

Total Maximum Daily Load (TMDL) Action Plan For Benthic Reduction (Sediment) in the Roanoke River

MS4 General Permit No. VAR040022



Prepared by
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(Updated)

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I. EXECUTIVE SUMMARY

Roanoke County's Total Maximum Daily Load (TMDL) Action Plan for Sediment Reduction in the Roanoke River (Sediment TMDL Action Plan) has been prepared and revised as required by the Virginia Department of Environmental Quality's (DEQ) "General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems" (Permit # VAR040022). Roanoke County is subject to the requirements of this permit, effective November 1, 2023 through October 31, 2028.

Roanoke County's strategy to address the permit requirements is to progressively implement Best Management Practices (BMPs) to decrease the discharge of sediment from the County's MS4 towards meeting the DEQ-assigned waste load allocation. Roanoke County will implement BMPs over multiple state permit cycles, using an adaptive iterative approach to reduce sediment discharges.

The following schedule shows the BMPs that Roanoke County plans to implement in this permit cycle to decrease discharges of sediment, along with implementation dates for each.

BMP #	BMP Name/Task	Estimated Implementation Dates
S-1	Lower Threshold for Compliance: Erosion & Sediment Control Program	Ongoing
S-2	Roanoke County MS4 BMP Capital Improvement Program	Ongoing
S-3	Enhanced Public Outreach (Sediment)	Ongoing
S-4	Enhanced Employee Training (Sediment)	Ongoing
S-5	Contractor Appreciation Program	Ongoing

This Sediment TMDL Action Plan was prepared by Roanoke County staff. Note that public input was sought through public advertisement and a comment period. The completed Plan was approved by the County Administrator. Nothing in this Action Plan shall be construed as binding Roanoke County to any action until such time that the Roanoke County Board of Supervisors provides final approvals and/or appropriate funding for implementation.

It is expected that this Sediment TMDL Action Plan will be periodically revised to add, modify, or delete BMPs, to adjust estimated implementation dates, and to reflect new information as it becomes available. Progress regarding implementation of this plan will be included in the MS4 Annual Report that is submitted to DEQ by October 1st of each year in the permit term.

II. BACKGROUND

A. General

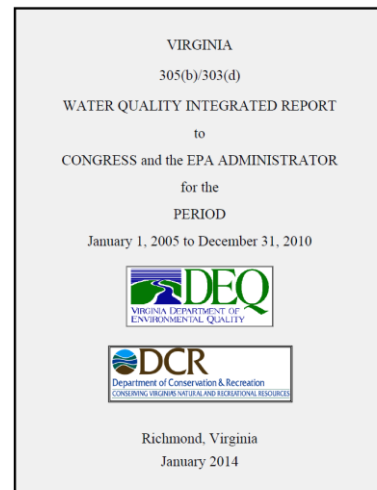
The Virginia Department of Environmental Quality (DEQ) routinely monitors and tests the Commonwealth's waters (i.e., streams, rivers, lakes, and estuaries) to confirm that they meet Virginia's water quality standards (9 VAC 25-260-10). According to the Virginia Water Quality Standards: *"all state waters are designated for the following uses: recreational uses (e.g., swimming and boating); the propagation and growth of a balanced indigenous population of aquatic life, including game fish, which might be reasonably expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish)."*

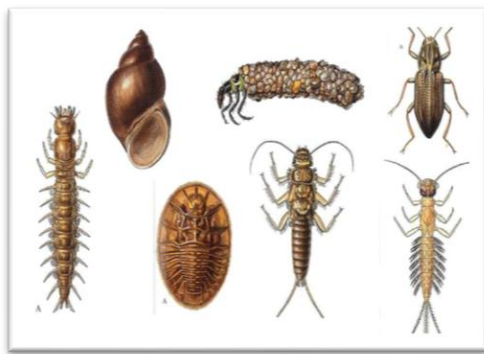
Where DEQ determines that a water does not meet Virginia's water quality standards, the water is termed "impaired." Impaired waters are listed on the "*Virginia Water Quality Assessment 305(b)/303(d) Integrated Report*" that is issued on even-numbered years to meet the requirements of the U.S. Clean Water Act, sections 305(b) and 303(d), and the Virginia Water Quality Monitoring, Information and Restoration Act. **Roanoke County has 16 different streams, including the Roanoke River, with 28 identified impairments.**

DEQ performs studies on impaired waters to determine the "Total Maximum Daily Load" that the water can assimilate and still meet water quality standards. These studies are called TMDL studies. TMDL studies assign "waste load allocations" (WLAs) to permitted point sources of pollution. WLAs are numerical limits of a pollutant of concern that a permitted point source must meet by implementing appropriate strategies, or Best Management Practices (BMPs), using an adaptive iterative approach. BMPs may be implemented over multiple state permit cycles, provided adequate progress to reduce the pollutant of concern is documented.

As previously noted, Roanoke County has coverage under the "Virginia General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems" (MS4 Permit); This MS4 Permit (General Permit No. VAR040022) is effective from November 1, 2023 through October 31, 2028. Pursuant to this permit, all stormwater that passes through a County-owned or County-operated storm drain or improved channel that is located within the urban parts of the County, as designated in the latest decennial U.S. Census, is a point source discharge and, therefore, subject to WLAs, where appropriate.

The Roanoke River from the confluence with Mason Creek to the backwater from Niagara Dam has WLAs for sediment. Within Roanoke County, Tinker Creek, Murray Run, Mudlick Creek, and Mason Creek are identified as impaired by excessive sediment. These tributary streams do not have separate WLAs, but they are "nested" within the Roanoke River WLAs. The Roanoke River does not properly support aquatic life due to the excessive sediment. Excessive sediment settles over stream bottoms, removing habitat and smothering macroinvertebrates that form the foundation of the aquatic food chain for fish.





Examples of Intolerant Benthic
Macroinvertebrates

Section II.B of the MS4 Permit requires Roanoke County to have an updated MS4 Program Plan that includes a specific TMDL Action Plan for pollutants allocated to the MS4 in approved TMDLs.

This specific TMDL Action Plan addresses reduction of sediment discharged into the Roanoke River. Although only the Roanoke River has a WLA for sediment, sediment discharges into all the streams that are tributary to the Roanoke River must be decreased.

This Sediment TMDL Action Plan has been prepared by Roanoke County staff. Public input was sought through public advertisement and a public meeting. The completed Plan was approved by the County Administrator. Nothing in this Action Plan shall be construed as binding Roanoke County to any action until such time that the Roanoke County Board of Supervisors provides final approvals and/or appropriates funding for implementation.

It is expected that this Sediment TMDL Action Plan will be periodically revised to add, modify, or delete BMPs, to adjust estimated implementation dates, and to reflect new information as it becomes available. Progress regarding implementation of this plan will be included in the MS4 Annual Report that is submitted to DEQ by October 1st of each year in the permit term.

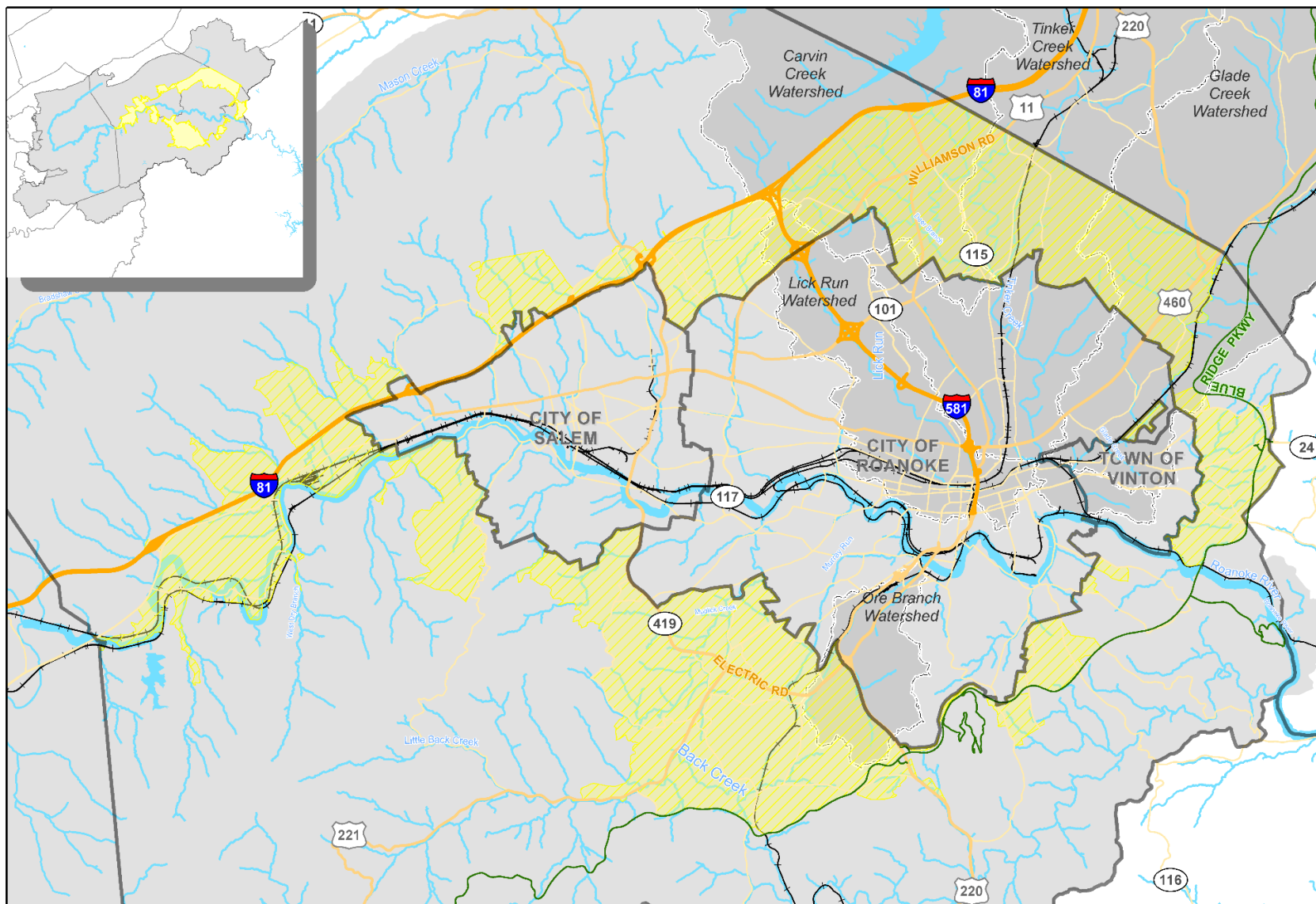
B. Roanoke River Watershed Description




The Roanoke River originates in Montgomery County and flows through Roanoke County, Salem City, Roanoke City, and the Town of Vinton. It flows through Roanoke County again and then into Bedford and Franklin Counties and Smith Mountain Lake.

All of Roanoke County, except for the northern part of the Catawba Valley, flows into the Roanoke River.

Within Roanoke County, the watershed contains 50.5 square miles within the MS4 regulated area, and 174.4 square miles outside of the MS4 regulated area. There are approximately 13.2 miles of river within the regulated MS4 area and approximately 2.7 miles of river outside of the regulated MS4 area.

Within Roanoke County's regulated MS4 area, the Roanoke River is fed by approximately 122.2 miles of drainage ways having drainage areas of 100 acres or greater. There are approximately 315.5 miles of drainage ways having drainage areas of 100 acres or greater outside of the regulated MS4 area. See **Figure 1: Roanoke River Watershed Map**.



-  MS4 Area
-  Supplemental Watersheds
-  Roanoke River Watershed

Roanoke River Watershed

Figure 1

1:126,720 1 in = 2 miles

0 1 2 4 Miles

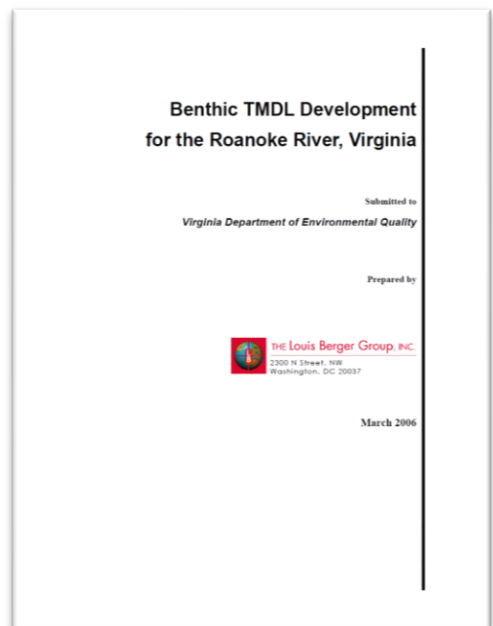


C. Impairments and TMDL Waste Load Allocations

The Roanoke River, Tinker Creek, Murray Run, Mudlick Creek, and Mason Creek were listed as “impaired” because they did not meet the Virginia water quality standard for wildlife habitat, as measured using the modified Rapid Bioassessment Protocols (EPA, 1999). Streams are required to support the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them. Sediment was identified as the probable stressor pollutant that is adversely impacting macroinvertebrates (benthic organisms).

A TMDL study was performed and approved by U.S. EPA on 5/10/06 and the Virginia State Water Control Board on 9/7/06. This study determined that the Roanoke River has a “moderately impaired benthic community from the confluence with Mason Creek to the backwater from Niagara Dam.”

Roanoke County was assigned a Waste Load Allocation (WLA) of 1,680 tons of sediment/year.



D. Roanoke River Bacteria and Sediment TMDL Implementation Plan, Part 1

DEQ released the draft *Roanoke River Bacteria and Sediment TMDL Implementation Plan, Part 1* on May 1, 2015 for public comment. Roanoke County attended meetings and provided comment during the development of this Implementation Plan. While Roanoke County supports the goals of the Implementation Plan, it has expressed concerns about the technical feasibility of the Implementation Plan’s proposed BMPs and their related costs.

E. Significant Sources of Sediment Discharging into MS4

No specific localized significant sources of sediment were determined by the TMDL study. The MS4 area is characterized by steep slopes with flashy streams and silty and clayey soils.

The most likely significant sources of anthropogenic sediment are increased erosion from developed lands due to conversion from forest to lawns and stream bank erosion during major storms.

Roanoke County has chosen to focus its efforts on decreasing erosion from active construction sites by adopting a lower threshold for compliance than that used in Virginia’s Erosion and Sediment Control Program. Roanoke County has also been addressing stream bank erosion by constructing stream restoration projects, which are BMPs approved by the Chesapeake Bay Program.

The County’s Public Education and Outreach efforts and its Employee Training Program have emphasized sediment as one of the County’s primary pollutants of concern.

III. BMPs DESIGNED TO REDUCE SEDIMENT

The following BMPs have been specifically identified to reduce discharges of sediment from the County's MS4. To the extent that they reduce sediment discharges, the BMPs listed below also reduce the discharge of *E. coli* that adheres to sediment surfaces. Note that the highlighted categories shown below align with the requirements outlined in Sections II.B.4 and II.B.6 of the MS4 Permit.

A. Land disturbance thresholds lower than Virginia's regulatory requirements for erosion and sediment control and post development stormwater management. (MS4 Permit Section II.B.6.a.(3))

BMP S-1: Lower Threshold of Compliance: Erosion & Sediment Control Program

Roanoke County's Erosion and Sediment Control Program regulates land-disturbing activities of 2,500 square feet or more, which is less than the state's threshold of 10,000 square feet or more. This lower threshold has been implemented due to the County's steep terrain and highly erodible clay soils.

Roanoke County permits and inspects approximately 129 land disturbing activities per year that each disturb less than 10,000 square feet. Cumulatively, these activities disturb approximately 18 acres per year.

The amount of erosion that occurs on an uncontrolled construction site and the amount of sediment that subsequently leaves such sites is highly variable. An earlier review of several references suggested values between 20 - 200 tons/acre/year of sediment discharges from uncontrolled construction sites. Based on the County's steep slopes and erodible soils, the County previously assumed that uncontrolled construction sites discharge about 120 tons/acre/year. However, in 2022, the County revised this estimate to 12 tons/acre/year using the Chesapeake Bay Program guidance as described in *Recommendations of the Expert Panel to Define Removal Rates for Erosion and Sediment Control Practices (2014)*.

Erosion and sediment control devices are not 100% effective; however, per the Chesapeake Bay Program, a properly designed and installed set of controls should retain at least 85% of sediment on the construction site. As previously noted, Roanoke County permits and inspects approximately 129 land disturbing activities per year that each disturb less than 10,000 square feet. Cumulatively, these activities disturb approximately 18 acres per year.

Therefore, Roanoke County's lower threshold for compliance keeps about 184 tons/year of sediment out of local waterways (12 tons/acre/year * 85% * 18 acre = 184 tons/year).

B. BMPs Approved by the Chesapeake Bay Program. (MS4 Permit Section II.B.6.a.(2))

BMP S-2: Roanoke County MS4 BMP Capital Improvement Program

In 2015, the County's consultant recommended that the most cost-effective BMP to reduce sediment discharged from the County's MS4 would be *natural stream restoration where*

excessive stream bank erosion was occurring. The consultant's recommendation was and is supported by the experience of other localities.

Roanoke County agrees that natural stream restoration is the most cost-effective means to lower sediment loads in the Roanoke River. Because of this, the County has been addressing the reduction of sediment loads through the construction of stream restoration projects. However, it should be recognized that Roanoke County, through its MS4 permit, is only responsible for point-source discharges from its improved storm drainage system (i.e., pipes, ditches, and swales). Roanoke County is not responsible for streambank erosion within streams, as they are not a component of the County's MS4 system.

Roanoke County's program to construct structural BMPs, such as stream restoration, is supported by its 10-Year Capital Improvement Program (CIP). Currently, the County's CIP indicates planned funding for one capital BMP project about every three years. This program also assumes that 50% of the cost will be provided through the Virginia Stormwater Local Assistance Fund (SLAF).

The County has completed the following projects:

Year Completed	Stream Name	Project Location	Tons of Sediment per Year Kept out of Stream by Project*
2016	Glade Creek	Vinyard Park	831
2016	Murray Run	Pebble Creek Apartments	226.3
2019	Glade Creek	Vinyard Park	378.2
2021	Wolf Creek	Goode Park	348

**Values determined based on field studies using a state approved methodology. These calculations were submitted and reviewed by the Virginia Department of Environmental Quality as a part of each project's SLAF grant application.*



Glade Creek in Vinyard Park prior to project. Note the high, vertical, and eroding stream banks.



Glade Creek in Vinyard Park after natural stream restoration project. Note provision of floodplain shelf and in-stream structure to lessen erosive stress, and use of toe wood to provide natural habitat.

C. Outreach strategy to enhance the public's education (including employees) on methods to eliminate and reduce discharges of the pollutants of concern. (MS4 Permit Section II.B.4.g.)

BMP S-3: Enhanced Public Outreach (Sediment)

In accordance with the MS4 Permit requirements, Roanoke County's Public Education Program targets three high-priority water quality issues that contribute to the degradation of stormwater runoff and receiving waters: *excess bacteria*, *excess sediment*, and *excess nutrients*. The following BMPs, as outlined in the County's MS4 Program Plan, address these issues:

BMP 1-1: Stormwater Educational Resources - The County has created and maintains a comprehensive listing of existing stormwater-related agencies and organizations along with pertinent educational programs and resources, which is made available to the public by way of the County's stormwater website.

BMP 1-2: Roanoke County Stormwater Newsletter - Roanoke County creates and distributes a Stormwater Newsletter, which is annually distributed to all Roanoke County single-family residences.

BMP 1-4: Stormwater Education Program for Schoolchildren (Revised) - Roanoke County has developed and implements a stormwater education program for its schoolchildren. Different programs target appropriate grade levels.

BMP 1-5: Stormwater Public Awareness Program - Roanoke County has developed and implements a Stormwater Public Awareness Program that includes the distribution of stormwater merchandise, public service announcements, and other high visibility educational media.

BMP 1-7: Targeted Education Program - Roanoke County conducts targeted education to communicate its high-priority stormwater messages. This BMP coordinates with **BMP 1-5: Stormwater Public Awareness Program**.

BMP 2-3: MS4 Program and Stormwater Pollution Prevention Website - Roanoke County has updated and will continue to maintain the webpage dedicated to the MS4 program and stormwater pollution prevention.

These BMPs have been revised, where appropriate, to include messages from the Sediment TMDL Action Plan. (See Figure 2.) This effort also extends to training materials developed for County employees. See **BMP S-4: Enhanced Employee Training (Sediment)**.

Figure 2. Targeted Education & Outreach Program for Sediment Reduction

High-Priority Water Quality Issue	Target Audiences	Means to Determine Audience Size	Estimated Audience Size	Overall Messages	Means to Deliver Messages	Rationale
#1 SEDIMENT	Car Washing/Detail Facilities; Car Dealers; Auto Body Shops (includes Tire Shops, Auto Parts Stores, etc.)	Business Licenses/Yellow Pages	285	<ul style="list-style-type: none"> • All wash water to sanitary sewer. • Potential damage caused to streams by wash water. 	<ul style="list-style-type: none"> • Mailer, annually • PSAs on local cable station 	Commercial car wash facilities can contribute significant sediment if wash water is discharged into the County's MS4. Vehicle washing and detailing can contribute significant sediment if wash water is discharged into the County's MS4, which drains, untreated, to local streams.
	Homeowners	Tax Records	34,883	<ul style="list-style-type: none"> • Potential damage caused to streams by wash water. • Direct wash water to grass area for filtration and infiltration. • Never allow wash water to flow into street or storm drains. 	<ul style="list-style-type: none"> • County newsletter sent annually to homeowners • PSAs on local cable station • Handouts at local environmental events, 4 per year minimum 	Residential car washing is specifically allowed, but it still may contribute significant sediment if wash water is not properly handled.
	Contractors Involved in Land-Disturbing Activities	Development Services Permit Records and Yellow Pages	841	<ul style="list-style-type: none"> • Damage caused to streams by sediments. • Healthy fish populations require clear stream bottoms. • Silt fence is not enough. • Limit disturbed areas. • Stabilize as quickly as possible. 	<ul style="list-style-type: none"> • Brochure given to land-disturbance permittee when permit is issued • Brochure given with enforcement actions • Newsletter mailed on an annual basis 	Erosion and sediment control is required by regulations; however, more effective implementation may occur with additional education.

BMP S-4: Enhanced Employee Training (Sediment)

In accordance with the MS4 Permit requirements, Roanoke County's Public Education Program targets three high-priority water quality issues that contribute to the degradation of stormwater runoff and receiving waters: *excess bacteria, excess sediment, and excess nutrients*. Thus, Roanoke County's employee training program has been enhanced to recognize sediment as a "high-priority water quality issue." Training courses include the following, as outlined in the MS4 Program Plan:

- **Recognition and Reporting of Illicit Discharges** - all applicable field personnel receive training on a biennial basis in the recognition and reporting of illicit discharges. Among many potential illicit discharges, sediment and bacteria are identified as potential pollutants in this training.
- **Good Housekeeping and Pollution Prevention Practices** - all employees that perform road, street, and parking lot maintenance, or are employed in and around maintenance and public works facilities and at recreational facilities receive biennial training in good housekeeping and pollution prevention practices. Sediment and bacteria are identified as potential pollutants in this training.

*NOTE: All employees who are required to take the Good Housekeeping and Pollution Prevention Practices training are also required to read and follow the County's Standard Operating Procedures (SOPs). These procedures were designed to eliminate or minimize pollutant discharges in stormwater, including sediment, and are detailed in **BMP 6-3** of the MS4 Program Plan.*

- **Contractor Oversight for Environmental Compliance** - all supervisors who oversee Contractors that perform work for the County or employees involved in developing contracts for Contractors take this training on a biennial basis. The training explains that all Contractors must have their own written good housekeeping and pollution prevention program, or they must comply with the County's written policies and SOPs. This training discusses the significance of soil erosion from construction sites, the potential harm to receiving waters, and the need to use effective erosion and sediment controls. It also discusses the need to carefully place and maintain portable toilets onsite to ensure bacterial wastes do not enter stormwater runoff. County employees who oversee Contractors working for the County must ensure compliance by Contractors.
- **Hazardous Materials (HAZ-MAT) Training** - the County of Roanoke currently maintains basic hazardous materials training for its employees, including volunteers, in Fire and Rescue. All career (paid) staff are certified to HAZ-MAT Operations. HAZ-MAT certification does not expire from the Virginia Department of Fire Programs; however, all career personnel receive annual, internal training on this topic as part of their career development training.

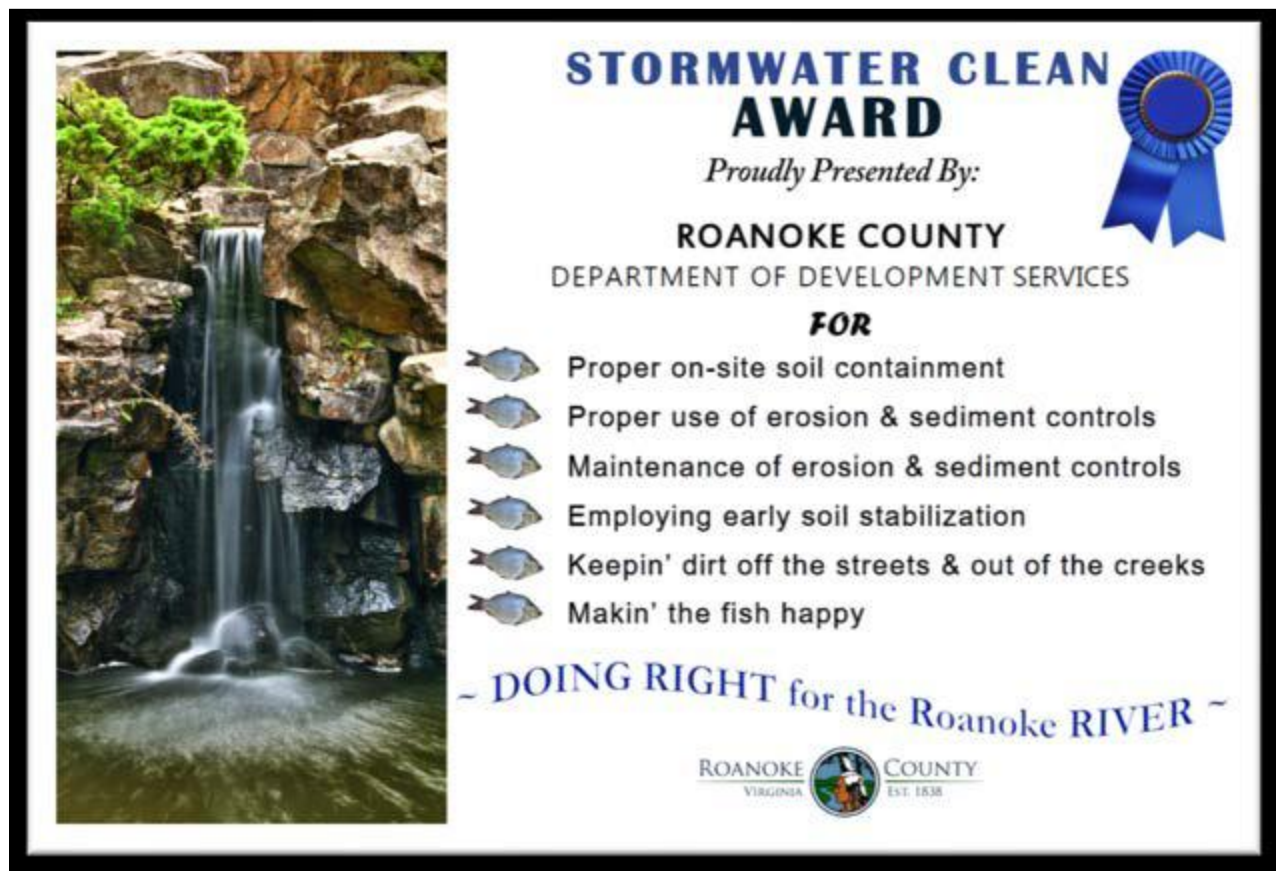
The BMPs outlined in **BMP S-3** and the County's SOPs for Pollution Prevention and Good Housekeeping have been revised, where appropriate, to include messages from the Sediment TMDL Action Plan.

BMP S-5: Contractor Appreciation Program

The overarching goal of this BMP is to reduce discharge of sediment from construction sites.

Roanoke County implemented the Contractor Appreciation Program to recognize those contractors that are proactive in implementing erosion and sediment controls and employing stormwater management measures to “keep their dirt on their project.”

The County believes that this program is very effective in raising awareness among contractors to ‘do the right thing’ by keeping their dirt on their projects and out of the local receiving waters. It gives staff an opportunity to work with the Contractors in a positive way and provides the recipient contractors with positive and free publicity for their projects. By praising those that do it well, the County hopes to encourage other contractors to strive to do the same.



OTHER BMPs

Roanoke County recognizes that addressing water quality and quantity in post-construction stormwater runoff is an important way to control excessive stream bank erosion and to prevent the deposition of sediment and other pollutants into its streams and rivers. As outlined in the County's MS4 Program Plan, the following BMPs in **MCM-5: Post-Construction Stormwater Management for New Development and Development on Prior-Developed Lands** help to address these concerns:

BMP 5-1: Stormwater Management Legal Authorities - Roanoke County utilizes certain legal authorities to comply with Virginia's Erosion and Stormwater Management Program (VESMP) Regulations.

BMP 5-2: Inspections for Post-Construction Stormwater Management Facilities - Roanoke County maintains and implements written inspection and maintenance procedures for post-construction stormwater management facilities (SWMFs) that discharge to the MS4 (both public and private) to ensure their adequate long-term operation and maintenance pursuant to the VESMP requirements.

BMP 5-3: Stormwater Management Facility Tracking - Roanoke County maintains and implements an electronic database or spreadsheet of all known County-owned and privately-owned stormwater management facilities that discharge into the MS4.

BMP 5-4: Strategies to Encourage Long-Term Maintenance of Stormwater Control Measures on Single Family Residential Lots - Roanoke County implements strategies to promote the long-term maintenance of stormwater control measures that are designed to treat stormwater runoff solely from the individual single family residential lot. These strategies are used in lieu of recorded maintenance agreements and post-construction inspections by the County.

BMP 5-5: Storm Sewer System Maintenance - Roanoke County implements a program to maintain and repair its storm sewer system within its MS4 program area. Such maintenance helps to keep the system working as designed, which minimizes the risk of surcharging and overflows; it also helps to minimize street flooding associated with clogged inlet structures and conveyances.

While these BMPs have been created to address the MS4 Permit requirements, they are also effective in helping the County achieve its TMDL goals for sediment: reducing excessive stream bank erosion and preventing the deposition of sediment and other pollutants into local streams and rivers.

IV. ANNUAL REPORTING REQUIREMENTS

The MS4 Annual Report will include a summary of actions conducted to implement this Sediment TMDL Action Plan during the reporting period of July 1st - June 30th for each year of the permit term. In accordance with the MS4 Permit, the report is submitted to DEQ by October 1st of each year.

V. EVALUATION OF THE TMDL ACTION PLAN

The *Total Maximum Daily Load (TMDL) Action Plan for Benthic Reduction (Sediment) in the Roanoke River* was originally completed in July 2015 and submitted to DEQ with the corresponding MS4 Annual Report. It was last updated in September 2022.

To satisfy the requirements of Section II.B.2.a.(1) of the current MS4 Permit, the County hereby provides “an evaluation of the results achieved by the previous action plan” named above.

The County chose to reduce sediment loads by implementing the following three permit strategies:

1. One or more BMPs approved by the Chesapeake Bay Program (Permit Section II.B.6.a.(2))

- **BMP S-2: Roanoke County MS4 BMP Capital Improvement Program.**

As described in Part III of this report, the County has been addressing the reduction of sediment loads through the construction of stream restoration projects as part of its Capital Improvement Program. **This program has proven to be quite effective, as evidenced by the following: Since 2016, an estimated 12,829 tons of sediment have been kept out of local streams by implementing the following four projects:**

Year Completed	Stream Name	Project Location	~Tons of Sediment per Year Kept out of Stream by Project*	~Total Cumulative Tons of Sediment Kept Out of Stream by Year 2025
2016	Glade Creek	Vinyard Park Phase I	831	7,479
2016	Murray Run	Pebble Creek Apartments	226.3	2,037
2019	Glade Creek	Vinyard Park Phase II	378.2	2,269
2021	Wolf Creek	Goode Park	348	1,044
TOTAL			1,784	12,829

**Values determined based on field studies using a state approved methodology. These calculations were submitted and reviewed by the Virginia Department of Environmental Quality as a part of each project's SLAF grant application.*

2. Land disturbance thresholds lower than Virginia's regulatory requirements for erosion and sediment control and post development stormwater management. (Permit Section II.B.6.a.(3))

- **BMP S-1: Lower Threshold of Compliance: Erosion & Sediment Control Program**

As described in Part III of this report, the County regulates land-disturbing activities of 2,500 square feet or more, which is less than the state's threshold of 10,000 square feet or more. This lower threshold has been implemented due to the County's steep terrain and highly erodible clay soils. Roanoke County's lower threshold for compliance is effective in that it keeps about **184 tons/year** of sediment out of local waterways (12 tons/acre/year * 85% * 18 acre = 184 tons/year).

3. An outreach strategy to enhance the public's education (including employees) on methods to eliminate and reduce discharges of the pollutant. (Permit Section II.B.4.g.)
- The County's Public Education and Outreach efforts and its Employee Training Program have emphasized sediment as one of the County's primary pollutants of concern. The County specifically implements two Best Management Practices (BMPs) to enhance the public's education and employee's education on methods to eliminate and reduce discharges of sediment:
 - **BMP S-3: Enhanced Public Outreach (Sediment)** - The County developed a host of publications with a variety of sediment reduction methods aimed at various target audiences. (See Figure 2, page 11.) These materials are directly mailed on an annual basis and reach 100% of the target audiences. They include but are not limited to the following:
 - ["It's Just Dirt" newsletter](#) and [brochure](#) describe the harm to receiving waters from excess sediment from construction sites, explains permit requirements, and provides techniques to "keep the dirt on the project."
 - ["Stormwater Guide for Homeowners"](#) provides messages about reducing erosion and sedimentation, minimizing PCBs, reducing stormwater pollution at home, refraining from feeding wildlife, creating stream buffers, and more.
 - [Landscaping Fact Sheet](#) reminds landscapers that grass/shrub clippings, leaves, sediment, fertilizers, etc. cause pollution to receiving waters; encourages the use of BMPs to minimize lawn debris, reuse stormwater, install erosion controls, and employ alternative lawn care practices.

The County finds these materials to be effective, and it often gets positive feedback from citizens or businesses who have received them.

- **BMP S-4: Enhanced Employee Training (Sediment)** - As outlined on page 12, the County revised its various training materials, such as SWPPP training and SOPs for Pollution Prevention and Good Housekeeping, to educate employees on ways to eliminate and reduce discharges of sediment. These materials are effective in increasing awareness and knowledge among staff.
- **BMP S-5: Contractor Appreciation Program** - Roanoke County recognizes those contractors that are proactive in implementing erosion and sediment controls and employing stormwater management measures to "keep their dirt on their project." This program is very effective in raising awareness among contractors to 'do the right thing' by keeping their dirt on their projects and out

of the local receiving waters. It gives staff an opportunity to work with the Contractors in a positive way and provides the recipient contractors with positive and free publicity for their projects. By praising those that do it well, the County hopes to encourage other contractors to strive to do the same.

Conclusion

Overall, the County finds the selected strategies to be effective for conducting the necessary education and training and in achieving actual reductions in sediment loads to its local waterways.

As noted on page 7, the TMDL study performed and approved by U.S. EPA and the Virginia State Water Control Board in 2006 determined that the Roanoke River has a “moderately impaired benthic community from the confluence with Mason Creek to the backwater from Niagara Dam.” As a result of this study, Roanoke County was assigned a Waste Load Allocation (WLA) of 1,680 tons of sediment/year.

In reviewing the sediment amounts withheld from strategies 1 and 2 above, the County keeps 1,968 tons of sediment/year (1,784 tons/year + 184 tons/year) out of its local streams that feed the Roanoke River. This demonstrates good progress toward achieving the WLA. While there is no quantitative measure for the outreach strategy described above in item #3, it serves to educate employees and citizens on methods to further eliminate and reduce discharges of sediment to the area waterways.