



It's Just Dirt

May 2022

Channel Protection

For Erosion Prevention



Appalachian Power's "Glenmary Substation" project won the Roanoke County Stormwater Clean Award for its proactive efforts regarding erosion and sediment control.

Award-Winning Projects

In 2021, Roanoke County recognized two outstanding projects with its Stormwater Clean Award under the Contractor Appreciation Program: Appalachian Power's *Glenmary Substation* and EDC's *Tanglewood Shops A & B*.

Both projects were noteworthy in their efforts because land development in Roanoke County presents difficult challenges in the management of stormwater runoff due to the very steep slopes and highly erodible soils. In fact, it is because of these challenges that Roanoke County created the [Contractor Appreciation Program](#) to give recognition to those land-disturbing contractors who "get it right." That is, they conduct exemplary work to protect the area's natural water resources.

More information about this program can be found on the County's Stormwater Management webpage.
<https://www.roanokecountyla.gov/1780/Stormwater-Contractor-Appreciation>



Glenmary Substation

Appalachian Power's *Glenmary Substation* project is located at 5495 Corporate Circle in Salem, VA. The construction team was led by Josh Fisher, who was proactive by building in a manner that minimized environmental impacts. The County's Stormwater inspector, Nathan Amick, noted "this project was a shining example of how erosion and sediment controls should be implemented and how the proper installation and maintenance of such control measures limit the amount of sediment that escapes a construction site." As a result of Appalachian Power's efforts, downstream waterways were protected from sediment-laden stormwater runoff.



Roanoke County's Stormwater Inspector Chriss VanEeckhout & Stormwater Program Manager Cindy Linkenhoker presented the Stormwater Clean Award to EDC Project Manager Michael Rauch & Project Superintendent Gregory Harders for their fine work at the "Tanglewood Shops A & B" project.

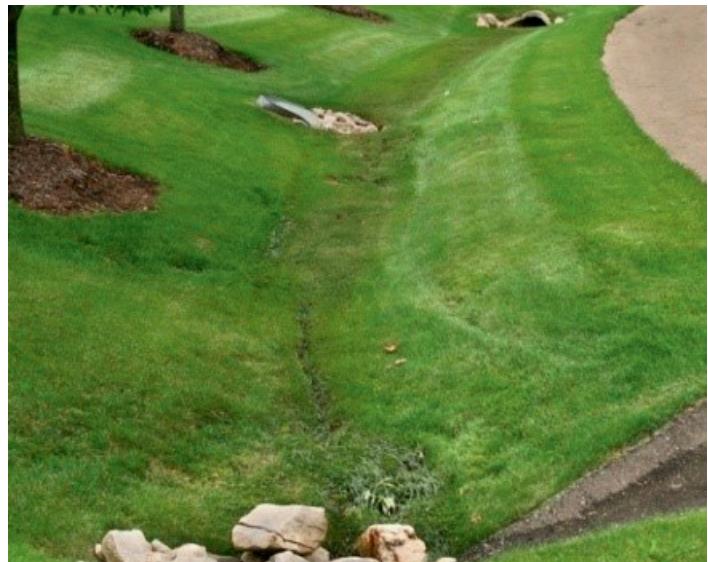
Tanglewood Shops A & B

EDC's project superintendent, Mr. Gregory Harders, was "proactive from day one" on the *Tanglewood Shops A & B* project, located at 4308 Electric Road; Roanoke, VA. The County's Stormwater Inspector, Chriss VanEeckhout, reported that "Mr. Harders made sure that sediment and concrete were contained on the site, and he installed multiple concrete washout stations, which were weekly cleaned. He also swept sediment from the road at the end of every work day." As a result of such conscientious efforts, waterways downstream from the site were protected from sediment-laden stormwater runoff.

Roanoke River Doing Right for the Roanoke River

Channel Protection for Erosion Prevention

The Virginia Erosion and Sediment Control Regulations contain 19 minimum standards that must be met during land development activities. Of those 19 minimum requirements, Minimum Standard 19 (i.e., MS-19) has the most potential for long-term impact. Why? Because it strives to protect downstream properties and waterways from sediment deposition, erosion, and damage due to increases in *volume, velocity*, and *peak flow rate* of stormwater runoff. It also requires that an adequate channel or outfall exists at the point of discharge. Calculations are required to determine the following for the receiving channel/outfall: (1) Erosion factor: Will the bed or banks erode? (2) Flooding factor: Will the banks be overtapped? If the answer to one or both of these questions is YES, then the receiving channel/outfall is considered to be inadequate.



A stable, well-vegetated grass-lined channel will provide excellent erosion control in channels with slow to moderate flow.



A stable, rip-rap channel will provide excellent erosion control in channels with higher flows.

Improvements to the channel or receiving pipe system must occur, or other on-site design options must be employed to return the post-developed flow back to the pre-developed flow condition. This article shall focus on providing channel upgrades to safely convey the concentrated stormwater runoff in non-erosive fashion. Luckily, there are many “soft” and “hard” options that are available to armor channels from erosion or to repair those that are already experiencing erosion. These options are applicable for both man-made and natural channels.

For low flows, soft armoring through vegetation is the best option for erosion prevention. Dense vegetation offers many benefits: It protects against the harmful bomb-like force of raindrops, which dislodge the soil particles from the soil surface. As this raindrop erosion turns into sheet erosion, the vegetation armors the soil against the scouring forces of sheet flow, it reduces the velocity of stormwater runoff, and it allows for the infiltration of stormwater into the soil. In addition, it filters sediment and other pollutants from the runoff, which protects downstream properties and waterways. That is “a lot of bang for the buck!” Another big plus is that vegetation is not only easy to install but also fairly inexpensive. Vegetation can be used in conjunction with soil stabilization fabrics for use with higher flows. There is a myriad of available fabrics, both natural and geosynthetic, from which to choose.

For flows that exceed that which vegetative options can handle, hard-armoring of channels becomes necessary. There are a variety of choices, including bituminous or concrete pavement, rip rap, gabion baskets, imbricated stone, etc. While all of these will protect the channel from erosion, if properly installed, they do have some drawbacks. For example, hard-armored channels do not typically allow for infiltration. Because of this, velocity and volume increase in the channel, making velocity dissipaters necessary at the point of discharge to prevent scour and undermining of the channel itself. Because the water cannot infiltrate into the soil beneath the channel, sediments and other pollutants are carried downstream with the stormwater. Also, rip rap is often considered unsightly in its appearance. Thus, it may be wise to choose an armoring option that not only meets the flow requirements but also addresses any aesthetic concerns for that particular location.

Socks for Slope Stabilization

Sediment Retention Rolls, often called Filter Socks, Sediment Tubes, or Wattles, are effective devices used for slowing the flow of stormwater runoff on steep slopes. These filter socks are placed in parallel rows along the contour to intentionally interrupt sheet flow across the slope such that it doesn't have time (i.e., enough distance) to become concentrated flow, which is more erosive.

No matter what name you call them, sediment retention rolls have become popular. The Virginia Department of Transportation (VDOT) widely uses them across the Commonwealth. VDOT describes them as *“manufactured 3-dimensional devices of a specified filler material encapsulated within a flexible containment material utilized in sediment and flow control applications. Sediment retention rolls may be used to reduce runoff flow velocities on sloped surfaces as slope interrupters, as curb inlet protection, and as ditch check dams.”*¹ As can be expected, there are a host of manufacturers that produce these devices, which come in a variety of fabrics and sizes. VDOT provides a list of approved vendors on its website in the Materials Approved List, last updated on March 3, 2022. The website link is provided here:

https://www.virginiadot.org/business/resources/materials/approvedlists/materials_approved_lists.pdf

Several of the VDOT-approved vendors and their products are shown below:

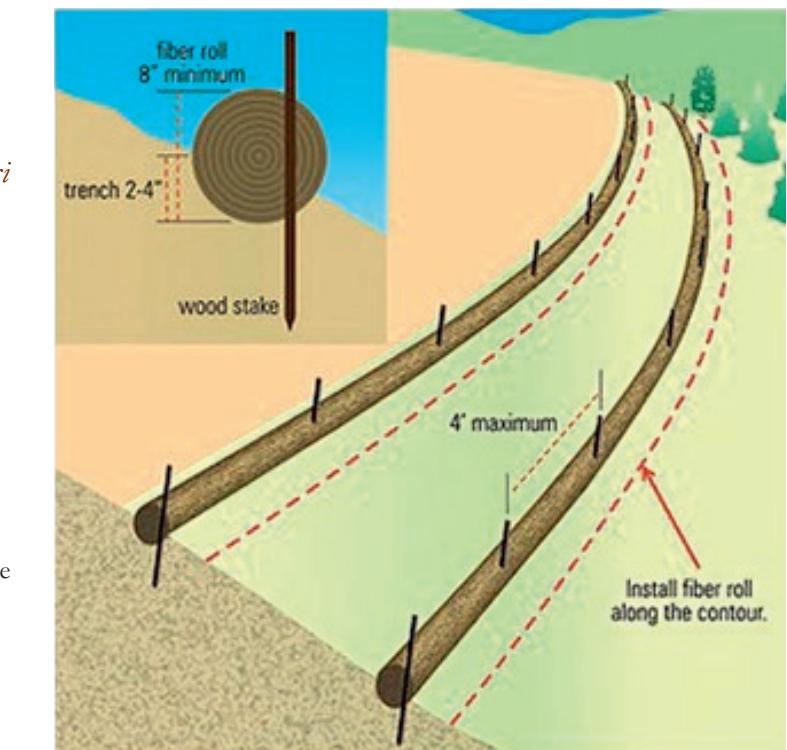
- **Filtress** - Compost Filter Sock and Sediment Tube
- **Filtrexx** - Sediment Tube
- **AGrow Wattle** - Sediment Tube
- **Curlex Sediment Log** - Sediment Tube
- **Premier Straw Wattle** - Sediment Tube
- **Terra-Tubes Fiber Filtration Tube** - Sediment Tube
- **Siltworm 18”** - Sediment Tube

In an area as steep as Roanoke County, and in one that is known for its highly-erodible, fine, clay soils, these devices may well be a godsend. Be proactive! Choose to use them to slow the flow of stormwater runoff on steep slopes and to contain sediment on your site. Your choice will result in less sediment loss from your project, which will have a positive impact on the downstream receiving waterways.

¹ VDOT 2020 Road & Bridge Specifications. Section 244. Roadside Development Materials.



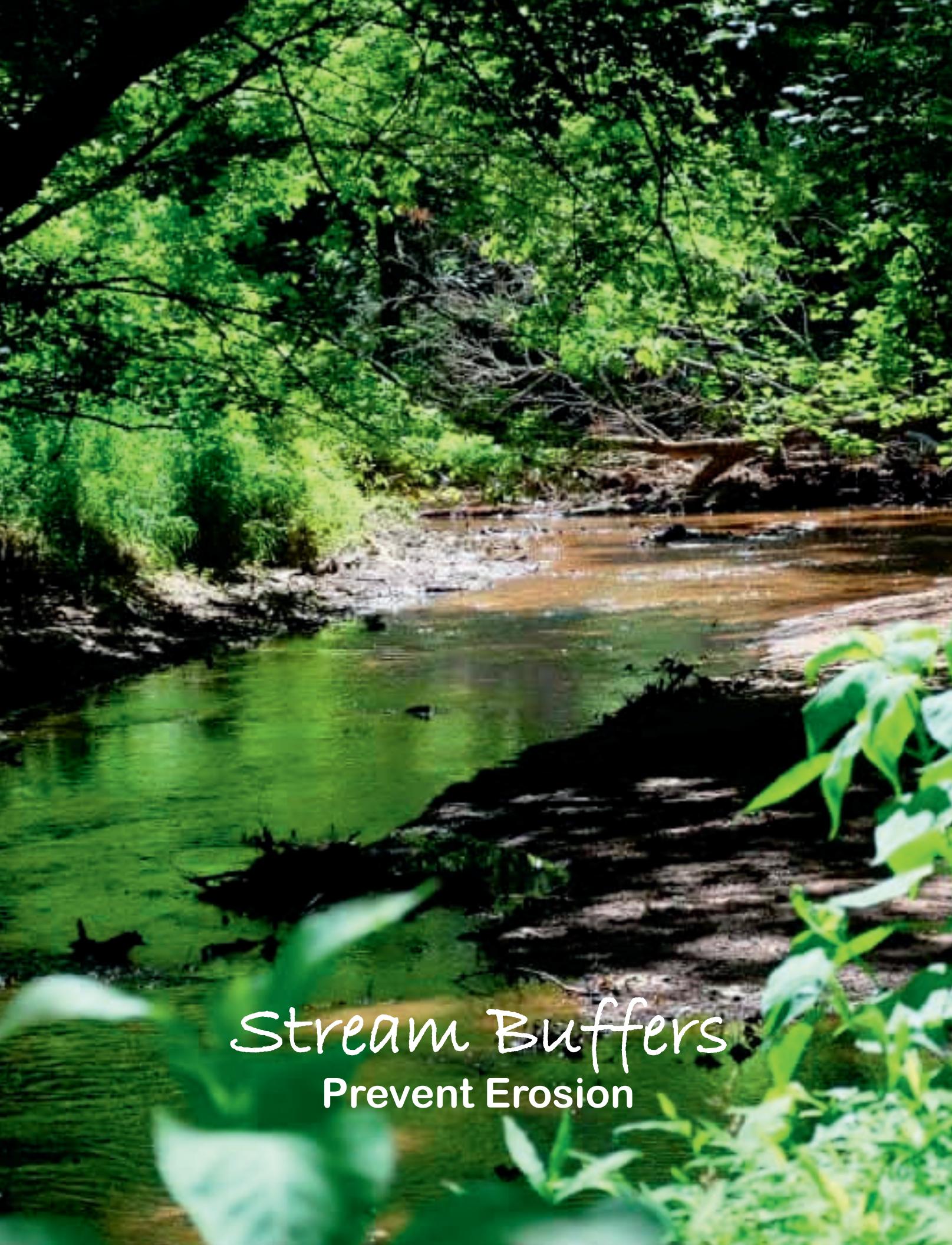
Sediment retention rolls, often called filter socks, are quite effective at slowing the flow of stormwater runoff, which helps to minimize erosion. Once sediment rolls are in place and properly secured, soil protection measures such as straw mulch or blanket/matting are needed to further protect the bare dirt from erosion.



Filter socks, or sediment rolls, are usually 8 inches in diameter. They must be entrenched into the soil a minimum of 2 to 4 inches. These devices are placed in parallel rows along the contour to slow the flow of stormwater runoff so that it does not transition from sheet flow to the more erosive concentrated flow.

Construction Site Waste Management

Starts with you



Stream Buffers Prevent Erosion

County Adopts New Stream Buffer Requirements

On July 27, 2021, Roanoke County revised its Erosion and Sediment Control (ESC) Ordinance #022316-7 to incorporate 25 ft. stream buffers along perennial streams; their purpose is to reduce pollutants in stormwater runoff from construction activities in an effort to keep such pollutants from entering the County's storm drainage system, more formally known as the Municipal Separate Storm Sewer System (MS4).

This ordinance requires Erosion and Sediment Controls (ESCs) for all regulated land disturbances of 2,500 square feet or more and an engineered ESC Plan for any land disturbance greater than 10,000 square feet. The ESC Plan must show appropriate erosion and sediment controls, to include their proper placement, design, and requirements for maintenance. Additionally, the ordinance provides for routine site inspections and enforcement procedures to assure compliance with the approved ESC plan.

Although these requirements target projects that are under active construction, landowners whose property abuts a stream or creek are encouraged to incorporate stream buffers, if feasible, to protect local receiving waterways. For more information about stream buffers

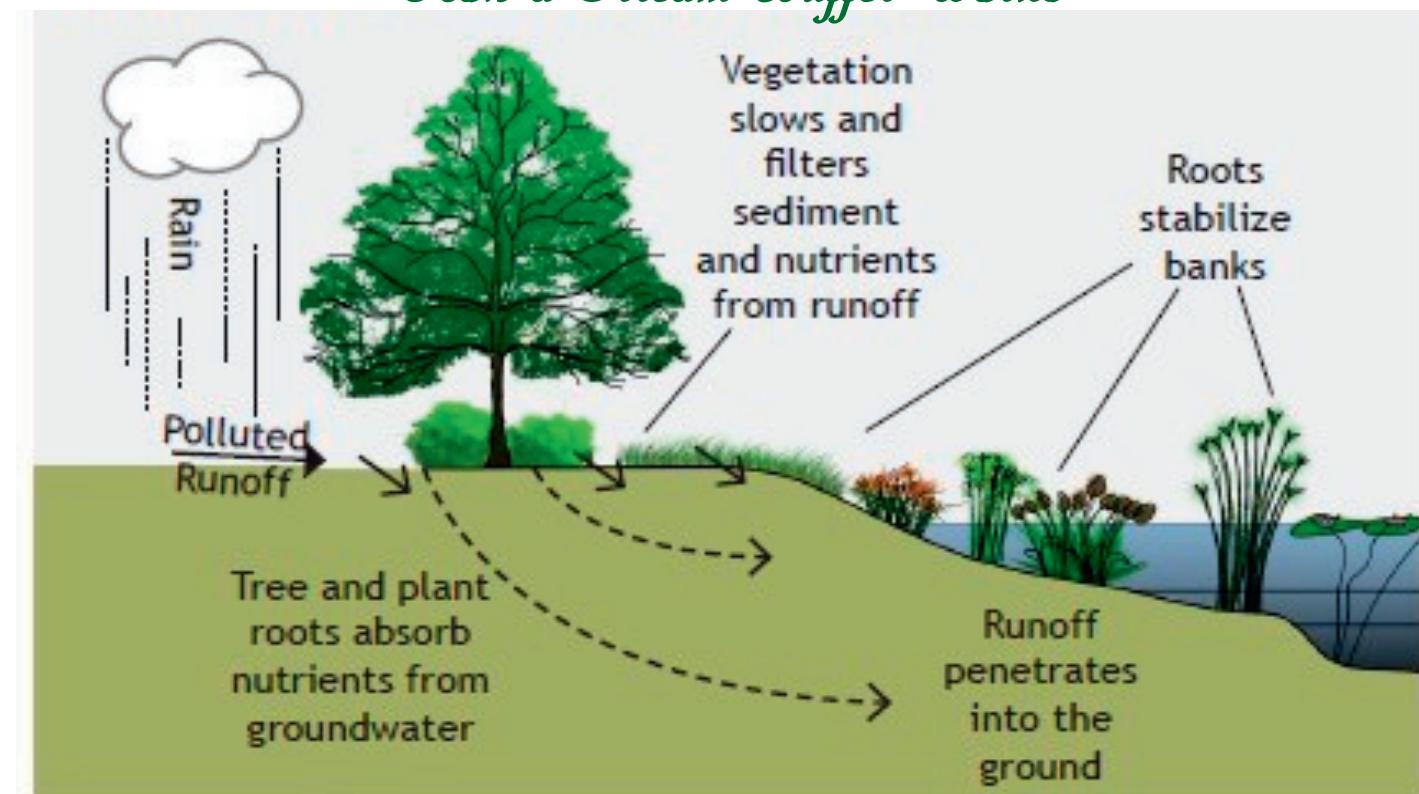
and how to build them, read the article entitled *Stream Buffers: Why We Need Them* in the May 2018 issue of [A Stormwater Guide for Homeowners](#), which is posted on the County's Stormwater webpage.

<https://www.roanokecountya.gov/1648/Stormwater-Public-Education-Documents>



A well-established stream buffer provides shade, filters pollutants, and protects against shoreline erosion.

How a Stream Buffer Works



Graphic courtesy of the Catawba Riverkeeper Foundation. <https://www.catawbariverkeeper.org/>

Contain It or Chase It? Dirt, that is. . .

For those who prefer a quick summary of expansive manuals like *Virginia's Erosion and Sediment Control Handbook*, one single phrase can sum up the book's entire purpose: **"Keep the dirt on the project."** And fortunately, containing sediment on your project is far less expensive than chasing after it once it leaves your site, whether by wind erosion, stormwater runoff, or vehicular tracking.

The cost to retrieve/clean up off-site sedimentation will vary greatly depending on where the sediment actually ends up. For example, if sediment is tracked onto a public road, it must be swept up. Minimum Standard 17 of Virginia's Erosion & Sediment Control (ESC) Regulations requires that this be done by the end of every work day, and the collected sediment must be disposed of in a lawful manner. (Ex., it may be returned to the site or hauled away.) Similarly, if wind erosion blows unprotected soil to adjoining properties, affected property owners may require that the accumulated sediment be removed from their parking lots, pools, sidewalks, driveways, patios, etc.



To avoid erosion, cover bare soils with straw mulch, soil retention fabric, sod, hydroseed, stone, or even a plastic tarp. This will protect the soil against highly-erodic wind and raindrop erosion and help to keep the dirt on your project.

A more expensive scenario occurs when the sediment ends up in a live stream; costs may quickly escalate, as supplementary professional services may be needed for coordination with and possible permitting by regulatory agencies, such as the Department of Environmental Quality and the Army Corps of Engineers. In some cases, cleanup may have to be done by hand, without mechanized equipment, to avoid further disturbance in the affected receiving stream and/or offsite property.

Additional costs may be incurred when injured parties wish to be reimbursed for damages, and Civil Penalties and other enforcement measures, such as Stop Work Orders, may be imposed by the County. Civil penalties can quickly add up, as they are charged on a daily basis until the issue is corrected.

Obviously, fines and stop work orders, offsite cleanup, additional permitting, and possible litigation initiated by aggrieved parties are additional costs to the project, which will affect your profit. But, the good news is that all of these negatives are usually avoidable. The trick is to keep the dirt on the project. How? Follow these tips:



Properly install silt fence by entrenching the bottom of the fabric into the soil. Make sure that the stakes are on the opposite side of the flow (sheet flow only) that is directed to the silt fence. Ensure to remove accumulated sediment when it reaches 1/2 the height of the fabric to avoid over-topping.

HOW TO KEEP THE DIRT ON THE PROJECT

Install Erosion Controls

- Clear and grub in phases to leave the existing vegetation in place for as long as possible. This is the **most effective and most affordable** way to minimize erosion.
- **Cover bare dirt with SOMETHING** when it will remain dormant for 14 days or more. This helps to prevent erosion. There are many products from which to choose, including straw mulch, sod, soil retention fabrics, hydroseed, stone, plastic tarps, etc. Choose the one that works best for your particular application or situation.
- When using straw mulch to stabilize bare soils, **apply it at the rate of 2 tons per acre**. If you do this right, you won't see any bare dirt, and the erosive wind and raindrops won't find it either.
- **Stabilize earthen structures**, such as dams, dikes, traps, and basins, immediately following installation.



Use VDOT #1 stone, 6" deep, over geotextile fabric for construction entrances. The heavy, angular stone helps knock dirt off of construction vehicle tires, which minimizes sediment tracking onto the road, and the fabric underlayment keeps the stone from getting mired down into the soil.

Install Sediment Controls

- Minimum Standard 4 (MS-4) of the Virginia Erosion & Sediment Control (ESC) Regulations requires that sediment trapping devices, such as sediment basins, sediment traps, silt fences, perimeter dikes, and similar devices **must be constructed as a first step** in any land-disturbing activity and **must be made functional before any upslope land disturbance takes place**. Why? To trap dirt on the project.
- When using silt fence for perimeter control, be sure to **bury the toe of the fabric in a trench, 4" deep** by 4" wide. This will contain the dirt on the site, instead of allowing it to escape beneath the fence fabric. Use silt fence to **only intercept sheet flow**.
- Install temporary stone construction entrances at all points of ingress/egress to minimize sediment tracking from your site onto paved roads. Minimum dimensions are 12 ft. wide x 70 ft. long, using **VDOT #1 stone** (6" deep), over a geotextile fabric.



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This publication is a public service message brought to you by Roanoke County, Department of Development Services. As regulated by federal and state laws, the County's Stormwater Management Program must include public information strategies to encourage the prevention of stormwater pollution. For other publications or information on ways to prevent stormwater pollution, please call Cynthia S. Linkenhoker, Stormwater Program Manager, at 540-772-2036.

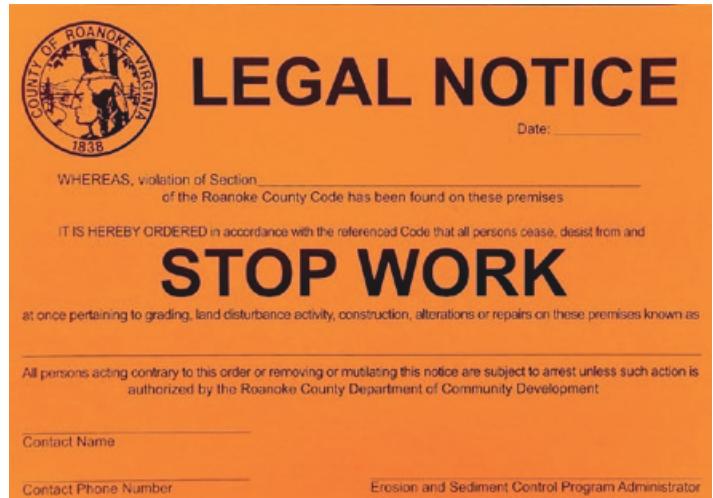
Time *IS* Money

The old saying that "*Time is Money*" still holds true. If you cannot work, you cannot make any money. So, it makes financial sense to not let your site get so far out of compliance that it becomes necessary for Roanoke County to issue a Stop Work Order. Pursuant to the County's state-mandated Erosion & Sediment Control (ESC) Program, a Stop Work Order is a tool for enforcement to achieve compliance on a project. Once it is issued, all other outdoor work must cease until such time as the violation is corrected. So again, if Time is Money, then work delays due to a Stop Work Order mean losing money.

In accordance with the County's ESC Ordinance, Stop Work Orders are issued for the following reasons:

- 1) **Failure to obtain an approved plan or permit before commencement of a land disturbing activity.**
- 2) **Where the land disturbance is causing or is in imminent danger of causing harmful erosion of lands or sediment deposition in waters within Virginia's watersheds.**
- 3) **Failure to Comply with a formal Notice to Comply issued by Roanoke County.**

AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE



A Stop Work Order is an effective tool used to achieve compliance with Roanoke County's Erosion & Sediment Control Ordinance.

Fortunately, the thrifty contractor can easily avoid all enforcement penalties, Stop Work Orders included, by "doing things right the first time." How? Obtain an approved plan and a permit before land disturbance begins. Install sediment trapping measures before any upslope land disturbance takes place. Address the corrective actions listed on the County inspection reports, and be proactive in maintaining ESC measures. This strategy will lead to a successful project every time!