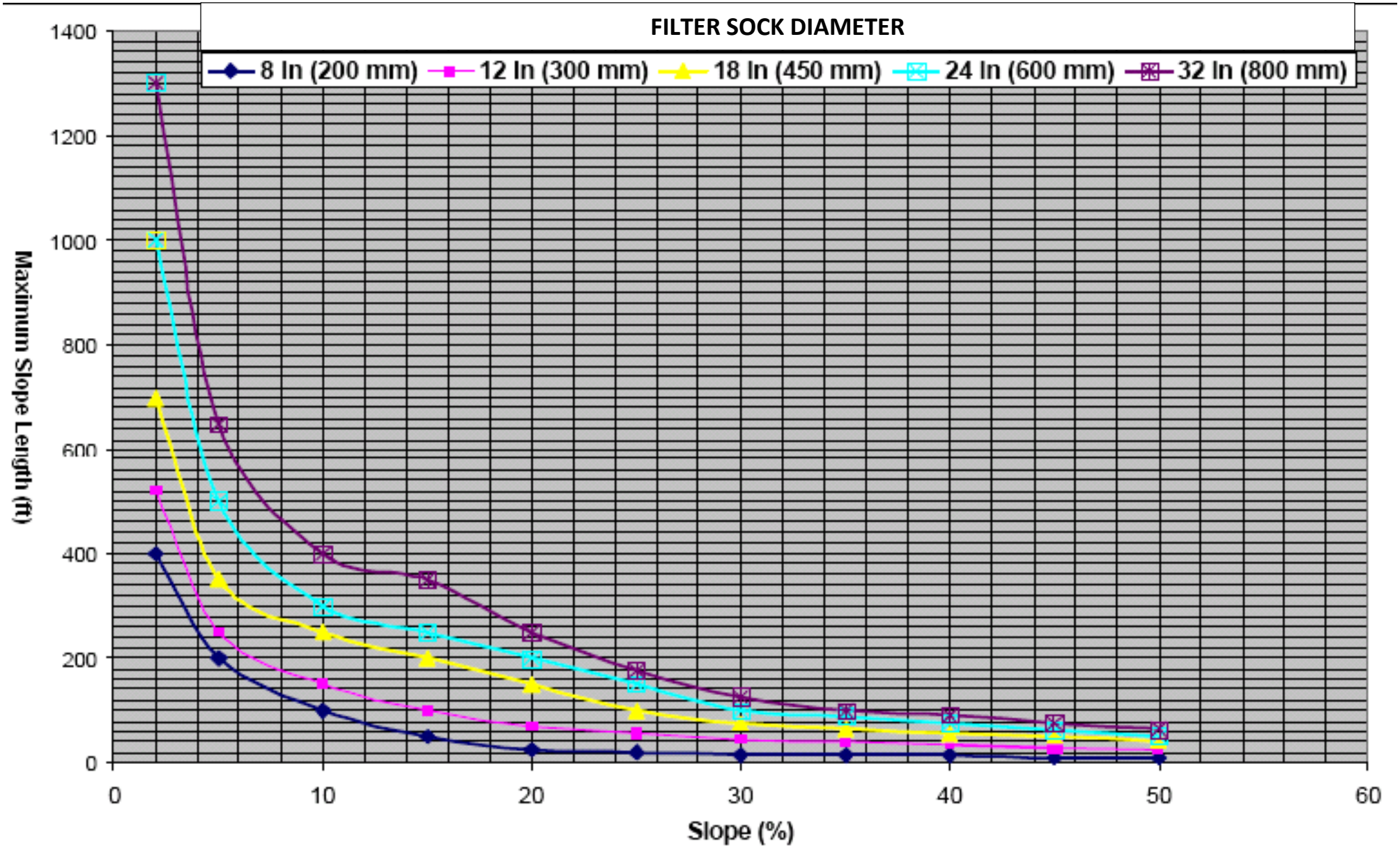
From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012

Courtesy of Lebanon County Conservation District



MAXIMUM SLOPE LENGTHS FOR FILTER SOCKS

From Erosion and Sediment Pollution Control Program Manual, PADEP, March 2012
Adapted from Filtrexx



LITERATURE

Erosion and Sediment Pollution Control Program Manual, Pennsylvania EP, March 2012.

Erosion Control and Conservation Plantings on Noncropland, Pennsylvania State University, 1997

The Agronomy Guide, 2013-2014, The Pennsylvania State University, 2013

OFFICES

Dauphin County Conservation District
1451 Peters Mountain Road
Dauphin PA 17018
717-921-8100

Natural Resource Conservation Service
1451 Peters Mountain Road
Dauphin PA 17018
717-921-8100

DEP South Central Regional Office
909 Elmerton Avenue
Harrisburg PA 17110
717-705-4700

Penn State Cooperative Extension
1451 Peters Mountain Road
Dauphin PA 17018
717-921-8803

WEBSITES AND RESOURCES

Dauphin County Conservation District – www.dauphincd.org

DEP – www.depweb.state.pa.us

NRCS Soil Survey – http://websoilsurvey.nrcs.usda.gov/app/

Penn State Publications – http://pubs.cas.psu.edu/Publications.asp

Penn State Agronomy Guide – http://pubs.cas.psu.edu/FreePubs/PDFs/agrs026.pdf

Erosion Control and Conservation Plantings on Noncropland -

http://www.dauphincd.org/erosion/EROSION%20AND%20SEDIMENT%20CONTROL%20ON%20NONCROPLAND.**pdf**

DAUPHIN COUNTY CONSERVATION DISTRICT
ESPC TECHNICIANS BY MUNICIPALITY

MUNICIPALITY				CONTACT
Berrysburg Borough East Hanover Township Elizabethville Borough Gratz Borough Hummelstown Borough	Lykens Borough Lykens Township Mifflin Township Millersburg Borough	Pillow Borough South Hanover Township Upper Paxton Township Washington Township	West Hanover Township Wiconisco Township Williams Township Williamstown Borough	Matt Williard
Jackson Township Jefferson Township Lower Paxton Township	Middletown Borough Royalton Borough	Rush Township Steelton Borough	Swatara Township Wayne Township	Steve Frey
Conewago Township Derry Township	Highspire Borough	Londonderry Township	Lower Swatara Township	Rich Snyder
Dauphin Borough Halifax Borough Halifax Township	Harrisburg City Middle Paxton Township	Paxtang Borough Penbrook Borough	Reed Township Susquehanna Township	Paul Wentz

SPECIAL PROTECTION WATERSHEDS IN DAUPHIN COUNTY

WATERSHED	LOCATION	DESIGNATION
RATTLING CREEK	BASIN – SOURCE TO CONFLUENCE OF EAST AND WEST BRANCHES	EXCEPTIONAL VALUE (EV)
RATTLING CREEK	BASIN – CONFLUENCE OF EAST AND WEST BRANCHES TO MOUTH	HIGH QUALITY – COLD WATER FISHERY
CONLEY CREEK	BASIN – (MOUNTAINHOUSE ROAD) BRIDGE	HIGH QUALITY – COLD WATER FISHERY
CLARK CREEK	BASIN	HIGH QUALITY – COLD WATER FISHERY
STONY CREEK	BASIN – SOURCE TO ELLENDALE DAM	HIGH QUALITY – COLD WATER FISHERY

LAND USE CLASSIFICATIONS

From the columns below, select the appropriate title and code for the site's existing and proposed land use. NOTE: Indicate land use from the table below. Do not use municipal zoning categories.

EXISTING LAND USE	CODE	PROPOSED LAND USE	CODE
Agricultural	A1	Residential	B1
Idle Ag Land	A2	Commercial	B2
Forest	A3	Industrial	B3
Residential	A4	Professional	B4
Urban(Comm/Indust)	A5	Recreational	B5
Impervious	A6	Semi-Public	B6
Utility	A7	Utility	B7
Mining/Quarry	A8	Agricultural	B8
Other	A9	Other	B9

DAUPHIN COUNTY STREAM CODES

Listed below are all of the named streams in Dauphin County as they appear on the US Geological Survey Maps. Indicate the name of the stream and the appropriate code that will receive runoff from the project site.

STREAM	CODE	STREAM	CODE
Mahantango Creek	C1	Stoney Creek	K1
- Deep Creek	C2	Fishing Creek	L1
- Pine Creek	C3	Paxton Creek	M1
Shippens Run	D1	Spring Creek (West)	N1
Wiconisco Creek	E1	Laurel Run	P1
- Little Wiconisco Creek	E2	Swatara Creek	Q1
- Canoe Gap Run	E3	- Iron Run	Q2
- Big Run	E4	- Beaver Creek	Q3
- Rattling Creek	E5	- Kellock Run	Q4
- Bear Creek	E6	- Spring Creek (East)	Q5
Gurdy Run	F1	- Manada Creek	Q6
Armstrong Creek	G1	- Walnut Run	Q7
- New England Run	G2	- Bow Creek	Q8
- Conley Creek	G3	Conewago Creek	R1
Powell Creek	H1	- Lynch Run	R2
- North Fork Powell Creek	H2	- Brill Creek	R3
- South Fork Powell Creek	H3	- Hoffer Creek	R4
Clark Creek	J1	Susquehanna River	S1