Armstrong Conservation District

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A GUIDE TO DEVELOPING AN EFFECTIVE EROSION AND SEDIMENT POLLUTION CONTROL PLAN FOR SMALL PROJECTS

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INTRODUCTION

The Commonwealth's Title 25 Chapter 102 Erosion and Sediment Control Regulations require that all persons conducting earth disturbance activities implement and maintain Best Management Practices (BMPs) to protect, maintain, and restore water quality within our state's waterways and wetlands.

Any project disturbing 0-5000 square feet do not require a written plan unless it is a municipal or county requirement, is needed as a part of a Department of Environmental Protection (DEP) general permit, or is located within a High Quality (HQ) or Exceptional Value (EV) Watershed. ***(HQ Watersheds in Armstrong County are: Buffalo Creek, Pine Creek and Little Mahoning).***

Any earth disturbance that disturbs 5,000 square feet to less than 1 acre will need a written E&S plan developed and on site during the construction. It does not need to be reviewed by the Conservation District unless it is a municipal or county requirement, needed as a part of a general permit, or located within a HQ or EV watershed.

Any earth disturbance activity that will disturb over 1 acre will need a National Pollutant Discharge Elimination System (NPDES) permit in addition to a Post Construction Stormwater Management (PCSM) plan developed, implemented, and maintained during the duration of the project.

The purpose of this guide is to give you guidance in developing an Erosion and Sediment Pollution Control (E&S) Plan for small grading projects that meet the following criteria:

1. Disturbs less than 1 acre.
2. Slopes do not exceed a 10% slope.
3. There are no surface waters in close proximity to the proposed project. Must provide at least a 50' undisturbed buffer.
4. Do not disturb hydric soils or wetlands.
5. Have an up hill offsite drainage area of less than 1 acre.
6. Propose permanent grades less than 8 feet in cut/fill depth.
7. Do not involve industrial or commercial land use.

If your project does not conform to the above criteria, please consult with a professional plan preparer for assistance in developing your plan.

What is Soil Erosion and Sediment Pollution?

Erosion is a natural process by which the surface of the land is worn away by water, wind, or chemical action. Accelerated erosion is the removal of the surface of the land through the combined action of human activities and natural processes at a rate greater than would occur from natural processes alone. Sediment is the number one pollutant to Pennsylvania's water resources. Sediment reduces water quality, degrades aquatic habitats killing fish and other aquatic life, and increases the frequency and intensity of flooding events. Any activity that disturbs the surface of the land can cause erosion and sedimentation. Completing and properly implementing an E&S Control Plan for your earth disturbance project will help Armstrong County's soil and water resources as well as the County's economic sustainability and quality of life.

What to Include in a Small Project E&S Control Plan:

1. **Existing topography** (physical features) of the site and immediate surrounding area.

2. Types of soils on the site – refer to the County Soil Survey available online at www.soils.usda.gov/survey.

3. A description of land use – describe past, present and proposed land uses and all proposed alterations to the site.

4. Location of any surface water (streams, ponds, wetlands, springs, etc.)

5. A description of proposed E&S best management practices – both temporary (such as hay bale barriers, silt fence, stone filters, silt sock) and permanent (such as seeding and mulching, rock-lined channels, etc.).

6. The sequence of earthmoving activities – Outline the sequence in which the earthmoving will occur, remembering that the most effective method of controlling erosion is to disturb only those areas necessary to complete a project. E&S best management practices should be in place before the site is disturbed. Disturbed areas should be permanently stabilized immediately after earthmoving is completed or temporary stabilized if delays in completing a project is anticipated.

7. Maintenance plan for all of the D&S best management practices being used on site.

Things to Consider in Plan Development:

1. Save existing vegetation – Vegetation cover is the best and most economical protection against soil erosion. Protect existing vegetation during the construction 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.

2. Save topsoil for re-vegetating – All of the topsoil from areas where cuts and fills have been made should be stockpiled and redistributed uniformly after grading. This is a key to re-vegetating a site.

3. Minimize the area and time of exposure – Disturb as little of the area as is required to construct the project. The construction sequence should be planned to keep the size and time of exposure to a minimum. Stabilize disturbed areas as they are completed.

4. Schedule earth disturbance during dry weather and during the growing season – Plan work to avoid periods of bad weather. If your project involves work in or around watercourses, work only during periods of low flow. Flowing water should always be diverted around disturbed areas. Attempt to time your project during the growing season. Projects completed during late fall or winter will require additional maintenance of BMPs until the disturbed areas can be permanently stabilized the following spring.

5. Avoid steep slopes – Steep sites generally will require more E&S controls than gently sloping sited. Avoid excessive cutting and filling and road grades in excess of 10%.

6. Protect ditches, streams, or other bodies of water – Maintain vegetated buffers where possible. Install temporary controls, such as filter fabric fence, straw bale barriers, silt sock, or rock filters to keep sediment pollution out of streams and other water sources.

7. 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 facilities indicate a need to consider upgraded control measures.

Suggested Sequence of Earth Disturbance Activity:

1. Install a tire cleaning, stabilized rock construction entrance to keep dirt from being tracked onto adjacent roadways (see details).

2. Install temporary E&S control measures such as hay bales, silt fence, silt sock, etc. (see details).

3. Clear and rough grade site.

4. Stockpile topsoil. Temporary protection (hay bales or silt fence) should be installed down slope (lower end) of the stockpile or the stockpile should be immediately stabilized with temporary seed (ie., annual ryegrass) and mulched.

5. Install and immediately stabilize any watercourses (swales, ditches, etc.) with appropriate lining (ie. seed, mulch, matting or netting, sod, or stone).

6. Construct structure(s).

7. Finish, grade, and permanently stabilize (seed, mulch, sod, stone, etc.) the site.

8. Inspect and maintain temporary E&S best management practices until grass is established. BMPs must be inspected at least weekly and after every runoff event and cleaned out or repaired immediately. A minimum of 70% stabilization of disturbed area with perennial vegetative cover or other permanent non-vegetative cover must be achieved before temporary erosion controls are removed.

9. Remove BMPs and properly recycle or dispose of construction waste. When all disturbed areas achieve a minimum uniform 70% perennial vegetation, stoned, or paved, the BMPs should be removed and disturbed areas from removal stabilized. All construction wastes, including silt fence, should be recycled or properly disposed of in accordance with DEP Solid Waste Management regulations. No construction wastes should be burned, dumped, buried, or discharged on the site.

Seeding and Mulching Specifications:

Time of Seeding – For best results, grass and legume seeding should be completed in the spring. Seedings that are primarily grass are best suited for fall planting. Through proper seed selection and seeding methods, disturbed site may be re-vegetated at almost any time from spring to fall.

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 lbs. of 10-20-20 fertilizer per acre.

Choice of Seed – Choose a seed mixture that fits your particular site conditions. Refer to the *"Erosion Control and Conservation Plantings on Noncropland"* available from your local

Extension Service office. Apply at required rates. If legumes are planted, be sure to inoculate the seed with the correct legume inoculate Seed may be broadcast on the surface and a layer of mulch applied at the necessary rates. Hydroseeding is another method of seeding where the seed, fertilizer, and mulch are mixed with water to form an emulsion and should only be dome with the correct equipment.

Mulching – All earth disturbance areas, regardless of seeding method, should be mulched to reduce erosion and aid seed germination. Hay or straw are 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 1000 sq. ft.) is sufficient. Straw or hay should not be chopped or finely broken.

Erosion Control Matting – Helps hold seed and mulch in place and is required on all slopes with a 3 to 1 (33%) or steeper slope.

Water – Don't forget to thoroughly water seeded areas during dry periods. For best results and to conserve water, water early in the morning or in the early evening, when sun and wind are at a minimum.

Small Project Erosion & Sediment Control Plan

Property Owner:_____Date:_____

Address_____

City_____State_____Zip_____

Telephone:_____Municipality_____

Contact Person (if other than property owner):_____

Location (Include copy of topographic map):_____

Name of nearest receiving stream or body of water:_____

Estimated dates for start-up and completion: Start_____Emd:_____

Type of project (house, addition, store, etc.):_____

Project acres (entire lot size):_____Disturbed acres:_____

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

_____

Soil type(s) (include soil map):_____

NARRATIVE (Provide detailed description of proposed work)

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

TEMPORARY CONTROLS – Detail any temporary E&S best management practices that will be implemented. List each practice separately, explain why it is needed, and when it can be safely removed. Drawings and designs for any practice not illustrated in this guide should be attached and referenced in this section.

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

MAINTENANCE PROGRAM – All E&S best management practices require maintenance to function properly. Hay bale dikes deteriorate and clog with sediment. Newly seeded areas may fail to germinate or be washed out by heavy rain. Hay bale dikes and filter fabric fences should be cleaned when they reach half of their capacity. Describe all measures that will be implemented to ensure that E&S best management practices will continue to function property and specify who will be responsible for maintenance activities.

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 disturbance.

To ensure prompt review of your project, include all required information:
Topographic Map, Soil Map, Completed Small Project E&S Control Plan, Small Project Control Plan Drawing and a completed E&S Control Plan Review Application.
Mail to: Armstrong Conservation District, Armsdale Administration Building,
124 Armsdale Building, Room B-1, Kittanning, PA 16201

Check with your municipality regarding any local ordinance provisions or permit requirements that may apply to your project.

Sample Small Project Erosion and Sediment Control Plan Drawing

SEEDING AND MULCHING RECOMMENDATIONS

Temporary Seeding Recommendations/Mixtures

If temporary seeding is necessary, follow the chart below. Then, when final stabilization is to be completed, apply the remainder of the recommendations below for lime and fertilizer prior to final seeding and mulching. Annual Ryegrass is a quick germinating species of grass that can be seeded at almost any time. If you plan to leave your project or part of your project area inactive before final stabilization/permanent cover is achieved, a temporary seeding should be applied immediately. General recommendations are as follows:

Lime	1 ton per acre	50 lbs. per 1000 square feet
Fertilizer	150 lbs. per acre	5 lbs. per 1000 square feet
Annual Ryegrass	40 lbs. per acre	1 lbs. per 1000 square feet

Permanent Seeding Mixtures

Establishing a permanent vegetative cover is the final step to effective erosion and sediment pollution control. It is recommended that the Penn State Agronomy Guide be consulted (available from PSU Cooperative Extension or the Armstrong Conservation District). All mixtures below are for 100% Pure Live Seed (PLS). Depending on your percent of PLS, you may have to adjust recommendations accordingly. General recommendations are as follows:

Lawn and Mowed Areas

A. Kentucky Bluegrass	30 lbs. per acre	12 oz. per 1000 square feet
Redtop	3 lbs. per acre	2 oz. per 1000 square feet
Perennial Ryegrass	20 lbs. per acre	8 oz. per 1000 square feet
B. Pennlawn-Fine Fescue	40 lbs. per acre	16 oz. per 1000 square feet
Redtop	3 lbs. per acre	2 oz. per 1000 square feet
Perennial Ryegrass	20 lbs. per acre	8 oz. per 1000 square feet

Slopes and Un-Mowed Areas

Crown Vetch	25 lbs. per acre	10 oz. per 1000 square feet
Perennial Ryegrass	25 lbs. per acre	10 oz. per 1000 square feet

Note: Crown Vetch is a legume and requires an inoculant. Contact your seed supplier for more specific information. Although providing a thick ground cover, crown vetch is also an extremely aggressive invasive species, offering little wildlife benefit. Use with caution.

Timing of Permanent Seeding

For best results, grass and legume seeding should be completed in the spring; however, with proper establishment techniques, disturbed sites can be seeded almost anytime from spring to fall. General rules are as follows: legume seeding needs 10-12 growing weeks prior to hard frost and grasses generally require 4-6 weeks of growth prior to hard frost.

Lime

Adding agricultural grade limestone to a site is often the key to establishing vegetation. Soil tests from a reputable source such as the U.S. Farm Service Agency are recommended. But in the case where test results are not available, use the guide below.

Fertilizer – Commercial Type 10-20-20

The need for fertilizer cannot be underestimated. Soil tests are again recommended, but the guide below can be used in their absence.

Mulch (Straw, Hay, or Bark)

All areas that are subject to stabilization, whether it be with the temporary or permanent seeding specifications, should be mulched. Mulch is a loose layer of straw, hay, or bark that is at least 1" in depth. Mulch reduces the potential for erosion of soils and aids in seedling germination. Reference the specific recommendations by using the guide below.

Lime	6 tons per acre	275 lbs. per 1000 square feet
Fertilizer	1000 lbs. per acre	25 lbs. per 1000 square feet
Mulch (Straw, Hay, or Bark)	3 tons per acre	150 lbs. per 1000 square feet

ROCK CONSTRUCTION ENTRANCE

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).

A geotextile underlayment should be placed over the existing ground prior to placing the stone. At a minimum, rock construction entrances should be constructed to the dimensions shown on Standard Construction Detail #3-1. Where site conditions warrant, it may be necessary to extend the length or width of the rock to ensure the effectiveness of the entrance. Wherever access to the site is across a roadside ditch, stream channel, natural drainage course, etc., a suitable means of conveying the flow past the entrance (e.g. a properly sized culvert pipe) should be provided. For such installations, a mountable berm is recommended to prevent crushing the pipe.

Rock construction entrances should be maintained to the specified dimensions and the capacity to remove sediment from the tires by adding rock when necessary. For some sites this could occur several times a day. A stockpile of rock material should be maintained on site for this purpose. It should be noted that occasionally the rock construction entrance can become too clogged and might have to be removed and replaced.

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

STANDARD CONSTRUCTION DETAIL # 3-1
Rock Construction Entrance

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

Topsoil should be removed 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 should be installed wherever optional culvert pipe is used. Pipe to 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 feet increments until condition is alleviated or install wash rack. Washing the roadway or sweeping the deposits into roadway ditches, sewer, culverts, or other drainageways is not acceptable.

SEDIMENT BARRIERS AND FILTERS

Sediment barriers are typically used as perimeter controls for small disturbed areas and as initial protection against sediment pollution during construction of other BMPs such as sediment basins or traps. Each type of sediment barrier has specific advantages and limitations. Care should be exercised in the selection of any sediment barrier to ensure it is suited to the particular site conditions where it is proposed

FIGURE 4.1
Sediment Barrier Alignment

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

Sediment barriers should be installed on existing level grade in order to be effective. Barriers which cross contours divert runoff to a low point where failure usually occurs.

The ends of sediment barriers should be turned upslope at 45 degrees to the main barrier alignment for a distance sufficient to elevate the bottom of the barrier ends to the elevation of the top of the barrier at the lowest point. This is to prevent runoff from flowing around the barrier rather than through it. For most locations, a distance of 8 feet will suffice, as shown in Figure 4.1. In locations where the topography is such that the barrier would have to extend for a long distance, a compacted berm tying into the ends of the barrier may be substituted for the upslope extension.

COMPOST FILTER SOCK

A compost filter sock is a mesh tube filled with composted material that is placed below a disturbed area, perpendicular to sheet flow, to filter sediment-laden runoff before it leaves the site.

Compost filter socks are flexible and can be filled in place or in some cases filled and moved to 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

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. 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 place 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.

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 (see Figure 4.1) 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 above ground 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 filter 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.

STANDARD CONSTRUCTION DETAIL #4-6
Rock Filter Outlet

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 of the height of the outlet.

FILTER FABRIC FENCE (SILT FENCE)

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 shall 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.

Support stakes that are 2" x 2" ($\pm$ 3/8") hardwood (minimum cross-sectional area of 3.0 square inches) hardwood 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 come 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.

TABLE 4.4
Maximum Slope Length for Filter Fabric Fence

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

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

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 or 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 above ground 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.

STANDARD CONSTRUCTION DETAIL #4-8
Reinforced Silt Fence (30" High)

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

Fabric width shall be 42" minimum. Stakes shall be hardwood or equivalent steel (U or T) stakes. An 18" support stake shall be driven 12" minimum into undisturbed ground.

Silt fence must be installed at existing level grade. Both ends of each fence section must be extended at least 8 feet upslope at 45 degrees to the main fence alignment (see Figure 4.1).

Guy wires should be attached to the support stakes of Reinforced Fabric Fence (see 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 (see Standard Construction Detail #4-9).

Sediment must be removed where accumulations reach half the above ground height of the fence.

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

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

STANDARD CONSTRUCTION DETAIL #4-9
Silt Fence Reinforced by Staked Straw Bales

This BMP is not suitable for projects lasting longer than 3 months unless bales are replaced quarterly.

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

Fabric width shall be 42" minimum. Stakes shall be hardwood or equivalent steel (U or T) stakes.

Silt fence shall be installed at existing level grade. Both ends of each fence section shall be extended at least 8 feet upslope at 45 degrees to the main fence alignment (see Figure 4.1).

Sediment shall be removed where accumulations reach half the above ground height of the fence.

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

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

SUPER SILT FENCE (SUPER FILTER FABRIC FENCE)

Super silt fence may be used to control runoff from some small disturbed areas where the maximum slope lengths for reinforced silt fence cannot be met and sufficient room for construction of sediment traps or basins does not exist.

Only those fabric types specified for use as silt fence by the manufacturer should be used.

Super silt fence should not be used in areas where rock or rocky soils prevent the full and uniform anchoring of the fence or proper installation of the fence posts. It should be used only where access exists or can be made for the construction equipment required to install and remove the chain ling fencing (e.g. trencher and posthole drill).

Super silt fence should be installed at level grade. Both ends of each fence section should be extended at least 8 feet upslope at 45 degrees to the main fence alignment to allow for pooling of water (see figure 4.1)

Super silt fence should be installed according to the details shown in Standard Construction Detail #4-10.

An 8" deep trench should be excavated, minimizing the disturbance on the downslope side. The bottom of the trench should be at level grade.

A chain link fence should be installed in the downslope side of the trench with the fence on the upslope side of the support poles. Poles should be 2 ½ "diameter galvanized or aluminum posts set at 10' maximum spacing. Poles should be installed a minimum of 36" below the ground surface and extend a minimum of 33" above ground. A posthole drill is necessary to do this for most sites. Poles do not need to be set in concrete. No. 7 gage tension wire should be installed horizontally through holes at top and bottom of chain-link fence or attached with hog rings at 5' (max.) centers.

Filter fabric should be stretched and securely fastened to the fence with wire fasteners, staples, or performed clips. The fabric should extend a minimum of 33" above the ground surface.

At fabric ends, both ends should be overlapped a minimum of 6", folded, and secured to the fence (see Standard Construction Detail #4-10). The fabric toe should be place in the bottom of the trench, backfilled, and compacted.

STANDARD CONSTRUCTION DETAIL #4-10
Super Silt Fence

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

Filter fabric width shall be 42" minimum.

Posts shall be installed using a posthole drill.

Chain link shall be galvanized No. 11.5 Ga. steel wire with 2 ¼ " opening, No. 11 Ga. aluminum coated steel wire in accordance with ASTM-A-491, or galvanized No. 9 Ga. steel wire top and bottom with galvanized No. 11 Ga. steel intermediate wires. No. 7 gage tension wire to be installed horizontally through holes at top and bottom of chain-link fence or attached with hog rings at 5' (max.) centers.

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

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

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

STRAW BALE BARRIER

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 barriers.

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

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

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), under-cutting and other failures typically occur.

Two support stakes should be driven through each bale to the 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

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

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 above ground 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 (see Standard Construction Detail #4-6.

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

FIGURE 4.4
Straw Bale Barrier Installation

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

As written under Chapter 102, if you are planning any size construction activity in PA, Chapter 102 and the PA Clean Streams Law require that steps be taken to prevent erosion and/ or treat sediment-laden water in the construction areas prior to the start of construction. Sites adjacent to a watercourse or wetlands, or associated with steep slopes, are particularly sensitive. If erosion occurs on site and dirty water enters another property, a waterway of any size, or a wetland, the Department or the Conservation District may request to see a written E&S plan, or may require that a plan and/ or specific measures be installed. An E&S plan is a written depiction of what steps are to be taken to prevent erosion and treat any "dirty" water before discharging this water off-site.

If you are planning to disturb more than 5000 square feet (approx. 1/10 ac.) during earth-moving or if your site is located in a special protection (SP) watershed, Chapter 102 requires an E&S plan be developed and implemented on site prior to starting earthmoving activities. Watershed listings can be found at: ***http://www.pacode.com/secure/data/025/chapter93/chap93toc.html.*** In such situations you are not required to submit an E&S plan to the District, although we encourage everyone to work closely with the District. We offer free technical assistance/ guidance to any interested party (you are still required to take steps to prevent "muddy water" from leaving your site).

TABLE OF CONTENTS

Generally speaking, there are three ways that you would be REQUIRED to submit a written E&S plan for review and approval by the Conservation District prior to starting earthmoving activities.

One: you are going to disturb one or more acres over the life of the project *and* are required to submit for an NPDES permit.

Two: a local, state, or federal entity with which you need approval/ permits requires that you provide an approved E&S plan before they will approve/ permit your project/ activity.

Three: your activities are determined by either the Department or the Conservation District to have the potential to discharge sediment-laden (dirty) water into a stream, watercourse, wetland, etc. REMEMBER: under the Clean Streams Law and the Chapter 102 regulations both the landowner *and* the contractors may be held responsible when sediment-laden water is running or discharged from a construction site.

If you are planning to disturb more than 5000 square feet (approx. 1/10 ac.) during earth-moving or if your site is located in a special protection (SP) watershed, Chapter 102 requires an E&S plan be developed and implemented on site prior to starting earthmoving activities. Watershed listings can be found at: *http://www.pacode.com/secure/data/025/chapter93/chap93toc.html.* In such situations you are not required to submit an E&S plan to the District, although we encourage everyone to work closely with the District. We offer free technical assistance/ guidance to any interested party (you are still required to take steps to prevent "muddy water" from leaving your site).

COMPOST FILTER BERM

Although compost is typically viewed as a means of stabilization, it may also be used to construct a filter berm for sediment control.

A Compost Filter Berm is a sediment filter consisting of composted material blown into a berm configuration below a disturbed area for the purpose of filtering the sediment-laden runoff before exiting the site. Compost Filter Berms may be vegetated or unvegetated and are usually left in place to provide long-term filtration of stormwater as a post-construction BMP.

STANDARD CONSTRUCTION DETAIL #4-2

Compost Filter Berm

Compost Filter Berms 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 (see Figure 4.1 on pg. 13).

The maximum slope length above a compost filter berm should be that shown in Table 4.3 (on pg. 15) for the Standard Silt Fence (18" high fence).

Tall grass shall be cut prior to installation to minimize potential for undercutting. Berm shall be netted or otherwise anchored after installation.

Sediment shall be removed when accumulations reach 1/3 the above ground height of the berm.

Any section Compost Filter Berm which has been undermined or topped shall be immediately replaced. Concentrated flows shall not be directed toward any Compost Filter Berm.

WOOD CHIP FILTER BERM

Wood Chip Filter 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 and 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 be aligned parallel to existing contours and located below all disturbed areas. 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 shown for the Reinforced Silt Fence in Table 4.3 (on pg. 15).

Wood Chip Filter Berms should be constructed as shown in Standard Construction Detail # 4-12 (on pg. 18).

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 Berms 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 barrier alignment (see Figure 4.1 on pg. 13). Wood Chip Berms may 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 a Special Protection Watershed.

Berms shall be inspected weekly and after each runoff event. Sediment shall be removed when accumulations reach 1/2 the above ground 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.

ROCK FILTER

Rock Filters may be used to control runoff within constructed channels (at the downstream end of the channel, during construction) until the protective lining is installed or during a temporary disturbance within the channel. Rock Filters may not be used to control disturbed areas tributary to the channel in which they are placed.

Rock Filters may not be used in lieu of appropriate channel linings. This practice often results in overtopping of the channel during storm events, scouring of the channel bottom below the filter, or erosion of the channel side slopes as sediment deposits build up behind the filter. Rock Filters may not be used in roadside ditches in lieu of a suitable temporary protective liner until vegetation is established except at the inflows to ditch relief culverts. Ditch relief culverts reduce road sediment delivery to nearby streams by diverting sediment-laden ditch water onto stabilized areas (i.e. such as a forest floor) where it can infiltrate and be filtered.

Rock Filters should be constructed according to the specifications shown in Standard Construction Detail # 4-14 (on pg. 20).

Rock Filters should be constructed with Rip-rap sized as follows: (see Chart RRSC #1 on pg. 19)

- **For channels with Total Depth > 3 feet, use R-4.**
- **For channels with Total Depth between 2 and 3 feet, use R-3.**

Rock Filters should not be used in channels of less than 2 feet total depth and they should be equal in height to ½ the total depth of the channel with a 6" depression in the center. A one foot thick layer of AASHTO #57 (i.e. 2B stone) or smaller should be placed on the upstream side of the filter. In special protection watersheds, a 6" layer of compost should be placed and anchored on top of the filter stone. NOTE: Filter fabric and straw bales should not be used in Rock Filters!

Rock Filters should be inspected weekly and after each runoff event. Clogged filter stone (AASHTO # 57) should be replaced and needed repairs be initiated after the inspection.

RIP – RAP (R) SIZING CHART - RRSC #1

American Association of State Highway and Transportation Officials (AASHTO)

Rock Size	R-3	R-4	R-5	R-6	R-7	R-8
2"					0-15%	
3"			15-50%		0-15%	
4"					0-15%	
6"			100%		15-50%	
9"			15-50%		0-15%	
12"			100%		0-15%	
15"			15-50%		0-15%	
18"			100%		15-50%	
24"			100%		15-50%	
30"					100%	
42"					100%	
Minimum Thickness	12"	18"	24"	30"	36"	48"

STANDARD CONSTRUCTION DETAIL # 4-14

Rock Filter

FOR 3' < D USE R-4
FOR 2' < D < 3' USE R-3
NOT APPLICABLE FOR D < 2'

ROCK FILTER NO. LOCATION D (FT.) RIPRAP SIZE

Sediment must be removed when accumulations reach 1/ 2 the height of the filter. Immediately upon stabilization of each channel, remove accumulated sediment, remove Rock Filter, and stabilize disturbed areas.

21 Revised 12/1/10

WATERBAR

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 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.

temporary). 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 whenever possible. Obstructions, (e.g. Straw Bales Barriers, Silt Fence, Rock Filters, etc.) should not be placed in or across Waterbars.

STANDARD CONSTRUCTION DETAIL #3-5

Waterbar

Waterbars must 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.

TABLE 3.1 – WATERBAR SPACING

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

22 Revised 12/1/10

SEDIMENT FILTER LOG (FIBER LOG)

Sediment Filter Logs are tube-shaped devices filled with straw, flax, rice, or coconut fiber and wrapped with UV-degradable polypropylene netting, burlap, jute, or coir (i.e. material derived from coconut shell husk) for longevity. They may be used to control runoff from small disturbed areas where Filter Fabric Fence would normally be used as well as certain locations where Filter Fabric Fence is not typically effective (e.g. above headwalls and endwalls). In general, 8" diameter logs may be used on individual lots of < 0.5 acres that are tributary to a sediment basin or sediment trap. Twelve inch (12") logs may be used on

slopes with lengths not exceeding those approved for Standard Silt Fence and eighteen inch (18") logs may be used on slopes approved for Reinforce Silt Fence. However, longer slope lengths will be considered by the Department on a case-by-case basis. Standard Construction Detail # 4-11 (on pg. 22) should be used for Sediment Filter Log installation and maintenance.

STANDARD CONSTRUCTION DETAIL # 4-11

Sediment Filter Log (Fiber Log)

Sediment Filter Log placement area must be prepared so that it is free of all debris, including rocks, sticks, roots, etc. A 2" layer of compacted fill material shall be placed on the upslope side of the log to prevent undercutting. Where more than one log is required to obtain specified length, logs shall be tightly abutted and securely staked. A 2" layer of AASHTO #57 stone shall be placed where the logs come together. A 6" layer of compost may be substituted for the stone. Sediment Filter Logs shall be placed at existing level grade. Ends shall be extended upslope at 45º to the main Sediment Filter Log alignment for a minimum of 8 feet.

Sediment Filter Logs shall be inspected weekly and after each runoff event. Sediment deposits shall be cleaned from the log when it reaches ½ the height of the log. Damaged Sediment Filter Logs shall be replaced within 24 hours of inspection. A supply of Sediment Filter Logs must be maintained on site for this purpose.

23 Revised 12/1/10

PERMANENT DIVERSION CHANNELS OR TEMPORARY SWALES

Flow Channel Stabilization

Channel Grade	Type of Stabilization
0.5 – 1.0%	Seed and Mulch
1.0 – 2.5%	Jute Matting (or equivalent) with mulch
2.5 – 8.0%	*Sod Lining

***Requires rock apron or some other device to slow the velocity of the water**

INSTALLATION

- **Remove all trees and shrubs that may interfere with the functioning of the channel/swale.**
- **The channel/swale should be excavated to the required depth and slope. Fills should be compacted by earthmoving equipment.**
- **Seed, mulch, and a specified erosion control matting should be placed immediately after final grade is reached.**

MAINTENANCE

- **Periodic maintenance should be performed. Any eroded areas should be seeded/mulched and erosion control matting should be immediately installed. Erosion resulting from concentrated water flows should be re-stabilized with an appropriate erosion control matting designed to meet the specifications of the existing slope.**

RESTRICTIONS

- **All channels/swale should have uninterrupted positive grade to a stabilized outlet.**
- **Diverted runoff from a disturbed area (i.e. construction site) should be conveyed to a sediment-trapping device (i.e. Rock Filter/Rip-rap Apron).**
- **Diverted runoff from an undisturbed area shall outlet directly into an existing stabilized area at a non-erosive velocity.**
- **Maximum drainage area for Permanent Diversion Channels is 5 acres, and maximum slope of Temporary Swales is 8%.**

NOTES

- **Earthen berms are to be used for the same purpose as Permanent Diversion Channels or Temporary Swales and follow the same restrictions as listed above.**

24 Revised 12/1/10

STANDARD CONSTRUCTION DETAIL # 9-2

Riprap Apron at Pipe Outlet Without Flared Endwall

Outlet No.	Pipe DIA Pd (in)	RipRap		Apron	
Size (R-)	Thick. Rt (In)	Length AI (FT)	Initial Width Aiw (FT)	Terminal Width Atw (Ft)	

Construct all Rip-rap Aprons to the dimensions shown. Adjust terminal widths as necessary to match receiving channels.

Extend riprap on back side of apron to at least ½ depth of pipe on both sides to prevent scour around the pipe.

Inspect all Rip-rap Aprons on a weekly basis and after each runoff event.

Replace displaced riprap within the apron immediately.