



COUNTY of ROANOKE VIRGINIA

Municipal Separate Storm Sewer System (MS4) Annual Report

Permit Year Three: July 1, 2015 – June 30, 2016

Submitted:
October 1, 2016
Revised December, 2016

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Submitted to the Virginia Department of Environmental Quality
Pursuant to General Permit No. VAR040022



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Roanoke Valley Resource Authority

Western Virginia Water Authority

Virginia Save Our Streams Foundation

Roanoke Valley Television Station

Virginia Department of Transportation

Certification Statement and Requirements

As required by 9VAC25-870-370 B, all reports required by state permits, and other information requested by the board shall be signed by a responsible official or by a duly authorized representative of that person. A responsible official is:

1. *For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy-making or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for state permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;*
2. *For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or*
3. *For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.*

Duly Authorized Representatives

A person is a duly authorized representative only if:


1. *The authorization is made in writing by a person described above;*
2. *The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or any individual occupying a named position; and*
3. *The written authorization is submitted to the department.*

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Responsible Official Signature



Date

VAR040022

Permit Number

County of Roanoke

MS4 Name

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Executive Summary

According to the United States Environmental Protection Agency (US EPA), polluted stormwater runoff is a leading cause of impairment to nearly 40 percent of surveyed U.S. water bodies that do not meet water quality standards. Whether travelling by overland flow or through stormwater conveyance systems, polluted stormwater runoff is discharged into local receiving waterways. Such untreated water pollution can result in the destruction of fish, wildlife, and aquatic life habitats; it can also cause a loss of aesthetic value and can threaten public health due to its potential to contaminate food, drinking water supplies, and recreational waterways.

The County of Roanoke is committed to continuing in the development, implementation, and enforcement of a Municipal Separate Storm Sewer System (MS4) Program that is designed to reduce the discharge of pollutants from the regulated MS4 area in compliance with its permit.

The County of Roanoke developed and implemented a comprehensive plan to meet the conditions of the MS4 permit. The plan is outlined in six Minimum Control Measures (MCMs), as follows: (1) Public Education and Outreach on Stormwater Impacts, (2) Public Involvement and Participation, (3) Illicit Discharge Detection and Elimination, (4) Construction Site Stormwater Runoff Control, (5) Post-Construction Stormwater Management in New Development and Redevelopment, and (6) Pollution Prevention and Good Housekeeping for Municipal Operations. Within each MCM, there are numerous Best Management Practices (BMPs) being implemented by the County of Roanoke. In addition, in accordance with permit requirements, the County of Roanoke has developed three Action Plans to identify County actions to decrease discharges of sediment, E. coli (bacteria), and PCBs. This report is the third annual report for the County's reissued MS4 permit, having an effective date of July 1, 2013 and an expiration date of June 30, 2018.

Strong regional cooperation has been pursued in two of the MCM areas: MCM 1 - Public Education and Outreach on Stormwater Impacts, and MCM 2 - Public Involvement and Participation. The County intends to continue to participate in regional efforts to educate the public in coordination with the City of Roanoke, the Town of Vinton, the Virginia Department of Transportation, and other regional organizations such as the Roanoke Valley-Alleghany Regional Commission (RVARC), the Upper Roanoke River Roundtable (URRR), and the Clean Valley Council (CVC). In fact, pursuant to a contract agreement with the CVC, the County actually relies on work performed by the CVC to satisfy some of the County's permit obligations in the aforementioned MCM areas. Regional cooperation and discussion will not only be economically sound, but also instrumental in delivering a consistent message to and continual education of the citizens of not only Roanoke County but also of the entire Roanoke Valley region.

The Minimum Control Measures and associated BMPs used by the County for this reporting period (July 1, 2015 - June 30, 2016) are described in the remaining sections of this report. Changes to the MS4 Program due to improvements to the program or due to MS4 General Permit requirements are documented in the MS4 Program Plan, last revised and submitted on March 23, 2015. Both of these documents are posted on the County's website at: <http://www.roanokecountyva.gov/index.aspx?NID=331>.

SECTION I

Minimum Control Measures (MCMs) for Stormwater Quality



MCM 1: Public Education and Outreach on Stormwater Impacts

This minimum control measure is intended to implement a public education program, which includes the distribution of educational materials to the community and various outreach activities designed to inform citizens about the impacts of polluted stormwater discharges on water bodies. These measures outline the steps that the public can take to reduce pollutants in stormwater runoff. The BMPs developed by the County to meet these educational and outreach goals are listed below:

BMP 1-1: Educational Programs Review

Update and distribute a comprehensive review of existing stormwater educational programs available to Roanoke County and the Roanoke Valley area.

BMP 1-2: Roanoke County Stormwater Informational Mailer

Develop and distribute a Roanoke County Stormwater Informational Mailer to County residents.

BMP 1-3: Stream Monitoring and Education

Provide stream monitoring and informational stream seminars for County residents.

BMP 1-4: Stormwater Education Program

Develop and maintain a stormwater quality education program for County school-age children.

BMP 1-5: Stormwater Public Awareness Program

Develop a Stormwater Public Awareness Program that includes the distribution of stormwater merchandise, public service announcements, and other educational media.

BMP 1-6: Roanoke County Stormwater Webpage

Maintain and expand a Roanoke County Stormwater webpage that informs the public about water quality, community-based outreach, and local projects.

BMP 1-7: Targeted Education Program

Develop and maintain a stormwater quality education program for specific targeted audiences within the County.

This report provides a detailed description of the objectives and measurable goals of each BMP, the strategies to ensure consistency with local Total Maximum Daily Loads (TMDLs), the status of the County's compliance with each BMP, and an evaluation of the BMP and any proposed modifications needed to better achieve the goals of the program. The TMDL compliance is broken down by impairment type, i.e., bacteria (*E. coli* (EC), sediment (SED), or PCBs.

BMP 1-1: Educational Programs Review

Goal:

The goal of this BMP is to update and distribute a list of current publications, education programs, websites, videos, maps, and training opportunities that directly address stormwater issues such as stormwater management, stormwater quality, floodplain management, pollution prevention, conservation practices, and riparian habitat protection. The target audiences and messages shall be coordinated with BMP 1-5.

Measurable Goals:

Roanoke County has created and maintained this educational programs review in the form of a stormwater programs database. The database documents educational programs, brochures, pamphlets, videos, maps, and training opportunities related to stormwater quality, stormwater management, floodplain management, pollution prevention, conservation practices and riparian habitat. The database is accessible through Roanoke County's website, at <http://www.roanokecountyva.gov/DocumentCenter/Home/View/226>.

A list of all of the stormwater-related pages that were tracked for access may be found on the attached compact disk under folder titled **BMP 1-1**.

In addition to the efforts specifically conducted by the County, Roanoke County also partners with the Clean Valley Council (CVC) to assist with this BMP. CVC maintains and updates a collection of handouts and web resources, as shown in Table 1-1. These materials are available to all citizens across the region, and handout materials are distributed at various events, as described in later sections of this report.

Table 1-1. CVC Handouts and Web Resources



Quarterly Report for Stormwater Programs (Roanoke City, Roanoke County, Town of Vinton)

FY 2015-2016 REPORTING QUARTER

<input checked="" type="checkbox"/>	1) October
<input checked="" type="checkbox"/>	2) January
<input checked="" type="checkbox"/>	3) April
<input checked="" type="checkbox"/>	4) July

MCM 1: Public Education and Outreach on Stormwater Impacts Stormwater Educational Publications and Programs

Title of Resource:	Date Added/Updated	Comment
Available Materials: FY 2014-2015		
Video: The Poop Fairy	2015	<u>Tips for managing pet waste</u>
Handout: How to manage Stormwater: Rain Barrels (www.cleanriverspdx.org, Portland, OR)	2015	<u>How to manual: How to build a rainbarrel</u>
Brochure: It's Just Dirt (Roanoke County Community Development)	2015	<u>Construction site erosion control and permitting</u>
Brochure: Clean and Green (DCR & VCE)	2015	<u>Handout on garden and backyard practices for reducing SW runoff pollution</u>
Map: Roanoke Valley Pet Waste Stations	2014	<u>Map of all pet waste stations in the Roanoke Valley</u>
Brochure: Roanoke Stormwater IdeaBook (City of Roanoke, 2014)	2014	<u>A stormwater guide for homeowners</u>
Brochure: Stormwater Utility Fee Credit Manual (City of Roanoke, 2014)	2014	<u>Stormwater BMP's, fees and credits</u>
http://www.cleanvalley.org/storm-water	2014	<u>Web resources targeted at residents: includes general BMP's, rain gardens, rain barrels</u>
http://www.cleanvalley.org/stormwater-businesses	2014	<u>Web resources targeted at businesses: subsections on carwash, restaurant, autoshops</u>
Handout: Cigarette Butts and the Environment (CVC)	2014	<u>Handout on impacts of cigarette butts in the environment</u>
Postcard: Only Rain Down the Drain - Car Wash (CVC)	2014	<u>5 keys for protecting SW when car washing</u>
Postcard: Only Rain Down the Drain - Restaurants (CVC)	2014	<u>5 keys for protecting SW at restaurants</u>
Brochure: Native Plants for Conservation, Restoration and Landscaping (DCR publication)	2013	<u>Gardening Information for reducing SW impacts and improving water quality</u>
Brochure: A Virginian's Guide to Year-Round Yard Care (DCR/Chesapeake Bay Program)	2013	<u>Gardening Information for reducing SW impacts and improving water quality</u>
Brochure: Stormwater Best Management Practices for Restaurants (County of Roanoke and Vinton)	2013	<u>Restaurant BMP's</u>
Teaching Manual: Project Wet: Curriculum and Activity Guide 2.0	2013	<u>Teaching Curriculum for water related programs, includes SW programs and activities</u>
Brochure: Pick it Up...It's your "Doodie" (Town of Vinton and County of Roanoke)	2013	<u>Pet Waste solutions for SW BMP's and water quality</u>
Postcard: Keep it Clean, Clear and Safe (CVC)	2012	<u>5 Tips for not polluting stormwater</u>
Brochure - Rain Gardens: A Landscape Tool to Improve Water Quality (VDOF Publication)	2012	<u>Gardening Information for reducing SW impacts and improving water quality</u>
Book: Best Management Practices: Integrated Pest Management by P. Eric Wiseman	2012	<u>Gardening Information for reducing SW impacts and improving water quality</u>
Brochure: Non-Point Source Pollution and You (DCR publication)	2012	<u>Non-point source pollution information</u>
Brochure: After the Storm: A Citizens Guide to Understanding Stormwater	2012	<u>Citizen information various BMPs for reducing SW impacts and improving water quality</u>
Video: After the Storm	2012	<u>Dan Rather video on stormwater pollution problems</u>
Book: Clean and Green: The complete Guide to Nontoxic and Environmentally Safe Housekeeping	2012	<u>Household information for reducing SW impacts and improving water quality</u>
Card: Important Water Quality Measurements (VA Naturally)	2011	<u>Macroinvertebrate and water quality measure guide the environment that covers plastic waste as litter in rivers/oceans and harm to wildlife</u>
Documentary: Bag It!	2011	<u>Tips for stormwater pollution prevention and recipes for non-toxic cleaners</u>
Bookmark: 10 Things You Can Do To Prevent Storm Runoff Pollution	2010	

TMDL Consistency:

Many of the sources available on the County's stormwater webpage provide educational material concerning the damage that livestock and pet waste can do to area waterways. For example, links are provided to the National Agriculture Library where information can be gathered regarding the research of impacts of agriculture on water quality. (EC)

Many of the sources available on this webpage also provide educational material concerning the damage that sediment can do to local waterways. For example, links are provided to websites that educate citizens on how water can be protected from non-point source pollution. Best management practices are described in non-technical terminology for any age to understand. (SED)

Evaluation and Modification:

The number of times that the database has been viewed illustrates whether the website is an effective format to distribute the information concerning educational programs. With site visits and page views as shown below, it appears that BMP is successful.

Year	Viewing Statistics
2013 – 2014 (YEAR 1)	716 (Stormwater webpage)
2014 - 2015 (YEAR 2)	110 visits; 147 page views
2015 – 2016 (YEAR 3)	716 visits; 1217 page views

BMP 1-2: Roanoke County Stormwater Informational Mailer

Goal:

The goal of this BMP is to create a stormwater informational mailer on an annual basis, which will educate residents of the County of Roanoke and beyond about local stormwater issues. The mailer will be designed as a regional document and may include information on the County's Stormwater Program, general stormwater quality education, updates on local impaired water bodies, and TMDLs. The mailer will be based on the unique issues and concerns for the Roanoke River Watershed.

Measurable Goals:

For Year 3 of the reissued permit, the County developed an informative stormwater newsletter that was mailed to every residence, some 32,493 addresses. In addition, the County circulated the newsletter and other stormwater educational articles by way of its electronic newsletter, produced and distributed by the Department of Community Development, and this monthly e-newsletter is emailed to 980 people, including staff and residents. Also, 208 people "like" the Roanoke County Planning Services page on Facebook and may see the posts. In addition to the above, 50 copies of the stormwater newsletter were provided to each of the County's six libraries and several hundred were provided to the Town of Vinton and to the Clean Valley Council for use at public events.

Copies of the stormwater newsletter and the electronic Community Development newsletters may be found on the attached compact disk, in folder entitled **BMP 1-2**. The newsletter is also available on the County's website, which can be accessed here: [Homeowners Stormwater Guide](#).

TMDL Consistency:

Such informative mailers help to address two of the TMDL pollutants in the Roanoke River and its tributaries: sediment and bacteria.

Evaluation and Modification:

In past permit years, the County published a stormwater page in a mailer periodically written and mailed by the Department of Parks, Recreation, and Tourism; however, the document's focus was on recreational activities. By developing a stand-alone newsletter that is exclusively focused on stormwater, the County believes that the message is better delivered to its citizens. The County will continue to review this BMP for possible expansion, but its goal remains the same: to perform effective stormwater-related public outreach to its citizens.



Year	Distribution Statistics
2013 - 2014 (YEAR 1)	-
2014 - 2015 (YEAR 2)	32,599 stormwater newsletters; 868 e-newsletters
2015 - 2016 (YEAR 3)	32,493 stormwater newsletters mailed to residences; 980 e-newsletters; 300 newsletters delivered to County libraries; several hundred copies each to Town of Vinton and to Clean Valley Council.

BMP 1-3: Stream Monitoring and Education

Goal:

In cooperation with the Clean Valley Council, stream schools, which may include outdoor stream monitoring and indoor informational stream seminars, are provided for Roanoke County residents. The goal of this BMP is to educate citizens on the field procedures that have been established to determine water quality, in addition to motivating citizens to monitor waterways in their neighborhood; this BMP also helps to enhance grassroots cooperation to promote the importance of stream monitoring within the County. These seminars/monitoring sessions provide



some field exposure to aquatic habitats, update citizens on local, state, and federal water quality regulations, and keep citizens updated on local stream health.

Measurable Goals:

During this annual period, on behalf of Roanoke County, the Clean Valley Council provided **26** stream schools targeting both adults and school-age children between 6th and 10th grade. Similar events were conducted across the region, including the City of Roanoke and Town of Vinton. Total attendance at the events held in the County was **723**, serving **705** youths and **18** adults. Supporting files can be found on the attached compact disk under the folder titled **BMP 1-3**.

TMDL Consistency:

This activity allows citizens to have an understanding of the many factors that can affect the life in a stream. The effects of pet waste, stream bank erosion, and agricultural runoff are discussed during the monitoring sessions as being likely contributors to degraded water quality in local receiving streams. (EC & SED)

Evaluation and Modification:

The number of seminars, monitoring events, and participating citizens show that this Stream Monitoring and Education BMP is an effective method to educate citizens and enhance the grass-roots monitoring effort throughout the County. The County's goal is to continue to provide stream seminars and monitoring sessions, as a means to educate citizens and encourage their cooperation in regional water quality health.

Year	# of Stream Schools (CVC)	Attendance
2013 - 2014 (YEAR 1)	2- Indoor Seminars 11 – Stream Monitoring Sessions	907
2014 - 2015 (YEAR 2)	30 – Stream Monitoring Sessions	536 youths 15 adults
2015 – 2016 (YEAR 3)	26 - Stream School Seminars	705 youths 18 adults

BMP 1-4: Stormwater Education Program

Goal:

Roanoke County has developed a stormwater education program for Roanoke County school-age children. Educators provide programs addressing stormwater and related water quality problems, with a particular focus on the County's three high-priority water quality issues: excess bacteria, sediments, and nutrients. Different programs target appropriate grade levels and are SOL appropriate.

Measurable Goals:

For this annual period, Roanoke County, in conjunction with Clean Valley Council, continued to provide stormwater education to school-age children. The following education programs were held in public and private schools across the Roanoke Valley region (Roanoke County, Roanoke City, and Town of Vinton). A total of **337** presentations were made across these three localities, **116** of which were held for Roanoke County schools alone and **15** others that were held for private schools/groups across the region. Together, these various programs reached **7,257** students between pre-kindergarten through the 12th grade:



1. All About Natural Resources
2. Animas River presentations
3. Bag It
4. Drains to Rivers
5. Environmental Science
6. Green Game
7. Groundwater
8. Indoor Stream School
9. Land Use
10. Lorax
11. Oceans of Trash
12. Oceans of Trash Chemistry of Plastics Drains to Rivers
13. Reeling in Runoff
14. Soil: Who Needs It?
15. Stormwater and Rain Barrel Workshop
16. Think Earth
17. Traveling Trash
18. Water Game
19. Watersheds to Oceans
20. Who Polluted the River?

The Stormwater Education Program descriptions and program statistics for each educational event can be found on the attached compact disk under the folder titled **BMP 1-4**.

TMDL Consistency:

Several of the educational programs that are presented to Roanoke County Schools target sources of bacteria, such as "Reeling in Runoff" (EC). Several of these school programs also target potential sources of sediment, such as "Why Watersheds?" "Drains to Rivers," and "Soil: Who Needs It?" (SED)

Evaluation and Modification:

The number of school programs and participating students indicates that the stormwater educational programs are an effective method to address stormwater and related water quality issues in the school system. The County will continue to provide these programs and to target appropriate grade levels with SOL-applicable material. The specific educational programs will be routinely evaluated and new programs may be incorporated, as needed, into the group of programs to address new issues that impact the community.

Year	Programs Given	Students Reached
2013 - 2014 (YEAR 1)	135 (County + Private Schools)	3,410
2014 - 2015 (YEAR 2)	121 (County + Private Schools)	2,436
2015 - 2016 (YEAR 3)	131 (County + Private Schools/Groups)	2,991

BMP 1-5: Stormwater Public Awareness Program

Goal:

Roanoke County maintains a Stormwater Public Awareness Program that targets three high-priority water quality issues that contribute to the degradation of stormwater runoff and receiving waters: excess bacteria, sediments, and nutrients. Sediment and bacteria were selected because the County has been assigned a Total Maximum Daily Load (TMDL) for them by the Department of Environmental Quality. Nutrients (phosphorus and nitrogen, in particular) were chosen because they have such negative impacts on receiving waters when in large quantities. The County develops relevant messages associated with its outreach efforts for this BMP and uses a variety of means and methods, including partnering with the Clean Valley Council, to distribute information and messages, public service announcements, printed materials (i.e., brochures and newsletters), radio and TV advertisements, use of websites and social media, and through giveaways of stormwater-related merchandise.

Measurable Goals:

In this annual period, Roanoke County, through the Clean Valley Council (CVC), distributed the following items:

- Ashtrays
- Chip Clips
- Crayons
- Funnels
- Lanyards
- Litter Bags
- Magnets
- Pencils
- Rain Gauges
- Rulers
- Stickers
- Tattoos

These materials all have some sort of stormwater pollution prevention message promoting the importance of water quality to the citizens of Roanoke County and beyond.



In total, the CVC gave out **1,975** pieces of merchandise to citizens in Roanoke County and beyond. The types and amounts of merchandise provided by the CVC can be found on the attached compact disk under the folder titled **BMP 1-5**.

The County participated in several activities on its own to raise awareness about stormwater management issues, as follows:

- The County Engineer (through the Community Development Department) gave a presentation to the Trout Unlimited organization about the County's current water quality

programs and it's Glade Creek Stream Restoration Project. There were 20 people in attendance. The slide show presentation used for this event can be found on the attached compact disk under the folder titled **BMP 1-5**.

- The County participated in a Riparian Buffer Planting day at Garst Mill Park with volunteers from the Roanoke Valley Master Naturalists, James Madison University, Hidden Valley High School's DECA program, Environmental and Key Club Master Naturalists, and other high school and college students in the area. Additional photos and a summary of the event can be found on the attached compact disk under the folder titled **BMP 1-5**.



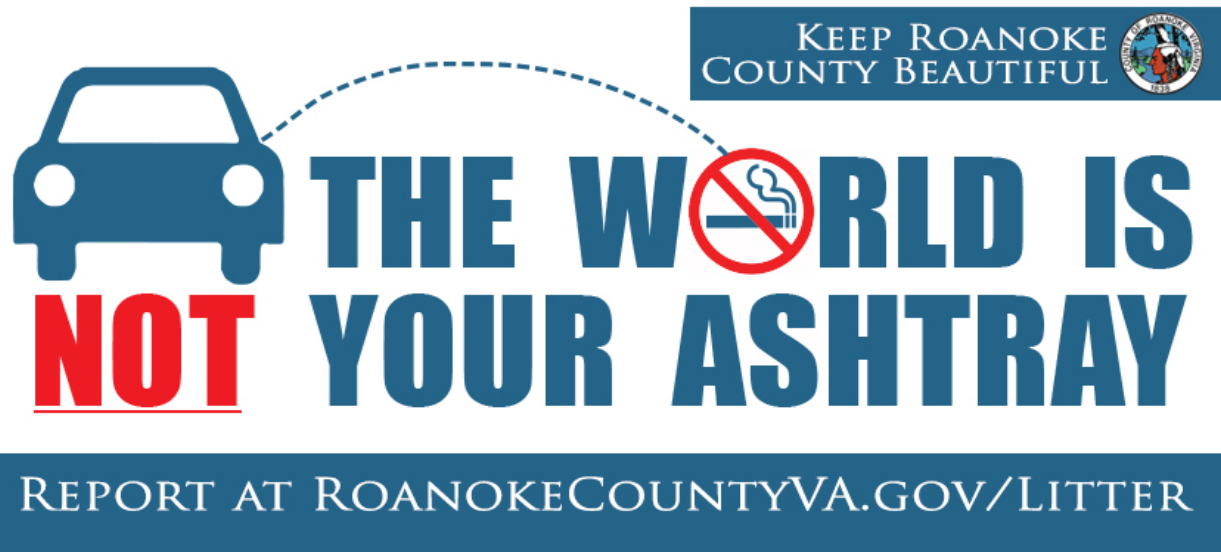
Mudlick Creek riparian zone (looking downstream) after planting on 3-12-16



County Park staff installed signs along the stream bank after planting

Roanoke County, in conjunction with RVT3, developed a new Public Service Announcement (PSA) entitled "Granny Says" to share information with the public as part of its stormwater public awareness/education program. This PSA primarily focuses on illicit discharges, encouraging folks to "do the right things," such as not littering, picking up after pets, bagging leaves and grass clippings, and pouring nothing down the storm drain. As with the County's earlier PSAs, the overarching goal was to address the three high priority water quality issues: bacteria, nutrients, and sediments. A copy of this PSA may be found on the attached compact disk under the folder titled **BMP 1-5**. All of the County's PSAs are also posted on several websites, including but not limited to the CVC, Roanoke County, and RVT3.

The County continues to run its anti-littering ad campaign: *The World is Not Your Ashtray*. All County vehicles sport bumper stickers with this slogan, a banner of same stands in front of the County's Administration Center on Bernard Drive, permanent signs with the message have been placed at several prominent intersections, and the homepage of the County's website provides an opportunity for citizens to report littering. If the vehicle listed in the online complaint form can be confirmed, Roanoke County Police Department sends a notice to the vehicle's owner that the offense was witnessed and requests their compliance with Roanoke County's litter ordinance in the future. Only verified complaints are processed. For access to this form, see: <http://www.roanokecountyva.gov/FormCenter/Police-6/Report-Littering-44>.



As noted in previous reports, the County purchased a set of video programs that were designed for educating the general public on Illicit Discharge Detection and Elimination (IDDE) to the storm drainage system; such discharges include the selected three high-priority water quality issues: excess bacteria, sediment, and nutrients. The kit includes five videos of varying run times, which are designed to be used in specific medium/media or to reach a specific audience. The County tracks the size of audiences exposed to the various videos, as reported in **BMP 1-6**. Along with the aforementioned PSAs, the videos are posted on the County's website at the following location: <http://www.roanokecountyva.gov/index.aspx?NID=1598>; they are also posted on its Facebook page. As shown in **BMP 1-6**, there were 115 visits to the online videos and 180 page views.

TMDL Consistency:

Roanoke County and its educational partners, such as CVC, give out thousands of pieces of merchandise that have reminder slogans on them to encourage citizen awareness about day-to-day activities, such as not littering, picking up after pets, and filling in bare spots in home lawns to prevent erosion. Public service announcements, television interviews, and newspaper articles also provide additional means for the County of Roanoke to bring stormwater quality issues to the attention of its citizens. (EC & SED)

Two of the three high priority water quality issues selected for this BMP's focus, i.e., bacteria and sediment, (see next section) were chosen because the County had TMDLs for these pollutants. (EC & SED)

Evaluation and Modification:

Roanoke County continues to successfully distribute a variety of educational materials to bring stormwater quality issues to the attention of the public through merchandise and informational sessions. The County finds this BMP to be effective and intends to continue to distribute stormwater merchandise and information through a variety of means, such as handouts and television/radio announcements, in an effort to continue meeting the goals of its MS4 permit.

This BMP focuses on the County's three high-priority water quality issues that contribute to the discharge [and degradation] of stormwater. The three selected water quality issues are excess bacteria, sediments, and nutrients. Sediment and bacteria were selected because the County has been assigned a Total Maximum Daily Load (TMDL) for them. Nutrients (phosphorus and nitrogen, in particular) were selected as the third water quality issue on which to focus, because they have such negative impacts on receiving waters when in large quantities. The County has developed relevant messages and outreach materials that target these issues and the audiences likely to have the most impact on minimizing them. The BMP will focus on (1) ways to increase the target audience's knowledge about ways to prevent these pollutants from getting into stormwater runoff and (2) the hazards and legal implications of illegal discharges and improper disposal of wastes. The MS4 Program Plan, revised July 1, 2014 contains more information on the development of the 3 high-priority water quality issues, target audiences, and messages.

Year	Materials Distributed	Media Sources Used
2013 - 2014 (YEAR 1)	4,719 (across entire Roanoke Valley region)	<ul style="list-style-type: none"> • 3 Radio Segments on 2 stations (CVC) • 8 TV Segments on 3 stations (CVC) • 2 Newspaper Articles (1 newspaper) (CVC) • 2 Public Service Announcements (RoCo)
2014 – 2015 (YEAR 2)	4,014 (across entire Roanoke Valley region)	<ul style="list-style-type: none"> • 5 Public Service Announcements (RVTv3) • 120 visits to the online videos and 186 page views • 2 Newspaper Articles (CVC) • 2 Newspaper Articles (1 newspaper) (CVC)
2015 – 2016 (YEAR 3)	1,975	<ul style="list-style-type: none"> • 115 visits to the online videos; 180 page views • 112 visits to online SW Public Education documents; 243 page views • 1 Presentation • 1 Riparian Buffer Planting event • 1 Public Service Announcement (RoCo)

CVC = Clean Valley Council; RoCo = Roanoke County

BMP 1-6: Roanoke County Stormwater Webpage

Goal:

Roanoke County maintains and monitors the Roanoke County Stormwater webpage, which enables citizens to obtain information concerning the County's Stormwater Management Program, ordinances, design guidelines, general information, contact information, stormwater pollution prevention information, educational programs, and links to other organizations and sites. The website also helps to inform citizens about on-going community-based projects, such as storm drain stenciling, Save Our Streams and other similar stream monitoring programs, and other related educational programs.

Measurable Goals:

This website is devoted to stormwater management, water quality, floodplain management, and local water quality issues and information. The website continues to inform citizens about current issues within the Roanoke Valley region, and it provides phone, e-mail, and website contact information for the County's stormwater staff in the event that citizens require additional information.



For this reporting year, there were a total of **4,077 visits**, with **5,748 page** views to the stormwater website between July 1, 2015 and June 30, 2016. The number of visitors to each webpage for this third year of the reissued permit is shown below and is also on the attached compact disk (CD) under the folder titled **BMP 1-6**.

Roanoke County Stormwater Webpage Statistics			
Visits/Pageviews			
Period: 7/1/2015-6/30/2016			
Page Name	Visits	Pageviews	%
Roanoke County, VA - Official Website - Stormwater Documents & Ordinances	716	1217	21%
Roanoke County, VA - Official Website - Flooding in Roanoke County	712	842	15%
Roanoke County, VA - Official Website - Stormwater Management	698	1021	18%
Roanoke County, VA - Official Website - Floodplain Management	450	669	12%
Roanoke County, VA - Official Website - NPS Pollution	378	467	8%
Roanoke County, VA - Official Website - Flood Warning System	156	192	3%
Roanoke County, VA - Official Website - Stream Impairments & TMDLs	150	181	3%
Roanoke County, VA - Official Website - Roanoke County Watersheds	145	169	3%
Roanoke County, VA - Official Website - Local Projects	124	136	2%
Roanoke County, VA - Official Website - Stormwater Public Education Videos	115	180	3%
Roanoke County, VA - Official Website - Stormwater Public Education Documents	112	243	4%
Roanoke County, VA - Official Website - Flood Insurance	105	128	2%
Roanoke County, VA - Official Website - Stormwater Advisory Committee	80	116	2%
Roanoke County, VA - Official Website - Stormwater Management Public Education	79	117	2%
Roanoke County, VA - Official Website - Stormwater Resources	57	70	1%
Total	4077	5748	100%

TMDL Consistency:

The County's stormwater website highlights a page discussing "Non-point Source Pollution (NPS)." This page illustrates how agriculture and straight pipes can contribute to the overall stormwater pollution problem (EC). This page also illustrates how a citizen can prevent non-point source pollution on or from their property by planting a riparian buffer along an adjacent creek (SED).

In addition , the site highlights Illicit Discharge Detection and Elimination (IDDE) through the use of various public service messages from the County's' new IDDE Public Outreach video kit. The associated messages directly tie to the TMDLs. (EC & SED)

Evaluation and Modification:

The County finds this BMP to be effective, as evidenced by the number of visits to the website.

Year	Webpage Views	Most Popular (MP) and Least Popular Page (LP)
2013 - 2014 (YEAR 1)	5,692	MP: Stormwater Management page LP: Flood Insurance page
2014 - 2015 (YEAR 2)	5,883	MP: Stormwater Management page LP: Flood Warning System page
2015 - 2016 (YEAR 3)	5,748	MP: Stormwater Documents & Ordinances page LP: Stormwater Resources page

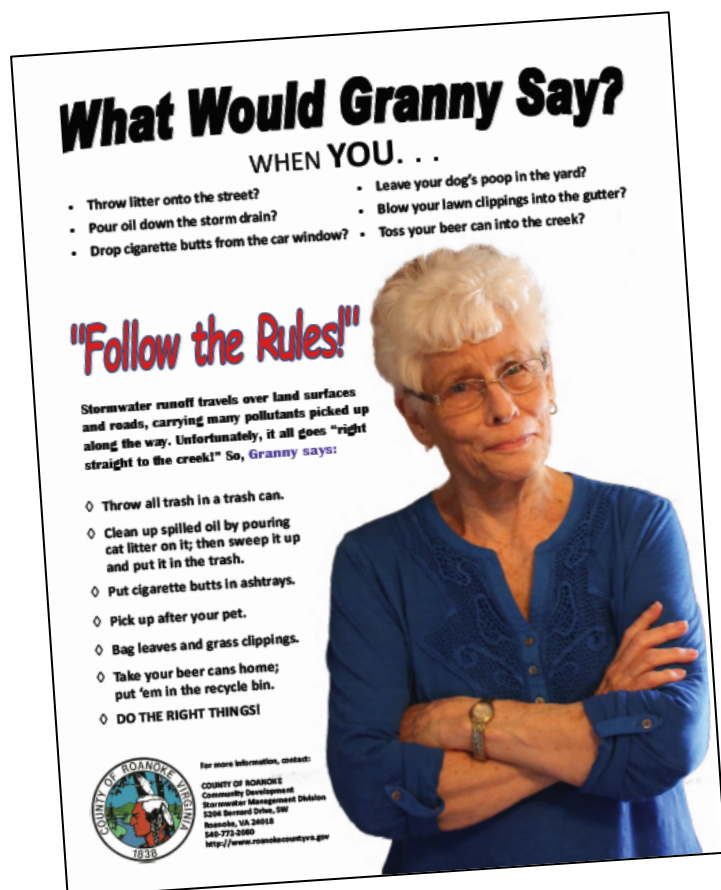
BMP 1-7: Targeted Education Program

Goal:

The goal of this BMP is to develop a stormwater quality education program for specific target audiences, as shown in **Table 1-7A**. This BMP will provide information to these audiences in an effort to increase awareness of the impact of illicit discharges into the County's storm sewer system from activities around the home or in connection with various business operations, and it is focused on the aforementioned three high-priority water quality issues: sediment, bacteria, and nutrients. The program is directed toward residents and certain groups of commercial, industrial, and institutional organizations that are most likely to have significant impacts to local stormwater quality.

Measurable Goals:

For Year 3 of the re-issued permit, Roanoke County distributed previously revised postcards to **two targeted** audiences: auto car wash/detailing operations and restaurants. These business types were chosen because car washing operations can have an adverse impact on local water quality through direct discharges of polluted wash waters; restaurants often rinse greasy range hoods and kitchen mats into the storm drainage system. In addition, the County developed a new brochure, Fact Sheet, and a poster to target certain audiences. The items were distributed, in most cases, directly to the targeted audiences and the percentages of the targeted audiences that were reached have been listed below in **Table 1-7D**.



TMDL Consistency:

The car wash postcard targets local businesses that may have uncontrolled discharges from vehicle washing operations, which could increase sediment discharges into local receiving waters. Therefore, these postcards address the TMDL for sediment (SED). Similarly, the Restaurant postcard addresses rinsing of kitchen equipment and accessories, which may contribute bacteria to receiving waters. Thus, the restaurant postcard helps address the County's TMDL for bacteria (EC). The materials developed exclusively by the County also address the TMDLs, as shown in **Table 1-7B**.

Table 1-7A. Targeted Education Program

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	Business Licenses/Yellow Pages	8	<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.
	Car Dealers	Business Licenses/Yellow Pages	23	<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 	Vehicle washing/detailing can contribute significant sediment if wash water is discharged into the County's MS4, which drains, untreated, to local streams. Residential car washing is specifically allowed; but, it still may contribute significant sediment if wash water is not properly handled.
	Auto Body Shops	Business Licenses/Yellow Pages	72	<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 	
	Homeowners	Tax Records	32,493	<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 Publication sent annually to homeowners • PSAs on local cable station • Handouts at local environmental events, 4 per year minimum 	
	Contractors Involved in Land-Disturbing Activities	Community Development Permit Records	51	<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 	Erosion and sediment control is required by regulations; however, more effective implementation may occur with additional education.

High-Priority Water Quality Issue	Target Audiences	Means to Determine Audience Size	Estimated Audience Size	Overall Messages	Means to Deliver Messages	Rationale
#2 Bacteria	Restaurants	Business Licenses/ Yellow Pages	127	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage and contributes to algae overgrowth, which hurts aquatic life. All wastewater to sanitary sewers. Keep exterior trash receptacles and dumpsters covered and do not wash out into storm drain. Clean kitchen hoods and floor mats; properly dispose of wastewater. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	Uncovered dumpsters containing garbage and dumpsters and greasy floor mats that are rinsed out onto the pavement can contribute bacteria to our MS4, which discharges directly to our streams.
	Pet Owners (dogs/cats)	Pet Licenses	5,392 dogs 371 cats	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> County Publication sent annually to Homeowners PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Veterinarian Offices	Business Licenses/ Yellow Pages	10	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in Veterinarian offices, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Pet Stores/Pet Boarding/ Grooming	Business Licenses/ Yellow Pages	23	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in pet stores, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	County Police and Firemen; Animal Control Officer	County Records	1	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> In-house training 	Dog waste is a major source of bacteria in our streams; these County employees own or handle dogs as part of their work.

High-Priority Water Quality Issue	Target Audiences	Means to Determine Audience Size	Estimated Audience Size	Overall Messages	Means to Deliver Messages	Rationale
#3 NUTRIENTS	Homeowners	Tax Records	32,493	<ul style="list-style-type: none"> How nutrients damage streams. Do not over-fertilize. Use soil tests. Keep fertilizer off of pavements. Do not over-water lawns. 	<ul style="list-style-type: none"> County Publication sent annually to Homeowners PSAs on local cable station 	Excessive nutrients are carried off lawns and other managed turf areas to the County's MS4 and then to local streams; this leads to algae overgrowth in the streams, which adversely impacts fish and other marine life.
	Nurseries/ Greenhouses	Business Licenses/ Yellow Pages	6	<ul style="list-style-type: none"> How nutrients damage streams. Do not over-fertilize. Use soil tests. Keep fertilizer off of pavements. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	
	Lawn Care Services	Business Licenses/ Yellow Pages	111	<ul style="list-style-type: none"> How nutrients damage streams. Do not over-fertilize. Use soil tests. Keep fertilizer off of pavements. Encourage use of organic products. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	

Table 1-7B. New and Previously-Developed Print Materials to Address Specific TMDLs

Type	Name	TMDLS Addressed
Poster	"There's No Such Thing as the Poop Fairy"	Bacteria
	"Granny Says. . ."	Bacteria, Sediment, PCBs, and more
Newsletter	"A Stormwater Guide for Homeowners"	Bacteria, Sediment, PCBs, and more
Brochure	"It's Just Dirt"	Sediment
	Stormwater Best Management Practices for Proper Pet Waste Disposal	Bacteria
	"Stormwater Best Management Practices for Restaurants"	Bacteria
	"Reduce, Reuse, Recycle and Properly Dispose of Hazardous Household Wastes"	Bacteria, Sediment, PCBs, and more
Fact Sheet	"Illicit Discharge Facts"	Bacteria, Sediment, PCBs, and more
	"Facts for Plumbers"	Bacteria, Sediment, PCBs, and more
	"Facts for Landscapers"	Sediment
	"Fall Foliage Facts"	Bacteria, Sediment, and more
	"Fact Sheet for Mosquito Control"	None - published as a Public Health issue
	"Tips for Homeowners - Stormwater Best Practices"	Bacteria, Sediment


 New in 2015 -2016

TABLE 1-7C. Program Materials and Targeted Audiences for BMP 1-7

Target Audience	Product Type	Delivery Method	# of Recipients	Nature of Message
Restaurants	Letter and Brochure (RoCo only*)	Mailed	127	Stormwater Management BMPS for Restaurants; MS4 permit requirements.
	Postcard	Mailed	127	Only rain down the storm drain; no solid or liquid waste; do not rinse out dumpsters.
Car Washes, Auto Repair Shops, New & Used Car Dealers, Auto Detailers, etc.	Postcard	Mailed	103	Wash water carries sediment, oil, and heavy metals to receiving waters.
Vets, Groomers, Stables, Pet Daycare and Boarding, etc.	Letter, Brochure, and Poster (RoCo only*)	Mailed	33	Pet waste pollutes receiving streams; owners are encouraged to pick up after their pets.
Landscaping Professionals	Letter and Fact Sheet (RoCo only*)	Mailed	113	Grass/shrub clippings, leaves, sediment, fertilizers, etc. cause pollution to receiving waters; use BMPs to minimize lawn debris, reuse stormwater, install erosion controls, and employ alternative lawn care practices.
Violators of Illicit Discharge Ordinance	Fact Sheet(s) applicable to the discharge	Mailed at time of violation	12	It is illegal to discharge anything into the MS4 system except for the allowable non-stormwater discharges listed in the permit.
Plumbers	Fact Sheet	Provided in Lobby	unknown	It is illegal to discharge anything into the MS4 system except for the allowable non-stormwater discharges listed in the permit
Contractors involved in Land Disturbing Projects	Brochure	Distributed with Permits	162	"It's Just Dirt" – brochure describes the harm to receiving waters from excess sediment from construction sites, explains permit requirements, provides techniques to "keep dirt on the project."
Residents	Brochure	Provided in Lobby; sent to schools; mailed with Illicit Discharge notices	93	"Reduce, Reuse, Recycle and properly dispose of hazardous household wastes" brochure.
Residences	Newsletter	Mailed	32,493	VSMP Program; proper methods for yard management, car washing, and disposal of hazardous household wastes; reasons to pick up pet waste; avoiding illicit discharges to the MS4.

A list of County businesses that received the above-listed materials can be found on the attached compact disk under the folder titled **BMP 1-7**.


Evaluation and Modification:

Following mail-out of the various materials, the County received numerous calls from local veterinary offices requesting additional copies of the “Poop Fairy” posters and brochures; also, several residents called to thank the County for the annual newsletter. The County believes this program is an effective BMP to raise awareness about the impact of illicit discharges into the County’s storm sewer system.

Table 1-7D. Summary of Targeted Mailings and % Reach

Annual Period	Type of Educational Material	Target Group	# Sent /Total # in Target Group	% of Target Audience Reached
2013 - 2014 (YEAR 1)	Car Wash Postcard	Businesses with Car Washes	107 / 107	100%
	Restaurant Postcard	Restaurants	115 / 115	100%
	MS4 Permit Brochure for Businesses	All County Businesses	1,209 / 1,209	100%
2014 - 2015 (YEAR 2)	Car Wash Postcard	Businesses with Car Washes	196 / 196	100%
	It’s Just Dirt Brochure	Land-disturbing Contractors	12 / 51	23.5%
	Stormwater Newsletter	Residences	32,599 / 32,599	100%
	Restaurant Postcard + Brochure	Restaurants	125 / 125	100%
	Landscaping Fact Sheet	Professional Landscapers, Nurseries, Greenhouses	88 / 88	100%
	Pet Waste Poster + Brochure	Veterinarians, Groomers, Stables, Pet Daycare, Pet Boarding, etc.	34 / 34	100%
2015 - 2016 (YEAR 3)	Car Wash Postcard	Businesses with Car Washes	103 / 103	100%
	Restaurant Postcard, Letter, and Brochure	Restaurants	127 / 127	100%
	It’s Just Dirt Brochure	Land-disturbing Contractors	162 / 97*	>100%
	Stormwater Newsletter	Residences	32,493	100%
	Landscaping Fact Sheet	Professional Landscapers, Nurseries, Greenhouses	117	100%
	Pet Waste Poster, Letter, and Brochure	Veterinarians, Groomers, Stables, Pet Daycare, Pet Boarding, etc.	34	100%
	“Tips for Homeowners - Stormwater Best Practices”	Residential lots using individual stormwater control measures without maintenance agreements	66 / 66 (32 new this year)	100%

* Total # of RLDs entered into County’s LDO tracking system since July 1, 2015; each RLD may obtain multiple permits



MCM 2: Public Involvement and Participation

This minimum control measure is intended to implement a program that helps to inform and educate County residents about the Roanoke County Stormwater Program; support from the citizens is critical for its success. To garner this support, the County has coordinated several programs to engage citizen interest in stormwater quality. The BMPs that have been established to complete this measure are listed below:

BMP 2-1: Storm Drain Stenciling Program

Coordinate a storm drain inlet stenciling program designed to engage group involvement and educate people about the consequences of dumping waste into the storm drainage system.

BMP 2-2: Stormwater Public Event

Conduct public events (4 per year, minimum) to bring attention to current stormwater issues and allow feedback from citizens on the condition of the County's Stormwater Program, from a citizen's point of view.

BMP 2-3: Stormwater Program Information Posted on Stormwater Website for Citizens to View

Post the Roanoke County Stormwater Discharge Permit, MS4 Program, and Annual Reports on the County's website for citizens to download and read.

This report provides a detailed description of the objectives and measurable goals of each of these BMPs, the strategies to ensure consistency with local TMDLs, the status of the County's compliance with each BMP, and an evaluation of the BMP and any proposed modifications needed to better achieve the goals of the program. The TMDL compliance is broken down by impairment type: bacteria (*E. coli* (EC)) or sediment (SED).

BMP 2-1: Storm Drain Stenciling Program

Goal:

The goal of this BMP is to coordinate a storm drain inlet stenciling program with local schools, neighborhoods, businesses, and other groups to stencil messages on storm drain inlet structures in an effort to educate people about the consequences of dumping waste into the storm drainage system.

Measurable Goals:

In this third year of the new permit cycle, the Clean Valley Council, on behalf of the County, hosted **three** storm drain stenciling events, with **72** storm drain inlets being stenciled.

For event dates and locations, see the attached compact disk under the folder titled **BMP 2-1**.

TMDL Consistency:

The storm drain stenciling program is an outreach method to inform and remind citizens that what enters storm drainage structures goes directly to local creeks and streams via underground piping. Roanoke County believes that when citizens understand that stormwater receives no treatment before being discharged to area waterways, unlike sanitary waste which goes to a wastewater treatment plant before discharge, they will be more likely to refrain from allowing their pet waste, yard clippings, and other non-stormwater debris/waste to enter the storm drain system through roadside drainage inlets. (EC)



Evaluation and Modification:

The County finds this BMP to be an effective method of information distribution and outreach. The County proposes to continue to coordinate a storm drain inlet stenciling program for structures within the County, while at the same time expanding the areas being stenciled so that the education and outreach value is enhanced and a consistent message is delivered across the Roanoke Valley region.

Year	# of Storm Drain Inlets Stenciled	Attendance
2013 - 2014 (YEAR 1)	106	63
2014 - 2015 (YEAR 2)	64	30
2015 – 2016 (YEAR 3)	72	18

BMP 2-2: Stormwater Public Event

Goal:

Throughout the year, Roanoke County, through staff participation in regional events or through the Clean Valley Council, participates in and/or hosts public events to address stormwater issues to inform the citizenry regarding the County's progress towards stormwater quality improvements, and to receive input from the public on the County's Stormwater Management Program.

Measurable Goals:

Through the CVC, Roanoke County was active in **5** regional events throughout the year that involved **3,407** people:

- Clean Valley Day
- Roanoke River Currents Conference
- Rain Barrel Workshop
- Recycle Regatta and River Fest
- Fall Waterways Cleanup



In addition, Roanoke County staff had a booth at the Roanoke Valley Fall Home Show. More than **1,825** attended this event, and many folks stopped by to grab stormwater-related educational materials, chat with the staff, or meet and pet the Poop Fairy.

During these events, Roanoke County staff and/or Clean Valley Council staff, under contract with Roanoke County, addressed questions and comments about stormwater and water quality. Information highlighted at the booths included the benefits of stream buffers, the differences between storm and sanitary sewers, and the importance of pet waste pick up and disposal.

A complete list of events and attendance can be found on the attached compact disk under the folder titled **BMP 2-2**.

TMDL Consistency:

Pet waste and soil erosion are common issues discussed at each of these events, because they are key regional water quality issues. (EC & SED)

Evaluation and Modification:

Based upon the attendance at these public events, Roanoke County finds this BMP to be an effective method of allowing the citizens to inquire about issues and allowing the County an opportunity to receive public input and also to provide pertinent stormwater-related information.

Year	Public Event(s)	Attendance
2013 – 2014 (YEAR 1)	14	23,490
2014 - 2015 (YEAR 2)	6	6,050
2015 - 2016 (PERMIT YEAR 3)	5	3,407 - CVC events; 1,825 - Fall Home Show

BMP 2-3: Stormwater Program Information Posted on Stormwater Website for Citizens to View

Goal:

The goal of this BMP is to post the Roanoke County's Municipal Separate Storm Sewer System (MS4) Program documents on the website for citizen review and comment. This form of public viewing allows Roanoke County citizens to become knowledgeable about the goals of the program. It also allows them to become better informed such that they can comment on existing issues and influence changes in future programs and direction. Each annual report will be posted on the website to keep citizens informed about annual evaluations of program effectiveness and proposed changes. In addition, the MS4 General Permit and MS4 Program Plan are also posted for public viewing.

Measurable Goals:

The following relevant documents are currently posted on the County's Stormwater website:

2013-2018 MS4 Permit

- 2014 MS4 Program Plan, revised March 2015
- 2014 Revised Program Plan
- 2013 Revised MS4 Program Plan
- 2013 MS4 General Registration Statement
- 2015-2016 MS4 Annual Report
- 2014-2015 MS4 Annual Report
- 2013-2014 MS4 Annual Report, revised March 2015
- 2013-2014 MS4 Annual Report

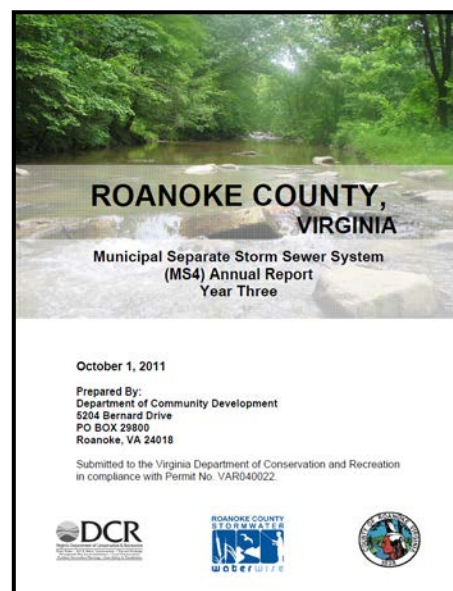
2008-2013 Permit

- 2012-2013 MS4 Annual Report
- 2011-2012 MS4 Annual Report
- 2010-2011 MS4 Annual Report
- 2009-2010 MS4 Annual Report
- 2008-2009 MS4 Annual Report
- 2008 MS4 General Permit Registration Statement

2003-2008 Permit

- 2007 VPDES Annual Report
- 2006 VPDES Annual Report
- 2005 VPDES Annual Report
- 2004 VPDES Annual Report
- 2003 VPDES General Permit Registration Statement

Roanoke County has also made the Stormwater Program Plan and all previous annual reports and this year's annual report available in hard copy, found in the Department of Community Development's office. No comments were received from the citizens regarding either of the revised Program Plans, dated March 21, 2013 or March 23, 2015.



TMDL Consistency:

Access to the MS4 Program Plan and Annual Reports gives Roanoke County citizens a means to familiarize themselves with the issues concerning the County's streams and rivers, the associated impairments, and any approved TMDLs. In addition, the documents detail the County's efforts to address these issues.

This BMP helps to inform citizens on ways to get involved with current water quality issues and to make them aware of available outreach programs, both with the goal of helping citizens minimize any impacts that they may have on local water quality. (EC & SED)

Evaluation and Modification:

Roanoke County believes that posting the MS4 program-related documents on its Stormwater Website is a good venue for allowing interested citizens to become more familiar with the County's stormwater program and local water quality issues. Because this BMP consists of posting more than just the Annual Report, this BMP was renamed **Information Posted on Stormwater Website for Citizens to View**, effective July 1, 2014.

MCM 3: Illicit Discharge Detection and Elimination (IDDE)

The goal of this minimum control measure is to develop, implement, and enforce a program to detect and eliminate illicit discharges to the storm sewer system. The BMPs that have been established to complete this measure are listed below:

BMP 3-1: Storm Drain Map

A Countywide Storm Sewer System Map in the GIS database has been prepared for all known locations of municipal storm sewer systems. The Roanoke County Storm Sewer Database is maintained so that a map of all the public storm sewers in the County is available to the public.

BMP 3-2: Illicit Discharge Ordinance

A Roanoke County Illicit Discharge Ordinance has been established, which includes policies, procedures, reporting, and enforcement measures for illicit discharges.

BMP 3-3: MS4 Outfall Inspections

Roanoke County implements a program to inspect a minimum of 50 storm drain outfalls per year within its MS4 area with the purpose of identifying potential illicit discharges into the MS4 system.

BMP 3-4: Illicit Discharge Detection and Elimination Program

Roanoke County has developed and implemented an illicit discharge program to target and inspect areas of high risk potential for illicit connections and illicit discharges.

Included in this report is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDLs, the status of the County's compliance with each BMP, and an evaluation of the BMP and any proposed modifications needed to better achieve the goals of the program. The TMDL compliance is broken down by impairment type: bacteria (E. coli (EC)) or sediment (SED).

BMP 3-1: Storm Drain Map

Goal:

The goal of this program is to develop and maintain a storm drain map that identifies the municipal separate storm sewers and components thereof within the County of Roanoke that discharge to a natural drainage conveyance or waterway.

Measurable Goals:

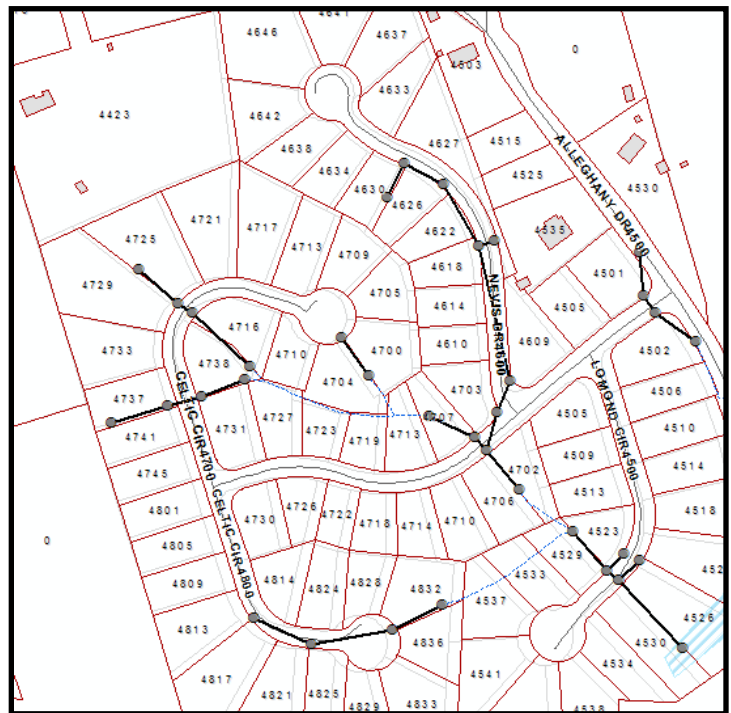
Roanoke County has continued this program by expanding and updating the storm sewer map of Roanoke County. In addition to locating any new storm sewer outfalls, the map has been updated to show the current outfalls and their associated Hydrologic Unit Code (HUC) for the watershed in which they discharge, the names and locations of all the impaired surface waters that receive discharges from these systems, and the estimated acreage draining to the storm sewer outfall. Note that for Year 3, there were no new outfalls added.

TMDL Consistency:

An updated and accurate storm drain map identifying all of the municipal separate storm sewers and their components will greatly aid Roanoke County in the discovery of illicit connections and the locations where sediment may be entering the regulated MS4. (SED & EC)

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that the process of mapping storm drains is an appropriate method to aid in the enforcement, detection, and elimination of illicit discharges to the storm sewer system.



BMP 3-2: Illicit Discharge Ordinance

Goal:

The goal of this BMP is to adopt regulations that prohibit illicit discharges into the County's Municipal Separate Storm Sewer System and that also provide the County with an enforcement mechanism.

Measurable Goals:

Roanoke County adopted an Illicit Discharge Ordinance on April 22, 2014; it is compliant with current state regulations of the Virginia Department of Environmental Quality. Enforcement measures and penalties are included in the Illicit Discharge Ordinance. The document may be found on the attached compact disk under the folder titled **BMP 3-2**.

TMDL Consistency:

An Illicit Discharge Ordinance aids in the enforcement of illicit discharges to the MS4 system. This legal mechanism will aid the County in eliminating illicit connections and discouraging a variety of illicit discharges to the MS4 system. (EC)

Evaluation and Modification:

Due to changes in the Virginia Stormwater Law and Regulations, Roanoke County adopted a new Stormwater Management Ordinance in 2014. As a part of this effort, a new, stand-alone Illicit Discharge Ordinance was also adopted at that time.



Year	Action	Modifications
2013 - 2014 (Year 1)	New Illicit Discharge Ordinance Developed and Adopted	n/a
2014 - 2015 (Year 2)	None	None
2015 – 2016 (Year 3)	None	None

BMP 3-3: MS4 Outfall Inspections

Goal:

The goal of this BMP is to detect dry weather illicit discharges into the MS4 system so that actions may be taken to eliminate them.

Measurable Goals:

In the first year of the reissued permit, 96 outfalls were inspected, with no illicit discharges identified. In the second year of the reissued permit, 85 outfalls were inspected with no identified illicit discharges. In this third year, 50 outfalls were inspected, again with no illicit discharges found. The selection process in each year for the chosen outfalls followed these criteria, in descending order:

- In the MS4 area
- Drains to an impaired waterway
- Within 1/10th of a mile from the nearest receiving water

The results are documented and may be found on the attached compact disk under the folder titled **BMP 3-3**.

TMDL Consistency:

Although the County has yet to find any illicit discharges through the use of this BMP, inspecting stormwater outfalls is thought to be a helpful technique in identifying potential or actual illicit discharges or illegal connections to the MS4 system. Once identified, appropriate enforcement action may be taken to track the discharge back to its source and ensure the illicit discharge or illegal connection is eliminated using BMPs 3-2 and 3-4. (EC)

Evaluation and Modification:

No modifications are planned for this BMP, as it is required by the MS4 Permit. However, inspecting outfalls for the purpose of identifying illicit discharges and illegal connections has not yet proven to be successful.

Year	# Outfalls Inspected	# of Illicit Discharges Found
2013 - 2014 (Year 1)	96	None
2014 – 2015 (Year 2)	85	None
2015 – 2016 (Year 3)	50	None

BMP 3-4: Illicit Discharge Detection and Elimination (IDDE) Program

Goal:

The goal of this BMP is to detect, identify, and address non-stormwater discharges to the MS4, as defined in 4VAC50-60-10, into the regulated municipal separate storm sewer system. The Illicit Discharge Detection and Elimination Program has written procedures for the following:

1. A prioritized schedule of field screening activities;
2. Minimum number of field screening activities to be performed annually;
3. Methodologies to collect general information;
4. A time frame upon which to conduct an investigation to identify and locate the source of any observed continuous or intermittent non-stormwater discharge;
5. Methodologies to determine the source of all illicit discharges;
6. Mechanisms to eliminate identified sources of illicit discharges;
7. Methods for conducting a follow-up investigation to verify that the discharge has been eliminated;
8. A mechanism to track all investigations to document the date(s) that the illicit discharge was observed and reported, results of investigation, any follow-up to the investigation, resolution of the investigation, and the date that the investigation was closed.



Measurable Goals:

Roanoke County developed a new Standard Operating procedure in this permit year to detect, address, and report illicit discharges that enter the municipal separate storm sewer system. In addition, the Illicit Discharge Ordinance (BMP 3-2) includes procedures to prohibit illicit discharges through the enforcement process.

In this Permit Year 3 of the reissued permit, Roanoke County responded to **25** illicit discharge complaints received from citizens or observed by staff. All were resolved or found to be invalid complaints. The Illicit Discharge Enforcement Log for Permit Year 3 summarizes the complaints, the associated investigations, how the issue was resolved, and the date the investigation was closed. This log and the new SOP is on the attached compact disk under the folder titled **BMP 3-4**.

The results of Permit Year 3 outfall inspections for dry weather screening associated with the IDDE program are discussed in **BMP 3-3**.


TMDL Consistency:

An Illicit Discharge Program aids in the location, identification, and elimination of illicit discharges to the MS4. This method can give staff the methodology needed to screen, target, and monitor the storm drain system in an effort to discover existing illegal discharges and connections to the MS4. (EC)

Evaluation and Modification:

Roanoke County believes that the Illicit Discharge Program is a critical component in the detection and elimination of illicit discharges and illicit connections to its storm sewer system. Roanoke County will continue its field reconnaissance of outfalls (**BMP 3-3**) and will also respond to and investigate illicit discharge complaints received from citizens.

Year	# of Illicit Discharge Complaints Received	# Resolved and Closed
2013 - 2014 (Year 1)	11	11
2014 - 2015 (Year 2)	15	15
2015 - 2016 (Year 3)	25	25



MCM 4: Construction Site Stormwater Runoff Control

Roanoke County recognizes that construction sites can deposit significant amounts of silt and sediment in stormwater runoff due to the large areas of land disturbances. The goal of this minimum control measure is to implement and enforce a program that will reduce pollutants in stormwater runoff to the regulated municipal separate storm sewer system from construction activities. The BMPs that have been established to complete this measure are listed below:

BMP 4-1: Erosion and Sediment Control Ordinance

Establish and maintain an Erosion and Sediment Control Ordinance to require erosion and sediment controls during construction activities, as well as sanctions, to ensure compliance, under local law for all land disturbances of 2,500 square feet or more.

BMP 4-2: Erosion and Sediment Control Certification

Identify County positions that require Erosion and Sediment Control training and track employees' certifications to ensure their training is received and updated.

BMP 4-3: Erosion and Sediment Control Plan Review

Develop and maintain written procedures for site plan review which addresses construction site stormwater runoff.

BMP 4-4: Erosion and Sediment Control Inspection

Develop and maintain written procedures for site inspections to confirm that construction complies with approved plans and that construction site stormwater runoff is properly addressed.

BMP 4-5: Erosion and Sediment Control Compliance and Enforcement

Develop and maintain written procedures for compliance and enforcement when necessary to compel compliance with construction site stormwater runoff requirements.

Included in this report is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDLs, the status of the County's compliance with each BMP, and an evaluation of the BMP and any proposed modifications needed to better achieve the goals of the program. The TMDL compliance is broken down by impairment type: bacteria (*E. coli* (EC)) or sediment (SED).

BMP 4-1: Erosion and Sediment Control Ordinance

Goal:

The goal of this BMP is to maintain an Erosion and Sediment Control (E&S) Ordinance designed to reduce pollutants in stormwater runoff from construction activities, in an overarching effort to keep such pollutants from entering the County's MS4. The Ordinance requires use of erosion and sediment controls, site inspection requirements, and sanctions to ensure compliance under state and local law. This ordinance requires E&S controls for all land disturbances of 2,500 square feet or more and an engineered E&S Plan for any land disturbance greater than 10,000 square feet. The E&S Plan must require construction site operators to implement appropriate erosion and sediment controls specific to the site.

Measurable Goals:

Roanoke County's initial Erosion and Sediment Control Ordinance was in compliance with the regulations previously set forth and enforced by the Virginia Department of Conservation and Recreation (DCR). DCR reviewed the County E&S Program during July 2012. As a result of the DCR review, Roanoke County developed, and DCR approved, an alternative inspection program. However, with the recent changes to the Virginia's erosion and sediment control regulations, the County adopted revisions to its ordinance in February 2016 to meet the newer state requirements. A copy of the ordinance is on the attached compact disk under the folder titled **BMP 4-1**.



During this third year of the reissued permit, the County had **151** regulated land-disturbing activities, and a total of **67.047** acres disturbed. The monthly counts of land disturbing activities, both residential and commercial, can be found on the attached compact disk under the folder titled **BMP 4-1**. [Note that there are two spreadsheets to look at because the report is set up to calculate calendar year instead of fiscal year.]

TMDL Consistency:

This ordinance targets reducing sediment in stormwater runoff from construction sites. These regulations require erosion and sediment controls on the site, as well as sanctions, to ensure compliance under local law. (SED)

Evaluation and Modification:

The E&S Ordinance was revised to align with the revised state regulations, as noted above. Roanoke County believes that the Erosion and Sediment Control Ordinance is a critical component to aid in reducing pollutants carried by stormwater runoff from construction activities into its MS4. To that end, it is also critical that the ordinance remain in compliance with the Virginia Erosion and Sediment Control Regulations.

Year	Total Acres Disturbed (acres)	Total # of Regulated Land-Disturbing Activities
2013 - 2014 (YEAR 1)	102.4	168
2014 - 2015 (YEAR 2)	66.31	189
2015 - 2016 (YEAR 3)	68.067 (67.047 in RoCo; 1.02 in TOV)	159 (151 in RoCo; 8 in TOV)

TOV = Town of Vinton RoCo = Roanoke County

Year	Action
2013 - 2014 (YEAR 1)	E & S Ordinance not reviewed; no proposed changes or modifications
2014 - 2015 (YEAR 2)	Proposed revisions to E & S Ordinance to meet state regulations, currently under Board of Supervisors consideration
2015 - 2016 (YEAR 3)	Adopted the Revised Ordinance

BMP 4-2: Erosion and Sediment Control Certification

Goal:

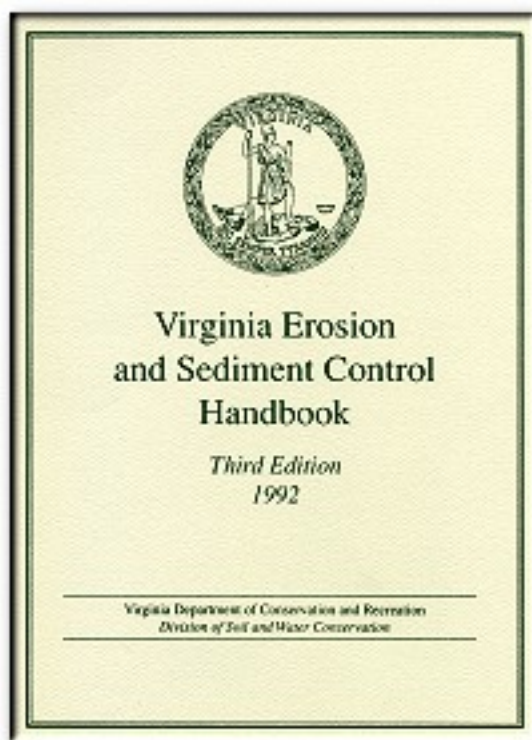
The goal of this BMP is to identify current Erosion and Sediment Control (E&S)-certified employees and develop a program for certification maintenance, additional certifications, and cross-training.

Measurable Goals:

Community Development has staff whose job responsibilities necessitate erosion and sediment control training and certification, such as the County Engineer, Plan Review Engineers, Stormwater Program Manager, and Site Inspectors, to name a few. Currently, the County utilizes training and certification through the Virginia Department of Environmental Quality's E&S training and certification program. Any new employees hired into positions whose job responsibilities have already been determined as needing training in E&S will also be certified using this program. A table of the positions, the employee(s) in the positions, and their level of certification is shown below and also on the attached compact disk under the folder titled **BMP 4-2**.

In addition, the Departments of Community Development and Parks, Recreation and Tourism have personnel state-certified as Responsible Land Disturbers.

In this permit year, the Department of Community Development provided its own erosion and sediment control training to all staff that conduct or oversee field inspections. The training material is included on the attached compact disk under the folder titled **BMP 6-4 Employee Training**.



TMDL Consistency:

For this BMP, the County identifies employees that need E&S training and tracks their certifications to ensure that such certifications remain current. This BMP helps to minimize onsite erosion by educating key employees involved with this topic on correct E&S procedures and policy. (SED)

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that the certification of County employees who are involved in some way with land-disturbing activities is a critical component in reducing pollutants in stormwater runoff.

ESC & STORMWATER MANAGEMENT CERTIFICATIONS				
NAME		CERTIFICATION	CERTIFICATE #	EXPIRATION DATE
Atkinson	Bob	Professional Engineer	0402 041822	01/31/17
Gwynn	Angie	Professional Engineer	0402 041477	10/31/17
Henderson	David	Professional Engineer	0402 022296	05/31/17
Yates	Morgan	Plan Reviewer	458	05/31/17
Linkenhoker	Cindy	ESC Combined Administrator	363	11/30/18
Thompson	Philip	ESC Combined Administrator	698	12/09/16
Fuller	RG	SWM Combined Administrator	SWCA0325	03/15/19
Gwynn	Angie	SWM Combined Administrator	SWCA0288	12/29/18
Cooper	Matt	Dual SWM Combined Administrator	DCA0235	06/05/18
Henderson	David	Dual SWM Combined Administrator	DCA0259	10/17/17
Covey	Arnold	Dual Program Administrator	DPA0108	06/30/19
Sowder	Denise	Dual Program Administrator	DPA0107	02/05/19
Bowles	Jimmy	ESC Inspector	2089	11/30/19
Carroll	Curtis	ESC Inspector	1966	11/30/19
Fowler	Bill	ESC Inspector	3740	11/30/16
Fuller	RG	ESC Inspector	3848	11/30/16
Holland	Dale	ESC Inspector	1945	05/31/19
Peters	Bruce	ESC Inspector	3469	05/31/18
Prillaman	Rhonda	ESC Inspector	ESIN0250	09/04/18
Waldron	Larry	ESC Inspector	3930	05/31/17
Yates	Morgan	ESC Inspector	1929	05/31/19
Younger	Carter	ESC & SWM Inspector	-	-
Prillaman	Prillaman	SWM Inspector	SWIN0364	10/16/18
Shrewsbury	Nick	Dual Inspector	DIN0239	10/28/18
Altice	Jeff	Responsible Land Disturber	39411	04/04/19

BMP 4-3: Erosion and Sediment Control Plan Review

Goal:

The goal of this BMP is to develop and maintain written procedures for site plan review, which address construction site stormwater runoff to ensure consistency of reviews.

Measurable Goals:

Success for this BMP is measured by the annual evaluation of the written plan review procedures, as described below.

TMDL Consistency:

Erosion and sediment control plans target reducing sediment in stormwater runoff from construction sites. Reviewing the plans for consistency to plan review procedures helps to ensure the proper erosion and sediment controls will be employed and properly maintained on the site. **(SED)**

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that maintaining and employing written procedures for erosion control plan review is a critical component in reducing pollutants in stormwater runoff during land-disturbing activities.

Year	Total # of E&S Plan Reviews
2013 - 2014 (YEAR 1)	Not reported
2014 - 2015 (YEAR 2)	196
2015 - 2016 (YEAR 3)	130 SFR (14 in TOV; 116 in RoCo) 49 Commercial (incl. subdivisions) (all in RoCo)

TOV = Town of Vinton

RoCo = Roanoke County

BMP 4-4: Erosion and Sediment Control Inspection

Goal:

The goal of this BMP is to develop and maintain written procedures for inspections to confirm that construction complies with approved plans and that construction site stormwater runoff is properly addressed.

Supporting Documents:

See copy of the Erosion and Sediment Control inspections written procedures, including the state approved alternative inspection program, in Supporting Documents (CD attached to this plan).

Measurable Goals:

Success for this BMP is measured by the annual evaluation of the written site inspection procedures.

TMDL Consistency:

Erosion and sediment control inspections of construction activities help to ensure that the required erosion controls, as shown on the approved plan, are implemented and properly maintained in the field; such controls reduce sediment in stormwater runoff from construction sites. (SED)



Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that inspecting construction sites against written procedures and approved plans helps to reduce pollutants in stormwater runoff during land-disturbing activities.

Year	# of Inspections Conducted (Commercial and SFR Projects)
2013 - 2014 (YEAR 1)	18,694
2014 - 2015 (YEAR 2)	14,131
2015 - 2016 (YEAR 3)	11,889* [SFR=9,679; Comm = 2,210] 137 SFR; 0 Comm in TOV 542 SFR, 2210 Comm in RoCo

SFR = Single Family Residential COMM = Commercial
TOV = Town of Vinton RoCo = Roanoke County
*Residential inspections occur with every building inspection

BMP 4-5: Erosion and Sediment Control Compliance and Enforcement

Goal:

The goal of this BMP is to develop and maintain written procedures for compliance and enforcement, in order to ensure program consistency.

Measurable Goals:

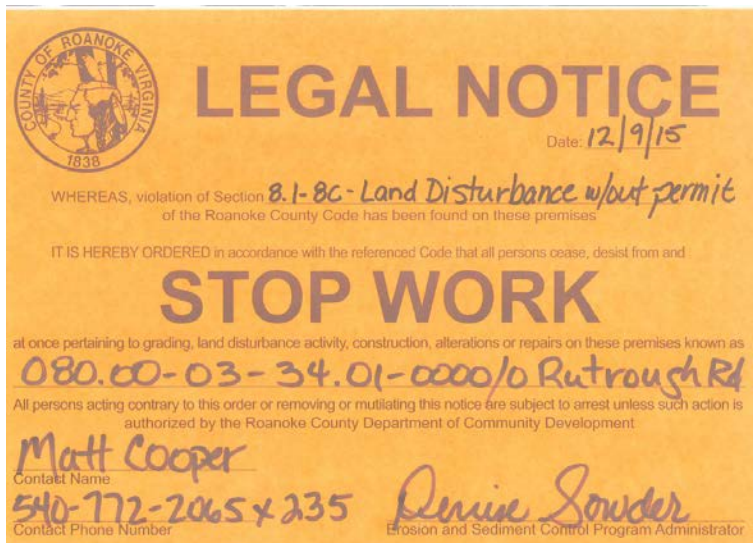
Success for this BMP will be measured by the annual evaluation of the written plan review procedures. A summary of the enforcement actions taken for this Permit Year 3, including the total number and type of enforcement actions is included on the attached compact disk under the folder titled **BMP 4-5**.

TMDL Consistency:

Written procedures that allow for the enforcement of the erosion and sediment control program help to ensure that the required erosion controls, as shown on the approved plan, are implemented and properly maintained in the field; such controls reduce sediment in stormwater runoff from construction sites. (SED)

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that implementing enforcement actions based on written procedures is critical to help reduce pollutants in stormwater runoff during land-disturbing activities.



Year	# of Enforcement Actions NTC = Notice to Comply SWO = Stop Work Order
2013-2014 (YEAR 1)	12 - NTC 2- Civil Penalties [Summons]
2014 - 2015 (Year 2)	19 - NTC 1 - SWO
2015 - 2016 (YEAR 3)	20 - NTC 4 - SWO 1 - Civil Penalty [Summons] (all were in the County)



MCM 5: Post-Construction Stormwater Management in New Development and Development on Prior-Developed Lands

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. The BMPs that have been established to complete this measure are listed below:

BMP 5-1: Stormwater Management Ordinance and Manual

Roanoke County has adopted a Stormwater Management Ordinance and Design Manual, which complies with the July 1, 2014 state requirements.

BMP 5-2: Stormwater Management Plan Review

Develop and maintain written procedures for site plan review which addresses post-construction stormwater.

BMP 5-3: Stormwater Management Facility Construction Inspection

Develop and maintain written procedures for site construction inspections to confirm that construction complies with approved plans.

BMP 5-4: Stormwater Management Facility Post-Construction Inspection

Develop and maintain written procedures for post-construction inspections of privately-owned and County-owned stormwater management facilities.

BMP 5-5: Stormwater Management Facility Tracking

Develop and maintain a GIS based system to track Stormwater Management Facilities to ensure that proper post-construction inspection and maintenance is occurring.

BMP 5-6: Strategies to Encourage Long-Term Maintenance of Stormwater Control Measures for Individual Residential Lots

Included in this report is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDLs, the status of the County's compliance with each BMP, a list of certified plan reviewer and inspection personnel, and an evaluation of the BMP and any proposed modifications needed to better achieve the goals of the program. The TMDL compliance is broken down by impairment type: bacteria (E. coli (EC)) or sediment (SED). Also included is a list of certified plan reviewer and inspection personnel.

BMP 5-1: Stormwater Management Ordinance and Manual

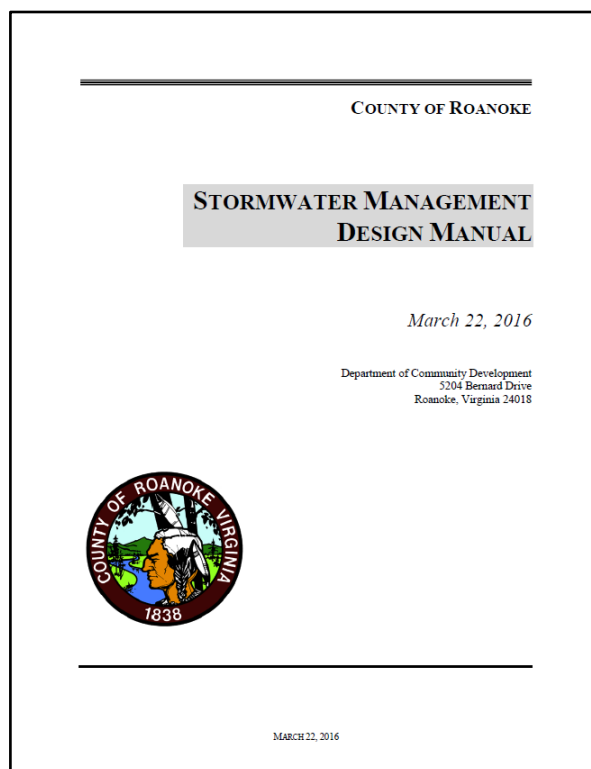
Goal:

The goal of this BMP is to adopt and enforce a Stormwater Management Ordinance and Design Manual that both require stormwater runoff to be addressed. These documents ensure that controls are in place that will prevent or minimize water quality and quantity impacts due to new development and redevelopment projects.

Measurable Goals:

Roanoke County began enforcing the Stormwater Management Ordinance and Manual on January 1, 2008. The Stormwater Management Design Manual details structural and non-structural best management practices (BMPs) that are appropriate for this region. The Ordinance requires the designation of a responsible party who is legally bound to inspect and maintain the best management practices for the life of the BMP.

During the first year of the reissued permit, Roanoke County replaced its Stormwater Management Ordinance and revised its Stormwater Design Manual to reflect the changes in the state stormwater regulations, which became effective on July 1, 2014. In Permit Year 2, the County made further revisions to the Stormwater Design Manual and to the Stormwater Management Ordinance, and both were submitted to the Board of Supervisors for approval. The revised documents were adopted in early 2016 in this 3rd year of the re-issued permit. Copies of these documents are on the attached compact disk in the folder titled **BMP 5-1**.



TMDL Consistency:

The Stormwater Management Ordinance and Design Manual target reducing the quantity and improving the quality of stormwater runoff from new development and redevelopment and help to protect against erosion from stream banks, construction sites, developed areas, and redeveloped areas. (SED & EC)

Evaluation and Modification:

The materials associated with this BMP were revised to align with the new Virginia Stormwater Management Law and Regulations and subsequent revisions to same. The latest revisions to the County's ordinance added the use of civil penalties to the enforcement options and incorporated minor changes previously requested by the Virginia DEQ. Revisions to the design manual were made to clarify and correct minor issues that became apparent after initially implementing the VSMP.

Year	Action	Changes and Modifications
2013 - 2014 (YEAR 1)	New Stormwater Ordinance and Design Manual Adopted	New Documents, effective July 1, 2014
2014 - 2015 (YEAR 2)	Revise SWM Ordinance and Design Manual	Revisions are under Board of Supervisor consideration.
2015 - 2016 (YEAR 3)	Revised SWM Ordinance and Design Manual	Revised SWM Ordinance, eff. 2-23-16 Revised SWM Design Manual, eff. 3-22-16

BMP 5-2: Stormwater Management Plan Review

Goal:

The goal of this BMP is to develop and maintain written procedures for site plan review, which addresses post- construction stormwater runoff to ensure consistency of reviews.

Measurable Goals:

Success for this BMP is measured by the annual evaluation of the written plan review procedures.

TMDL Consistency:

Stormwater management plans target reducing sediment in stormwater runoff from construction sites and controlling volume and velocity of peak runoff rates during and after development. Reviewing the plans for consistency to plan review procedures helps to ensure the proper stormwater controls and practices will be employed and properly maintained on the site. **(SED)**

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that maintaining and employing written procedures for stormwater management plan review is a critical component in reducing pollutants in and reducing volume and velocity of stormwater runoff during and after land-disturbing activities.

Year	# of SWM Plans Reviewed	# of Agreement in Lieu of SWM Plans issued
2013 - 2014 (YEAR 1)	37	-
2014 - 2015 (YEAR 2)	185	33
2015 - 2016 (YEAR 3)	162 28 - Commercial; 134 - SFR	32

SFR = Single Family Residential

NOTE:

VSMP Permits Issued for SFR = 32

VSMP Permits Issued for Commercial = 9

BMP 5-3: Stormwater Management Facility Construction Inspection

Goal:

The goal of this BMP is to develop and maintain written procedures for construction inspections to confirm that construction complies with approved plans.

Measurable Goals:

Success for this BMP will be measured by the annual evaluation of the written site construction inspection procedures.

TMDL Consistency:

Stormwater Management Facility inspections help to ensure that the required facilities, as shown on the approved plan, are implemented and properly maintained in the field; such facilities help to reduce sediment in stormwater runoff from construction sites and control volume and velocity of peak runoff rates during and after development. (SED)



Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that maintaining and employing written procedures for stormwater management construction inspections is a critical component in reducing pollutants in and reducing volume and velocity of stormwater runoff during and after land-disturbing activities.

Year	# of SWM Facilities Inspected Under Construction
2013 - 2014 (YEAR 1)	111
2014 - 2015 (YEAR 2)	73
2015 - 2016	53

BMP 5-4: Stormwater Management Facility Post-Construction Inspection

Goal:

The goal of this BMP is to develop and maintain written procedures for post-construction inspections to confirm that adequate maintenance is occurring.

Measurable Goals:

Success for this BMP will be measured by the annual evaluation of the written post-construction inspection procedures; and completion of the required post-construction inspections.

TMDL Consistency:

This BMP ensures that all permanent stormwater management facilities (SWMFs) are adequately maintained and properly functioning, which is critical for flood protection and erosion prevention. (SED)



Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that inspecting permanent stormwater management facilities is a critical component in reducing pollutants in and reducing volume and velocity of stormwater runoff from developed sites.

In this Permit Year 3, Roanoke County was unable to inspect all of its publicly-owned SWMFs, as required by the permit, due to a loss of several key personnel. However, the County did complete the inspections before the submission of this report.

Year	Post-Construction Stormwater Facilities Inspected	Total Number of Stormwater Facilities*	BMP Maintenance Guides Given Out
2013 - 2014 (YEAR 1)	23 - Public 184 - Private	71 - Public 661 - Private	120
2014 - 2015 (YEAR 2)	49 Public 97 Private	71 - Public 700 - Private	0
2015 - 2016 (YEAR 3)	67- Public 95 - Private	67- Public 681- Private (623-in County; 58 in TOV)	30

* Total # of SWM Facilities has changed slightly due to more accurate accounting using the County's GIS

* TOV = Town of Vinton

BMP 5-5: Stormwater Management Facility Tracking

Goal:

The goal of this BMP is to develop and maintain a GIS-based system to track Stormwater Management Facilities to ensure that proper inspection and maintenance is occurring.

Measurable Goals:

Success for this BMP will be measured by the annual evaluation of any additions or modifications to the GIS stormwater database. In this Permit Year 3, there were 14 new Stormwater Management Facilities brought online in the MS4 area, serving 23.21 acres. For a complete listing of these facilities with other pertinent data, see the enclosed compact disk in the folder titled **BMP 5-5**.

TMDL Consistency:

Tracking permanent SWMFs helps to ensure that all permanent stormwater management facilities are inspected, adequately maintained, and properly functioning, which is critical for flood protection and erosion prevention. (SED)

Evaluation and Modification:

Roanoke County is currently implementing a new software program (Cityworks®) to assist with facility and inspection tracking, and its Department of Community Development has added an additional staff position to assist with data organization. The County believes that these actions will improve this BMP. Roanoke County also believes that tracking permanent SWMFs helps to ensure that these facilities are routinely inspected, adequately maintained, and properly functioning, which is critical for flood protection and erosion prevention.

New Stormwater Facilities Brought Online

HUC	#	Acres Treated
RU10	4	16.82
RU12	2	0.67
RU13	4	4.38
RU14	4	1.34
Total	14	23.21

BMP 5-6: Strategies to Encourage Long-Term Maintenance of Stormwater Control Measures for Individual Residential Lots

Goal:

The goal of this BMP is to implement strategies to promote the long-term maintenance of stormwater control measures that are designed to treat stormwater runoff solely from the individual residential lot. These strategies will be used to replace recorded maintenance agreements and required County post-construction inspections.

Measurable Goals:

Success for this BMP will be measured by tracking the number of new single family residential lots each year that are covered by the strategies, annually reaching 100% of the total number of SFRs covered under the strategies with homeowner outreach and education materials using direct mail, maintaining maintenance information for the stormwater practices on the County's website, and evaluating the effectiveness of the strategies in promoting the long-term maintenance of stormwater control measures.

TMDL Consistency:

Stormwater management techniques target reducing sediment in stormwater runoff from developed sites and are designed to reduce volume and velocity of peak runoff rates during and after development. By implementing strategies to promote the long-term maintenance of stormwater control measures that are designed to treat stormwater runoff solely from the individual residential lot, this BMP helps to assure that such sites are not contributing large volumes of sediment to receiving waters. (SED)

Evaluation and Modification:

Roanoke County believes this is an effective BMP to address the maintenance of relatively simple stormwater management practices used on individual single family residences (SFRs). However, as the County has more experience with it, revisions may be made in the future.

Permit Year 2 was the first year to not require maintenance agreements for individual residential lots. In this Permit Year 3, some 32 new residential lots used individual stormwater control measures without maintenance agreements. Information for each lot is summarized on the attached compact disk in the folder titled **BMP 5-6**. Practices included roof leaders directed to grass swales and underground detention, among others.

100% of the total number of individual SFRs was reached with homeowner education and outreach materials using direct mail. (For this Permit Year 3, the newsletter entitled *A Stormwater Guide for Homeowners* was used to satisfy this mailing requirement, along with a new informational Fact Sheet entitled: "Tips for Homeowners - Stormwater Best Practices.")

The new Fact Sheet providing maintenance information for stormwater practices can be found on the attached compact disk under the folder titled **BMP 1-7** and under "Stormwater Public Education Documents" on the County's website. Click on this link:

<http://www.roanokecountyva.gov/index.aspx?NID=1648>



MCM 6: Pollution Prevention and Good Housekeeping for Municipal Operations

Roanoke County's goal for the pollution prevention and good housekeeping program is to reduce stormwater runoff pollution from Roanoke County's day-to-day operations. To perform this measure, the County will continue to evaluate its facilities and also provide education and programs that will educate its employees about pollution prevention and hazardous waste. The BMPs that have been established to complete this measure are listed below:

BMP 6-1: Spill Prevention Control and Countermeasures Plans

Roanoke County has developed Spill Prevention Control and Countermeasure Plans (SPCCs) for some of its municipal facilities. These plans will be updated and new plans will be prepared as needed.

BMP 6-2: Household Hazardous Waste Event

Roanoke County will participate in Household Hazardous Waste Collection events to help citizens dispose of household materials that could be hazardous to dispose of in landfills.

BMP 6-3: Storm Sewer Maintenance Program

Roanoke County will continue to provide storm sewer system maintenance.

BMP 6-4: Employee Training

Roanoke County will develop and implement biennial training for applicable employees in (1) recognition and reporting of illicit discharges; (2) good housekeeping and pollution prevention practices for, (a) road, street, and parking lot maintenance, (b) maintenance and public works facilities, and (c) recreational facilities; (3) spill response by emergency response employees; (4) herbicide application training; and (5) contractor oversight for environmental compliance.

BMP 6-5: Standard Operating Procedures

Roanoke County will develop and implement standard operating procedures (SOPs) for daily operations and maintenance activities that have a potential of discharging pollutants directly or with stormwater runoff into the MS4. SOPs will be used in training activities.

BMP 6-6: Stormwater Pollution Prevention Plans (SWPPPs) for Municipal Facilities

Roanoke County will identify all high-priority facilities that have a high potential to discharge pollutants in stormwater. Stormwater Pollution Prevention Plans (SWPPPs) will be prepared, implemented, and maintained. SWPPPs will be used in training activities.

BMP 6-7: Nutrient Management Plans

Roanoke County will identify all County owned lands where nutrients are applied to a contiguous area of 1 acre or more. Nutrient Management Plans will be prepared by a certified nutrient management planner. Nutrient Management Plans will be implemented and maintained.

BMP 6-8: Pesticide Applicator Certification

All employees that apply pesticides shall have the proper Virginia Pesticide Applicator Certificate.

BMP 6-9: Responsible Land Disturber

Employees that oversee the performance of regulated land disturbance activities by County employees shall be recognized as a Responsible Land Disturber by DEQ.

Included in this report is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDLs, the status of the County's compliance with each BMP, and an evaluation of the BMP and any proposed modifications needed to better achieve the goals of the program. The TMDL compliance is broken down by impairment type: bacteria (E. coli (EC)) or sediment (SED).

BMP 6-1: Spill Prevention, Control, and Countermeasure Plans

Goal:

The goal of this BMP is to develop and update Spill Prevention, Control, and Countermeasure (SPCC) Plans for appropriate Roanoke County municipal facilities. Facilities that store oil with an aggregate above-ground storage capacity of 1,320 gallons or more; or have a fully buried storage capacity of 42,000 gallons or more are required to have SPCC plans. These plans must be updated when significant changes occur, and they must be evaluated every 5 years.

Measurable Goals:

Success for this BMP will be measured by the updating of or creation of SPCC plans for applicable County facilities in accordance with 40 CFR Part 112.

County facilities that have a current SPCC Plan include:

- Cave Spring Fire Station, revised May 2016
- Clearbrook Fire Station, revised May 2016
- Fort Lewis Fire Station, revised May 2016
- Hollins Fire Station, revised May 2016
- Fleet Service Center, revised June 2016
- Public Safety Center, prepared May 2016

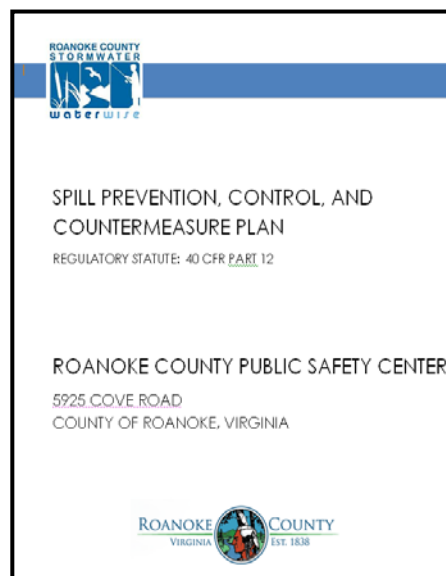
Copies of these plans may be found on the attached compact disk in a folder titled **BMP 6-1**.

TMDL Consistency:

This BMP minimizes the potential for oil spills to enter the municipal storm drain system. Having updated SPCC Plans will aid in the education of County Employees that are in areas with some risk of oil spills. This BMP does not directly address any of the County's TMDL requirements.

Evaluation and Modification:

SPCC plans are required for facilities per 40 CFR Part 112. The SPCC plan for the Public Safety Building was prepared in this third year of the re-issued permit and the SPCC plans for the four fire stations and the Fleet Service Center were all revised.



BMP 6-2: Household Hazardous Waste Event

Goal:

The goal of this BMP is to encourage and identify strategies and events to help citizens dispose of household materials that could be hazardous to dispose of in bulk landfills.

Measurable Goal:

Success for this BMP is measured by the continued participation in Household Hazardous Waste Collection Events.

Roanoke County participated in **11** Household Hazardous Waste (HHW) Collection events with the Roanoke Valley Resource Authority; **405** people from Roanoke County participated in them. The waste that was collected consisted of oil, antifreeze, paint, and batteries. Statistics for the HHW Events can be found in files on the attached compact disk under the folder titled **BMP 6-2**.



Additionally, the County participated in a drug take-back event with Western Virginia Water Authority. This year, **two** drug take back event was held with a total of 5,480 pounds of medication collected from the following localities: Roanoke County, Roanoke City, City of Salem, Botetourt County, Craig County, and the Town of Vinton. The flyer and a summary of the data are included on the attached compact disk in a folder titled **BMP 6-2**.

- **September 26, 2015**
Roanoke County: 952.7 pounds
Total: 2,842 pounds
- **April 30, 2016**
Roanoke County: 1,494 pounds
Total: 3,878 pounds

Got Drugs?

Turn in your unused or expired medications for safe disposal.

Saturday, April 30, 2016
10 am - 2 pm

Convenient Parking Lot Locations in:

Roanoke - Roanoke Civic (Berglund) Center	Roanoke County - Tanglewood Mall Kroger,
Botetourt County - Daleville Kroger	Kroger on Valley Gateway Blvd., Kroger at
Salem - Super Shoes on Main Street	Colonial & Brambleton and the Hershberger
Vinton - Hardy Road Kroger	Road Fire and Rescue Station #1
Craig County - Market Street Pharmacy	

or visit www.dea.gov for additional drug disposal sites in your area

No appointment is necessary - the public is welcome. Simply bring your medications to this event where they can be safely collected and then destroyed by local law enforcement and DEA agents. Sponsored by:

Roanoke Area Youth Substance Abuse Coalition • Western Virginia Water Authority • U.S. Drug Enforcement Administration
Prevention Council of Roanoke County • Roanoke Police Department • Roanoke County Sheriff's Department
Salem Police Department • Botetourt County Sheriff's Department • Roanoke Valley Academy of Medicine
Roanoke County Police Department • Vinton Police Department • U.S. Attorney's Office Western District of Virginia



Since this program was started in 2010, a hefty 21,566 pounds of medication have been collected in Roanoke Valley locations.

TMDL Consistency:

Currently there is no known direct benefit that this BMP will have on any TMDL wasteload allocations. However, it should have a beneficial effect on stream water quality by keeping these products out of local receiving waters.

Evaluation and Modification:

Participation in the Household Hazardous Waste events has become popular with citizens. Roanoke County understands that these events are an important way to keep these hazardous wastes from being disposed of in an inappropriate fashion and, therefore, the County does not have any plans to modify this BMP.

Year	HHW Events	Attendance
2013 - 2014 (YEAR 1)	12	346
2014 - 2015 (YEAR 2)	12	339
2015 - 2016 (YEAR 3)	11	405

BMP 6-3: Storm Sewer Maintenance Program

Goal:

The goal of this BMP is to actively maintain the County's storm sewer system. Keeping the storm sewer system properly maintained is high on the County's priority list because it keeps the regulated storm sewer working as designed, minimizing the potential for flows to surcharge or surpass the capacity of the regulated storm sewer system. In addition, the maintenance crews also have the potential to discover illicit connections and cite additional areas where pollutants may be entering the regulated MS4.

Measurable Goals:

Success for this BMP will be measured by the continuation of this program, and the increase in total value of improvement that has been completed to maintain the storm sewer system.

The Stormwater Operations Division of the Department of Community Development employs two stormwater construction / maintenance crews with a total of 7 employees. These crews perform a large variety of duties including municipal stormwater pond maintenance, installation of pipes and structures, repair of damaged structures, emergency response to flooding problems, and all other County storm drain system maintenance.



This year **63** maintenance and improvement projects were completed, resulting in the following:

- Feet of pipe installed = 1,686
- Total properties improved = 95
- Total feet of open/riprap channel = 864
- Total restoration area = 121, 059 square feet
- Tons of sediment removed = 400 cubic yards
- Number of Board-approved projects = 4
- Number of small projects = 12
- Number of routine/repetitive projects = 17
- Number of emergency / high priority projects = 22
- Inter-departmental projects = 8

A total of **16,562 labor** hours were committed towards storm sewer system maintenance and improvements to the municipal storm sewer system. The value of these improvements that were performed in-house was estimated to be **\$929,500**; additionally, the County contracted for **\$297,929** in additional drainage improvements. Therefore, the total County investment in storm drainage maintenance and improvements was **\$1,227,429**.

TMDL Consistency:

This program is responsible for maintaining the regulated storm sewer system. This includes the improvement of eroding stream banks and channels. This program directly remediates existing areas where sediment is eroding and stabilizes the system, removing the input of sediment to the streams and channels. For example, at the Hidden Valley High School, some 400 cubic yards of silt was removed from the forebay and dam area. (SED) This program also increases the potential for discovering illicit connections to the storm drain system. (EC)

Evaluation and Modification:

Roanoke County will continue to maintain the County's storm sewer system. Maintaining the storm drainage system keeps it functioning properly and provides an opportunity to discover potential illicit connections to it.

Year	Total Projects	Annual Period Improvement Value
2013 - 2014 (YEAR 1)	51	\$950,250
2014 - 2015 (YEAR 2)	50	\$1,567,757*
2015 - 2016 (YEAR 3)	63	\$1,227,429

*Incorrectly reported last year as \$1,657,757



Striking channel improvements in The Orchards subdivision, installed by Stormwater Operations Division, Dept. of Community Development

BMP 6-4: Employee Training

Goal:

The goal of this BMP is to provide County employees with adequate training to support the requirements of the MS4 General Permit and to perform their duties in a manner that protects water quality. Roanoke County will develop and implement biennial training for applicable employees in (1) recognition and reporting of illicit discharges; (2) good housekeeping and pollution prevention practices for, (a) road, street, and parking lot maintenance, (b) maintenance and public works facilities, and (c) recreational facilities; (3) spill response by emergency response employees; (4) herbicide application training; and (5) contractor oversight for environmental compliance.

Measurable Goals:

This BMP is measured by the number of County employees that receive this training. Last year (Permit Year 2), employees in eleven departments received training on several of the topics listed above. The training dates, name and number of employees attending, by department, and a generic copy of the letter sent to all department heads explaining the purpose of said training were provided in last year's Annual report. Training topics included:

Recognition and Reporting Illicit Discharges

Applicable field personnel received training in the recognition and reporting of illicit discharges. This training video takes approximately 30 minutes.

Good Housekeeping and Pollution Prevention Practices

Employees that perform road, street, and parking lot maintenance, or are employed in and around maintenance and public works facilities and at recreational facilities received training in good housekeeping and pollution prevention practices. This training video takes approximately 1 hour.

NOTE: All employees who were required to take *Good Housekeeping and Pollution Prevention Practices* were required to read and follow the County's Standard Operating Procedures (SOPs). These procedures were designed to eliminate or minimize pollutant discharges in stormwater.

Contractor Oversight for Environmental Compliance

Supervisors who oversee Contractors that perform work for the County or employees involved in developing contracts for Contractors took this training. 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. County employees who oversee Contractors working for the County must ensure compliance by Contractors. This training video takes approximately 30 minutes.

Hazardous Materials (HAZ-MAT) Training

The County of Roanoke currently maintains basic hazardous materials training for its employees in Fire and Rescue. All career (paid) staff are certified to HAZ-MAT Operations. For this permit year, there are 168 uniformed, career employees. The number of volunteers is always in flux, but the County estimates that there are also 246 volunteers that currently have HAZ-MAT Operations training. 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.

In addition, a summary report of all DEQ-certified staff who review, approve, and inspect the implementation of stormwater management plans is also on the enclosed compact disk in the folder titled **BMP 6-4**.

TMDL Consistency:

This BMP ensures that all employees receive pollution prevention training and targeted employees receive additional training for municipal good housekeeping, pollution prevention, and Illicit Discharge Detection and Elimination (IDDE). It also ensures that all Fire and Rescue employees maintain basic hazardous waste training to prevent any mishandling of hazardous materials in ways that could be detrimental to the environment. (SED/EC)

Evaluation and Modification:

No modifications are planned for this BMP at this time. Roanoke County believes it is effective to train employees in the above-mentioned topics by use of the newly-acquired videos from EXCAL Visual and by use of its Standard Operating procedures for Water Quality, as discussed in **BMP 6-5**.

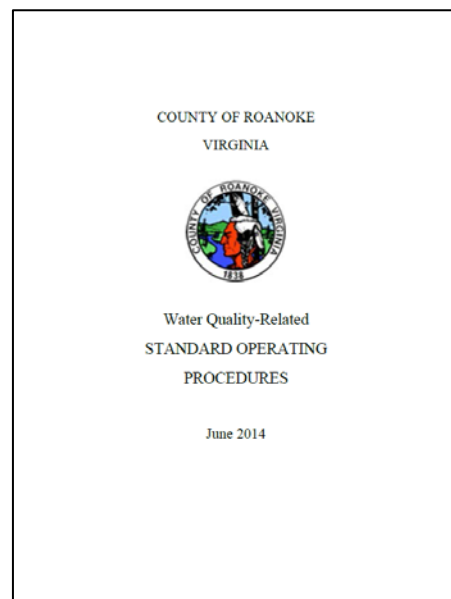
BMP 6-5: Standard Operating Procedures

Goal:

The goal of this BMP is to develop and implement standard operating procedures (SOPs) for daily operations and maintenance activities that have a potential of discharging pollutants directly or with stormwater runoff into the MS4. SOPs will be used in training activities.

SOPs for Water Quality are designed to prevent pollutant discharge from (1) daily operations such as road, street, and parking lot maintenance, (2) equipment maintenance, and (3) the application, storage, transport, and disposal of pesticides, herbicides, and fertilizers.

The SOPs have been designed to (1) prevent illicit discharges, (2) ensure the proper disposal of waste materials, including landscape wastes, (3) prevent discharge of municipal vehicle wash water into the MS4, (4) prevent discharge of wastewater into the MS4, (5) require use of BMPs when discharging water pumped from utility construction and maintenance activities, (6) minimize pollutants in stormwater runoff from bulk storage areas; (7) prevent pollutant discharge into the MS4 from leaking municipal automobiles and equipment; and (8) ensure that the application of materials, including fertilizers and pesticides is conducted in accordance with the manufacturer's recommendations.



In addition to the above, two departments finalized new standard operating procedures regarding the washing of County-owned vehicles: the Sheriff's Department and the Fire Department. The Sheriff's Department uses inmate labor to wash vehicles assigned to their department and those assigned to the Police Department. To ensure car wash runoff does not enter the County's MS4 system, the Sheriff's Department constructed a car washing pad at the County Jail facility, complete with an underground oil/grit separator, above-ground canopy, electricity, water, and connection to the sanitary sewer. Additional photos of this new facility are provided on the attached compact disk in the folder titled **BMP 6-5**.



New Car Washing Pad at County Jail

The Fire Department elected to institute a new policy requiring that all vehicle washing be conducted indoors, where it drains to the sanitary sewer system, for all fire stations within the County's MS4 area. The new policy is included on the attached compact disk in the folder titled **BMP 6-5**.

Measurable Goals:

Measurable goal is the development and training on appropriate SOPs. The SOPs are provided on the enclosed compact disk in the folder titled **BMP 6-5**. Training using the SOPs was described in the previous **BMP 6-4**.

TMDL Consistency:

This BMP ensures that all Standard Operating procedures for water quality are in place and used for training. This is an effective BMP to help ensure pollutants from daily County operations do not enter the MS4. (SED)

Evaluation and Modification:

Roanoke County believes it is effective to maintain water quality-related SOPs and to train employees to use them, as a means to protect receiving waters from pollutants carelessly handled by employees in their daily operations.

BMP 6-6: Stormwater Pollution Prevention Plans (SWPPPs) for Municipal Facilities

Goal:

The goal of this BMP is to identify municipal facilities that have a high potential to discharge pollutants and provide SWPPPs for them. Roanoke County has identified all high-priority facilities that have a high potential to discharge pollutants in stormwater. Stormwater Pollution Prevention Plans (SWPPPs) will be prepared, implemented, and maintained for each of them. SWPPPs will be used in training activities as a part of the SOP training, where appropriate.

High-priority facilities include composting facilities, equipment storage and maintenance facilities, materials storage yards, pesticide storage facilities, public works yards, recycling facilities, salt storage facilities, solid waste handling and transfer facilities, and vehicle storage and maintenance yards.

High-priority facilities that have a high potential to discharge pollutants in stormwater include the following – (1) areas where residuals from using, storing or cleaning machinery or equipment remain exposed to stormwater; (2) materials or residuals on the ground from spills or leaks; (3) material handling equipment; (4) materials or products that would be expected to be mobilized by stormwater during loading/unloading or transporting activities; (5) materials or products stored outdoors; (6) materials or products that would be expected to be mobilized by stormwater contained in open, deteriorated or leaking storage containers; (7) waste materials, except waste kept in covered non-leaking containers; (8) disposal of process wastewater; or (9) particulate matter or visible deposits of residuals from roof stacks or vents.

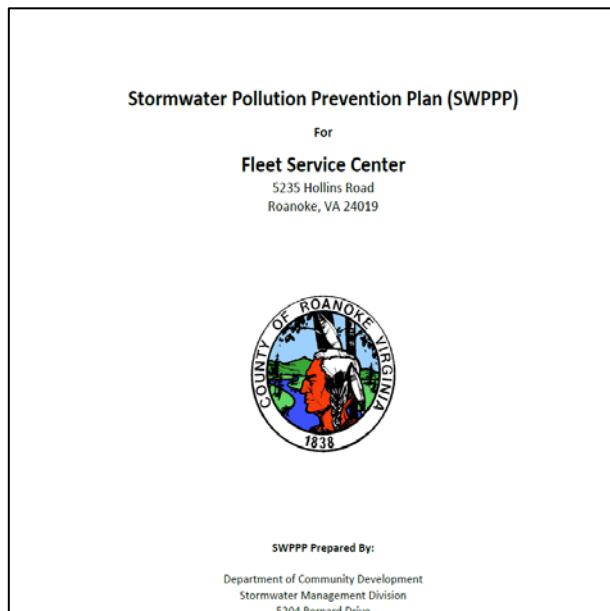
A SWPPP Program Plan is attached to this plan that identifies all County high-priority facilities that have a high potential to discharge pollutants. The SWPPP Program Plan also contains the schedule by which the individual SWPPPs will be prepared, and the individual SWPPPs locations.

Measurable Goals:

Success for this BMP will be measured by the development, implementation, and maintenance of the required SWPPPs. In this Permit Year 3, the following SWPPPs were completed and are enclosed on the attached compact disk in a folder titled **BMP 6-6**.

Roanoke County Public Schools (RCPS)

- Burton Center for Arts and Technology (BCAT)
- Cave Spring High School Bus Lot



Roanoke County Public Safety Buildings

- #1 North County Fire & Rescue Station
- #3 Cave Spring Fire Station
- #5 Hollins Fire & Rescue Station

TMDL Consistency:

This BMP ensures that all high-priority facilities that have a high potential to discharge pollutants in stormwater have a SWPPP in place with employees trained to understand, implement, and maintain it. The SWPPP identifies Best management Practices to be employed at each facility to prevent the discharge of pollutants into the MS4. (SED/EC)

Evaluation and Modification:

No modifications are planned for this BMP at this time. Roanoke County will continue to develop and implement the remaining SWPPPs, as previously identified and reported on the attached compact disk in the folder titled **BMP 6-6**.

BMP 6-7: Nutrient Management Plans

Goal:

The goal of this BMP is to ensure that excessive nutrients are not being applied to County-owned lands. Roanoke County will identify all County owned lands where nutrients are applied to a contiguous area of 1 acre or more. Nutrient Management Plans will be prepared by a certified nutrient management planner for these lands. Nutrient Management Plans will be implemented and maintained.

Measurable Goals:

Success for this BMP will be measured by the development and implementation of the Nutrient Management Plans on the necessary lands.

Property owned by Roanoke County - For last year, Permit Year 2, the County's Department of Parks, Recreation, and Tourism (PRT) completed a Nutrient Management Plan (NMP) that covers all of the sites that are fertilized by the Parks Department. Some of the fields maintained by PRT are on school properties, so those sites are also included on the NMP. However, Roanoke County Schools is responsible for most of their fields and grounds and those areas have been covered under the Schools' Nutrient Management plans, as previously reported. PRT added a couple of fields to their list, so their acreage went up from last year; PRT currently fertilizes roughly **108 acres on 31 sites**.

The **Phase 1 grouping** of sites listed in the Nutrient Management Plan encompasses **36.65 acres**, and it was implemented in Permit Year 2, as previously reported.

The **Phase 2 grouping**, implemented this Permit Year in the spring of 2016, adds roughly another **40 acres** to the plan. The final **Phase 3 grouping** will add **31 acres** in spring of 2017. In 2018, Group 1 of the Plan will be renewed and the cycle will continue from there. Nutrient Management Plans (and, in this case, Phases of the plan) are good for 3 years and then have to be renewed.

Sites covered by Phase 1 grouping in the Parks NMP plan, as reported last year, were:

- | | |
|-------------------------------|--|
| • Back Creek Elementary | 7130 Bent Mountain Rd. Roanoke, VA 24018 |
| • Brambleton Center | 3738 Brambleton Ave. Roanoke, VA 24018 |
| • Burton Complex | 1760 Roanoke Blvd. Salem, VA 24153 |
| • Clearbrook Elementary | 5381 Tall Pine Rd. Roanoke , VA 24014 |
| • Garst Mill Park | 2699 Willowlawn St. Roanoke, VA 24018 |
| • Green Valley Elementary | 3838 Overdale Rd. Roanoke, VA 24018 |
| • Hidden Valley Middle School | Hidden Valley School Rd. Roanoke, VA 24018 |
| • Merriman Complex | 6657 Merriman Rd. Roanoke, VA 24018 |
| • Shell Park | 6318 Merriman Rd. Roanoke, VA 24018 |
| • Starkey Park | 5701 Crystal Creek Dr. Roanoke, VA 24018 |

Sites covered by Phase 2 grouping in the Parks NMP plan, as implemented this year:

- | | |
|----------------|------------------------------------|
| • Hollins Park | 5688 Hollins Rd. Roanoke, VA 24019 |
|----------------|------------------------------------|

- | | |
|------------------------------------|--------------------------------------|
| • Ingersoll Rand Park | Old Mountain Rd Roanoke, VA 24019 |
| • Roanoke County Fleet Center | 5235 Hollins Rd. Roanoke, VA 24019 |
| • Bonsack Elementary 5437 | Crumpacker Dr. Roanoke, VA 24019 |
| • OLD Central Middle School (RCCC) | 100 Highland Rd. Vinton, VA 24179 |
| • Herman Horne Elementary | 1002 Ruddell Rd. Vinton, VA 24179 |
| • Vinyard Park East | 151 Berkley Rd. Roanoke, VA 24012 |
| • Vinyard Park West | 150 Berkley Rd. Roanoke, VA 24012 |
| • Goode Park | 5904 Goode Park Rd. Vinton, VA 24179 |
| • Mount Pleasant Park | 3071 Pitzer Rd. Roanoke, VA 24014 |
| • Craig Recreation Center | 900 Chestnut St. Vinton, VA 24179 |

Property owned by Roanoke County Public Schools - As reported last year (Permit Year 2), the Roanoke County Public Schools completed Nutrient Management Plans for all of their necessary lands, covering 100% of their 45.66 acres.

Glenvar High School

- Baseball - 100,000 sq. ft.
- Football - 87,000 sq. ft.
- Softball & Soccer - 183,000 sq. ft.

Northside High School

- Soccer & Football Practice - 90,000 sq. ft.
- Football - 87,000 sq. ft.
- Baseball - 100,000 sq. ft.

Northside Middle School

- Baseball & Football - 165,000 sq. ft.
- Football Practice - 65,000 sq. ft.

Hidden Valley Middle School

- Football - 56,000 sq. ft.

Hidden Valley High School

- Baseball 100,000 sq. ft.
- Football Practice - 87,000 sq. ft.
- Softball - 56,000 sq. ft.
- Soccer - 113,000 sq. ft.

Cave Spring Middle School

- Practice - 87,000 sq. ft.

Cave Spring High School

- Baseball - 100,000 sq. ft.
- Football Practice - 87,000 sq. ft.
- Softball - 75,000 sq. ft.

William Byrd High School

- Football 87,000 sq. ft.
- Soccer & Softball - 75,000 sq. ft.
- Baseball - 100,000 sq. ft.
- Football Practice - 87,000 sq. ft.

TMDL Consistency:

This BMP ensures that all County owned lands where nutrients are applied to a contiguous area of 1 acre or more. While there is no known benefit towards satisfying the TMDL requirements for E. coli or sediment, there is a water quality benefit associated with proper application of nutrients so as to avoid excess products entering the receiving waters via stormwater runoff.

Evaluation and Modification:

No modifications are planned for this BMP at this time. Roanoke County will continue to develop and implement the remaining NMPs, as previously identified and reported on the attached compact disk in the folder titled **BMP 6-7**.

BMP 6-8: Pesticide Applicator Certification

Goal:

The goal of this BMP is to ensure that all employees that apply pesticides have the proper Virginia Pesticide Applicator Certificate.

Measurable Goals:

Success for this BMP will be measured by maintenance of current certification by the applicable employees. A list of employees that currently hold Pesticide Applicator Certification is included on the enclosed compact disk in the folder titled **BMP 6-8**.

TMDL Consistency:

While there is no known benefit towards satisfying the TMDL requirements for E. coli or sediment, there is a water quality benefit associated with proper application of pesticides so as to avoid excess products entering the receiving waters by way of stormwater runoff.

Evaluation and Modification:

No modifications are planned for this BMP at this time. Roanoke County will continue to require the applicable personnel to hold the proper pesticide and fertilizer applicator certifications.

Currently, the following employees in the Parks, Recreation, and Tourism Department hold Pesticide or Fertilizer Applicator certifications:

EMPLOYEE	CERTIFICATION TYPE	CERTIFICATION #	EXPIRATION DATE
Eric C. Vest	Pesticide Applicator	72792-G	6/30/2017
Eric C. Vest	Fertilizer Applicator	CFA-13407-23631	6/4/2017
Mick Brizendine	Pesticide Applicator	73382	6/30/2017

BMP 6-9: Responsible Land Disturber (RLD)

Goal:

The goal of this BMP is to ensure that employees that have responsibility to oversee the performance of regulated land disturbance activities by County employees shall have the qualifications to properly implement erosion and sediment control measures. Responsible employees shall be certified as a Responsible Land Disturber by DEQ.

Measurable Goals:

Success for this BMP will be measured by maintenance of current certification by the applicable employees. A list of employees that currently hold RLD certification is included below and on the enclosed compact disk in the folder titled **BMP 6-9**.

TMDL Consistency:

Requiring employees that have responsibility to oversee the performance of regulated land disturbance activities to have the qualifications to properly implement erosion and sediment control measures helps to minimize the amount of sediment that leaves the construction site and thereby minimizes the potential of sedimentation in receiving waters. (SED)

Evaluation and Modification:

No modifications are planned for this BMP at this time. Roanoke County will continue to require the applicable personnel to hold the proper RLD certification.

EMPLOYEE	CERTIFICATION	CERTIFICATION #	EXPIRATION DATE
Eric C. Vest	RLD	38019	7-16-18
Jeff Altice	RLD	39411	4-4-19

RLD = Responsible Land Disturber

SECTION II

Total Maximum Daily Loads (TMDLs)



Total Maximum Daily Loads (TMDLs)

A. TMDL ACTIVITIES

Roanoke County undertakes a number of activities to enhance its stormwater program to address its TMDL wasteload allocations. These activities are described in the MS4 Program Plan and specific TMDL Action Plans.

B. TMDL ACTION PLANS

Section 1.B.1 of the MS4 General Permit requires that the County's MS4 Program Plan prepare and implement a specific TMDL Action Plan for pollutants allocated to the MS4 in approved TMDLs. Roanoke County has approved wasteload allocations for E. coli, Sediment, and PCBs. Specific TMDL Action Plans for E. coli and Sediment were completed July 1, 2015 and implementation began this permit year. The specific TMDL Action Plan for PCBs was completed July 1, 2016, and its initial implementation will be reported in the next annual report. The TMDL Action Plans are included in Section III.

C. BMPs DEVELOPED to ADDRESS E. coli (EC) and Sediment (SED) TMDLs

The BMPs developed to address E. coli (EC) and Sediment (SED) TMDLs are listed below:

T-1: Initial Stream Assessments and BMP Planning (EC and SED)

Perform initial stream assessments of 135.4 miles of streams that drain 100 acres or more within the MS4 regulated area in order to better understand their conditions and to assist in determining the most cost-effective means of lowering pollutant loads.

T-2: Enhanced Public Education and Outreach (EC and SED)

Enhance **BMPs 1-5, 1-7 and 2-3** to ensure that they address bacteria and sediment as high priority water quality issues.

T-3: Enhanced Employee Training (EC and SED)

Enhance **BMP 6-4** to ensure that it addresses bacteria and sediment as high priority water quality issues.

T-4: County Facilities Assessments and Corrections (EC and SED)

As a part of **BMP 6-6**, all County facilities will be assessed for conditions that could result in elevated discharges of bacteria or sediment. Where sources of elevated discharges are discovered, they will be eliminated. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared where appropriate.

T-5: Enhanced Illicit Discharge Detection and Elimination Program (EC)

Visit selected businesses that have a possible elevated potential to discharge bacteria or sediment to observe conditions. Take corrective actions where illicit discharges are observed.

T-6: Erosion and Sediment Control Enhanced Enforcement (EC and SED)

Evaluate the need to strengthen the erosion and sediment control program enforcement activities.

T-7: Dog Waste Stations (EC)

Increase the number of dog waste stations in public parks and greenways.

T-8: Dog Waste Ordinance (EC)

Consider a new dog waste ordinance to strengthen the requirements to pick up dog waste.

T-9: Onsite Sewage Disposal System Maintenance Ordinance (EC)

Evaluate the advisability of enacting a sewage disposal system maintenance ordinance.

T-10: Stream Buffers (EC and SED)

Evaluate the possibility of enacting stream buffer requirements.

Capital Improvements (EC and SED)

Construct cost-effective capital improvements to address impairments utilizing 50% Virginia Stormwater Local Assistance Fund grants.

T-1: Initial Stream Assessments and BMP Planning (EC and SED)

Goal:

The goal of this BMP is to perform field and office investigations of streams within the MS4 area to document existing conditions and identify opportunities for implementation of cost-effective BMPs.

Measurable Goals:

In last permit year (2014 – 2015), the County hired a consultant to perform this task. The initial stream assessment has been **completed** by the consultant and is documented in a report, dated January 2016, that is included in Section III.

The Assessment included a listing of the stream reaches (Table 6) that have the best potential opportunities for stream projects. This information will be used as the first screen in the selection of streams to be studied further and submitted for state Stormwater Local Assistance Fund grants.

Table 6. Field Reconnaissance Sites with Potential Opportunities for Stream Projects

	Site #	Site Description	Stream Reach	Total Erosion Length	Bank Height	RCI
Very Good Opportunity	6	Vacant parcel between Williams Rd & Florist Rd	Carvin Creek	250	15	0.81
	9	Read Mountain Preserve	Cook Creek	500	10	0.93
	11	Garst Mill Park	Mudlick Creek	600	5	1.21
	13	Hidden Valley High School	Mudlick Creek	1,000	15	0.76
	27	Goode Park/Wolf Creek Greenway	Wolf Creek	250	5	1.11
Good Opportunity	15	St. John's Church	Mudlick Creek	250	4	1.17
	18	Green Valley Elementary School (Adjacent to Ballfield)	Murray Run	50	15	1.13
	23	Christian Life Fellowship Church	Stypes Branch	100	15	0.96
	28	Wolf Creek Greenway	Wolf Creek	250	4	1.30
Moderate Opportunity	1	Merriman Soccer Complex	Back Creek	100	6	1.18
	3	Richfield Retirement Community	Big Bear Rock Branch	15	1	1.06
	10	Private (Vacant Parcel), Borders Garst Mill County Park	Mudlick Creek	100	12	1.15
	30	Starkey Park	Back Creek	200	12	1.06
	Pilot_05	Wal-Mart	Cook Creek	60	5	1.18
	Pilot_06	Wal-Mart	Cook Creek	90	5	1.1
	Pilot_08	Wal-Mart	Cook Creek	100	3	1.03

The results also included identifying sources of potential bacteria and sediment sources. (See Table 3).

Table 3. Summary of Potential Pollutant of Concern Sources by Watershed

Stream Reach	Miles Assessed in MS4 Service Area	Eroding Stream Reach Segments	Armored Stream Reach Segments	Other Sediment Sources	All Animal Sources	Potential Other Sources	Potential Additional Outfalls	Attachment 1 Map Group #
Mason Creek	1.9	0	1	2	0	0	0	05
Mill Creek	1.19	2	1	0	1	0	0	17
Mudlick Creek	17.96	39	20	5	0	2	7	06
Murray Run	1.97	12	2	2	0	6	2	07
Ore Branch	3.72	3	0	0	0	0	0	08
Paint Bank Branch	1.25	6	0	2	1	0	0	15
Peters Creek	5.98	10	6	4	2	0	0	09
Roanoke River	13.24	25	4	5	2	1	0	12
Roanoke Tributary	3.2	5	3	0	0	0	1	19/20
Stypes Branch	1.78	9	2	2	0	1	0	14
Synders Creek	0.07	0	0	0	0	0	0	16
Tinker Creek	7.74	14	5	2	0	1	2	10
Tinker Creek Lower	0.44	0	0	0	0	0	0	04
Twelve O'clock Branch	1.91	7	5	2	2	0	0	17
West Dry Branch	0.93	3	1	0	0	1	0	14
Wolf Creek	10.12	25	6	3	0	2	0	11
Total		321	129	93	25	37	14	

The assessment identified 321 eroding stream reaches and 129 armored stream sections. No further action will be taken at this time on these reaches, as County efforts will be focused on prioritized stream projects.

The assessment identified 93 other sediment sources, 25 animal sources, and 37 other potential sources. These potential sources will be investigated further over the next 3 permit years (approximately 52 per year). After further investigation, the County will eliminate sources, where they are significant and the County has jurisdiction. Sources that are on VDOT property will be referred to VDOT. Sources that are related to agriculture will be referred to VDCR for its action.

The results also included 14 potential additional outfalls that are not currently on the County's GIS mapping. These potential outfalls will be investigated and added to the County's mapping (if appropriate) during the 2016 - 2017 permit year.

TMDL Consistency:

This initial stream assessment identified locations where County efforts should be concentrated, at this time, to lower bacteria and sediment discharges. (EC & SED)

Evaluation and Modification:

This initial stream assessment is valuable in understanding existing stream conditions and in prioritizing the County's efforts. While the assessment itself is completed, the County will perform further evaluation and investigation of its results and take appropriate actions.

T-2: Enhanced Public Education and Outreach (EC and SED)

Goal:

Raise awareness of the water quality issues involving E. coli and Sediment in target audiences and the general public.

Measurable Goals:

Incorporate information concerning sediment and E. coli into the MS4 Program public education and outreach efforts in accordance with Table 1-7a in the TMDL Action Plans for Sediment and E-coli. See MS4 Annual Report in **BMP 1-7** for detailed assessment of compliance with goals and complete versions of Tables 1-7a through 1-7d.

A modified version of Table 1-7a is provided on the next sheet, which shows how the County addresses E. coli and Sediment in target audiences and the general public.

TMDL Consistency:

The enhanced Public Education and Outreach goals were specifically tailored to address Sediment and E-coli water quality issues.

Evaluation and Modification:

Use of messages tailored to address Sediment and E. coli that are focused on the proper target audiences is an effective means to raise awareness, improve individual's actions, and increase support for water quality programs. Roanoke County believes that its current activities in this area are robust and do not require modifications at this time.

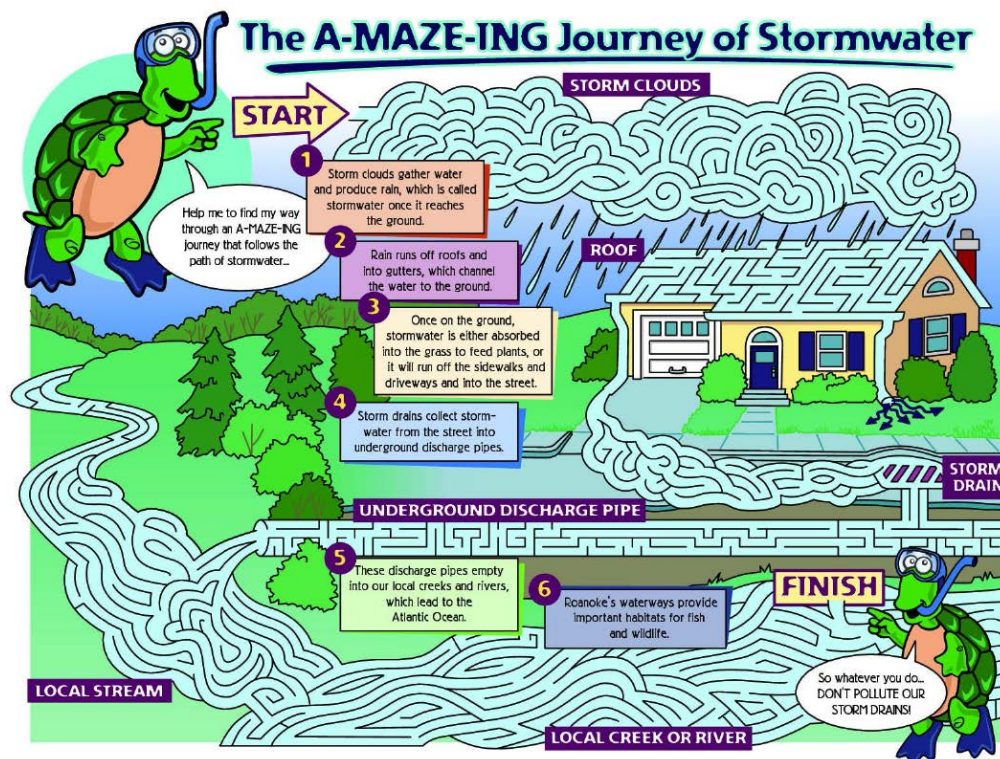


Table 1-7A (modified). Targeted Education Program for Sediment & Bacteria Reduction

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	Business Licenses/Yellow Pages	16 (TOV = 6 RoCo = 10)	<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.
	Car Dealers	Business Licenses/Yellow Pages	20 (all in RoCo)	<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 	Vehicle washing/detailing can contribute significant sediment if wash water is discharged into the County's MS4, which drains, untreated, to local streams. Residential car washing is specifically allowed; but, it still may contribute significant sediment if wash water is not properly handled.
	Auto Body Shops	Business Licenses/Yellow Pages	51 (TOV = 19 RoCo = 32)	<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 	
	Homeowners	Tax Records	36,000 (TOV = 3,680 RoCo = 32,320)	<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 Publication sent annually to homeowners • PSAs on local cable station • Handouts at local environmental events, 4 per year minimum 	
	Contractors Involved in Land-Disturbing Activities	Community Development Permit Records	51 (All in RoCo)	<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 	Erosion and sediment control is required by regulations; however, more effective implementation may occur with additional education.

TOV = Town of Vinton

RoCo = Roanoke County

High-Priority Water Quality Issue	Target Audiences	Means to Determine Audience Size	Estimated Audience Size	Overall Messages	Means to Deliver Messages	Rationale
#2 BACTERIA	Restaurants	Business Licenses/ Yellow Pages	115 (TOV = 21; RoCo = 94)	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage and contributes to algae overgrowth, which hurts aquatic life. All wastewater to sanitary sewers. Keep exterior trash receptacles and dumpsters covered and do not wash out into storm drain. Clean kitchen hoods and floor mats; properly dispose of wastewater. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	Uncovered dumpsters containing garbage and dumpsters and greasy floor mats that are rinsed out onto the pavement can contribute bacteria to our MS4, which discharges directly to our streams.
	Pet Owners (dogs/cats)	Pet Licenses	5,392 dogs 371 cats (All in RoCo)	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> County Publication sent annually to Homeowners PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Veterinarian Offices	Business Licenses/ Yellow Pages	13 TOV = 2 RoCo = 11	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in Veterinarian offices, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Pet Stores/Pet Boarding/ Grooming	Business Licenses/ Yellow Pages	27 (All in RoCo)	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in pet stores, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	County Police and Firemen; Animal Control Officer	County Records	1 (All in RoCo)	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> In-house training 	Dog waste is a major source of bacteria in our streams; these County employees own or handle dogs as part of their work.

TOV = Town of Vinton

RoCo = Roanoke County

T-3: Enhanced Employee Training (EC and SED)

Goal:

Raise awareness of the water quality issues involving E. coli and Sediment in County employees that receive employee training as a part of **BMP 6-4**.

Measurable Goals:

Compliance with **BMP 6-4** training goals for:

- Recognition and Reporting of Illicit Discharges
- Good Housekeeping and Pollution Prevention Practices
- Contractor Oversight for Environmental Compliance
- Hazardous Materials (HAZ-MAT) Training

This training began in permit year 2014 - 2015 and will be performed every two years, in accordance with the MS4 Permit requirements. See **BMP 6-4** in the MS4 Annual Report for documentation of compliance.

TMDL Consistency:

The Enhanced Employee Training was specifically tailored to address Sediment and E-coli water quality issues. (EC & SED)

Evaluation and Modification:

This training is important to give County employees the understanding of why certain procedures must be followed. The County does not believe any modifications are needed at this time.

T-4: County Facilities Assessments and Corrections (EC and SED)

Goal:

Reduce discharges of E-coli and Sediment from County facilities.

Screen County facilities for conditions that could result in elevated discharges of E-coli and Sediment.

Measurable Goals:

Roanoke County has identified all of its high-priority facilities that have a high potential to discharge pollutants in stormwater. Stormwater Pollution Prevention Plans (SWPPPs) will be prepared, implemented, and maintained for each of them. Annual inspections of all facilities that have a SWPPP will be conducted to ensure that any sources of E-coli and Sediment are identified and eliminated. Documentation of these inspections will be kept in each of the SWPPPs.

TMDL Consistency:

Screening County facilities, performing site inspections, preparing and implementing SWPPPs, and eliminating potential sources of elevated E-coli and Sediment discharge are consistent with the E-coli and Sediment TMDLs. (EC & SED)

Evaluation and Modification:

No modifications are planned for this BMP at this time. Roanoke County will continue to develop and implement the remaining SWPPPs, as previously identified and reported under BMP 6-6 and documented in Section III, under **BMP 6-6**.

T-5: Enhanced Illicit Discharge Detection and Elimination Program (EC)

Goal:

Identify and eliminate Illicit Discharges by proactively visiting and observing conditions at businesses that may have the potential to discharge elevated levels of E. coli into receiving waters.

Measurable Goals:

Beginning in permit year 2017 - 2018, a minimum of 15 businesses will be visited to perform site surveys to observe conditions.

Initial businesses to be visited include: veterinary clinics, kennels, pet stores, and restaurants.

TMDL Consistency:

Actively looking for illicit discharges of E. coli and Sediment is consistent with the TMDLs. (EC & SED)

Evaluation and Modification:

This activity will begin in permit year 2017 - 2018. Evaluation and modification are not appropriate at this time.



ONLY RAIN MAY GO DOWN THE STORM DRAIN



1. Properly dispose of all solid and liquid waste. NEVER DUMP into storm drain or on the ground.
2. Maintain grease traps or other waste oil containers and use a routine disposal service.
3. Sweep and collect debris, instead of pressure washing.
4. Dispose of all wash water (and ONLY wash water) down a sink, toilet, or floor drain.
5. Keep dumpsters and waste containers covered and ensure they do not leak. Do not rinse out dumpsters.

All Storm Drains Flow to the Roanoke River

T-6: Erosion and Sediment Control Enhanced Enforcement (EC and SED)

Goal:

Reduce offsite discharge of silt and sediment from construction sites.

Measurable Goals:

In permit year 2016 - 2017, evaluate current enforcement procedures and policies to determine if there is a need to revise them in order to obtain shortened corrective action times. If the evaluation determines that changes are advisable, any revisions to procedures and policies will be implemented in permit year 2017- 2018.

TMDL Consistency:

Actions that result in lowering discharges of silt and sediment from construction sites are consistent with the TMDLs. (EC & SED)

Evaluation and Modification:

This activity will begin in permit year 2016 - 2017. Evaluation and modification are not appropriate at this time.

T-7: Dog Waste Stations (EC)

Goal:

Increase the number of maintained dog waste stations in public parks and greenways to reduce discharge of E. coli from dog waste.

Measurable Goals:

In permit year 2015 - 2016, County staff documented the locations of the 12 existing dog waste stations and identified desired future locations. See map on the compact disk included with the MS4 Annual Report in the folder titled **TMDLs**, sub-folder **T-7**.

Three new Mutt Mitt pet waste stations were ordered in the spring of 2016 and installed by the Parks, Recreation, and Tourism Department.

In addition, over the next 5 years, 18 additional dog waste stations will be installed (20%/ year), per the Dog Waste Station Phasing Schedule, provided on the compact disk included with the MS4 Annual Report in the folder titled **TMDLs**, sub-folder **T-7**. An edited version follows:

Proposed Locations for Dog Waste Stations Phasing Schedule for Installation					
Year	Park/Greenway/Trail	Location	Existing Watercourse	Impairment	Quantity
FY 16-17	Vinyard Park 1	Between parking lot and creek	Glade Creek	Bacteria	1
FY 16-17	Walrond Park	Between Restroom and Parking Lot	Existing pond and wetland; karst area		1
FY 16-17	Starkey Park/Crystal Creek Road Fields 1-4	Parking Lot	Back Creek	Bacteria	1
FY 16-17	Arnold Burton	Parking Lot/Concession Stand	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1
					\$ 800.00
FY 17-18	Wayside Park	Parking lot	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1
FY 17-18	Brookside Park	Near Parking lot and trail to shelter	Carvin Creek		1
FY 17-18	Merriman Soccer Complex/Starkey Park	Parking Lot	Back Creek	Bacteria	1
					\$ 600.00
FY 18-19	Vinyard Park 2	Between parking lot and creek	Glade Creek	Bacteria	1
FY 18-19	Mount Pleasant Park	Parking Lot			1
FY 18-19	Hollins Park	Near small parking lot			1
					\$ 600.00
FY 19-20	Vinyard Park 1 (2nd unit)	Smaller Parking Lot	Glade Creek	Bacteria	1
FY 19-20	Whispering Pines	Parking Lot			1
FY 19-20	Oak Grove Park	Parking Lot			1
FY 19-20	Green Hill Park (3rd unit)	Picnic Shelter	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1
					\$ 800.00
FY 20-21	Read Mountain Preserve	Kiosk			1
FY 20-21	Hanging Rock Battlefield Trail (2nd unit)	Dutch Oven Road Parking Lot	Mason Creek	Bacteria, Sediment	1
FY 20-21	Explore Park (4th unit)	Along River	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1
FY 20-21	Explore Park (South Ops)	Future Greenway Trailhead	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1
					\$ 800.00
TOTAL UNITS					18
Set-up Cost (\$200/unit)					\$ 3,600.00
Annual Maintenance (\$75/unit)					\$ 1,350.00

TMDL Consistency:

Actions that decrease discharges of E. coli are consistent with the TMDL. (EC)

Evaluation and Modification:

No modifications are planned for this BMP at this time. Roanoke County will continue to install the dog waste stations, as outlined above.

T-8: Dog Waste Ordinance (EC)

Goal:

Reduce discharge of E. coli from dog waste.

Measurable Goals:

In permit year 2015 - 2016, County staff researched existing dog waste ordinances in other Virginia localities and considered the need to revise its existing Ordinance. In the event that it appeared to be advisable, a proposed dog waste ordinance would be presented to the Board of Supervisors for consideration in permit year 2016 - 2017

TMDL Consistency:

Actions that decrease discharges of E. coli are consistent with the TMDL. (EC)

Evaluation and Modification:

Based upon research of existing ordinances in Virginia, County staff could not find any locality that had a dog ordinance stricter than Roanoke County's. After internal discussion, County staff determined that enacting a stricter dog waste ordinance, at this time, would likely be counter-productive due to the probability of stiff citizen resistance, which could adversely impact other County-initiated water quality activities.

County staff believes that continued public education along with providing suitable dog waste stations are the best ways to address dog waste at this time. See the Memorandum, dated June 27, 2016, contained on the compact disk included with the MS4 Annual Report in the folder titled **TMDLs**, sub-folder **T-7** for documentation of County research and consideration.

No further actions will be taken on this BMP.

Stormwater Best Management Practices for Proper Pet Waste Disposal



A Guide for Roanoke County Pet Owners

T-9: Onsite Sewage Disposal System Maintenance Ordinance (EC)

Goal:

Reduce the discharge of E. coli due to mal-functioning onsite sewage disposal systems.

Measurable Goals:

In this permit year 2015 - 2016, staff researched onsite sewage disposal system locations within the County, and also researched the ordinances of other Virginia localities.

In permit year 2016 - 2017, staff will consult with the Board of Supervisors; if the Board gives general concurrence, then public input will be sought and a draft ordinance may be submitted for the Board's consideration.

TMDL Consistency:

Actions that decrease discharges of Sediment and E. coli are consistent with the TMDLs. (EC & SED)

Evaluation and Modification:

Based on research of existing ordinances in Virginia, periodic septic pump outs are required by state law in jurisdictions covered by the Chesapeake Bay Protection Act and in portions of some localities to protect a particular water resource (i.e., Franklin County to protect Smith Mountain Lake.

Evaluation and modification are not appropriate at this time.

Existing onsite septic systems in Roanoke County

Date Constructed	Before 1970	1970 - 1979	1980 - 1989	1990 - 2015	TOTAL
Within MS4 Area	2,670	1,328	615	631	5,244
Outside MS4 Area	2,521	1,080	1,135	2,076	6,812

T-10: Stream Buffers (EC and SED)

Goal:

Reduce discharges of Sediment and E. coli by filtering sheet flow through vegetated buffers along streams.

Measurable Goals:

In permit year 2016 - 2017, County staff will research similar ordinances in Virginia, identify properties that border waterways in the County, and develop possible stream buffer criteria for new development.

In permit year 2017 - 2018, public input will be sought and discussions with the Board of Supervisors will be held to obtain direction.

If the Board of Supervisors provides general concurrence, staff will work towards submitting an Ordinance to the Board for its consideration near the end of permit year 2017 - 2018.

TMDL Consistency:

Actions that decrease discharges of Sediment and E. coli are consistent with the TMDLs. (EC & SED)

Evaluation and Modification:

This activity will begin in permit year 2016 - 2017. Evaluation and modification are not appropriate at this time.

Capital Improvements (EC and SED)

Roanoke County has completed, or has under construction, the following projects:

1. Jail Vehicle Wash Facility - Completed September 2015



County Sheriff's Department, and other law enforcement, vehicles are washed by inmates at the jail. Previously, this wash water was discharged into the storm drainage system. To eliminate this discharge, Roanoke County constructed a covered washing area that discharges to the sanitary sewer system.

This project eliminates the improper discharge of wash water from up to 30 car washes on a peak day in the summer. This project lowers sediment discharge.

2. Restoration of Murray Run at Ogden Road - Completed July 2016

Murray Run was experiencing excessive erosion where it passes through an existing apartment complex. In some areas there were near vertical banks approximately 8 feet high. The erosion was threatening to wash out an adjacent sanitary sewer and it was beginning to threaten a nearby apartment building.

Under a unique agreement as allowed by the Public Private Education Act (PPEA), the County and the private property owner partnered to restore approximately 1,460 feet of stream using natural stream concepts. The County agreed to obtain and administer a Stormwater Local Assistance Fund (SLAF) grant from DEQ to pay for 50% of the project cost and to be responsible for long term maintenance of the stream. The private property owner agreed to pay for the 50% local grant match to design and construct the restoration and to perform normal day-to-day maintenance activities.



The private property owner benefited from this project by transforming an eroding stream that was a liability into an amenity for its tenants. The County benefited by eliminating a source of excessive erosion and decreasing sediment and E. coli discharge. It is anticipated that this project will decrease sediment discharge by 226.3 tons/year.

3. Restoration of Glade Creek at Vinyard Park – Under construction; completion estimated January 2017

Glade Creek was experiencing excessive erosion where it passes through Vinyard Park. In some areas, there were near vertical banks approximately 10 feet high. The County obtained a SLAF grant and procured a Design Build Contractor. Permitting was complicated by the need to obtain a U.S. Fish and Wildlife biological opinion since Glade Creek is habitat for the endangered freshwater fish known as the Roanoke Logperch.



Construction began in September 2016 and is expected to be completed in January 2017. The restoration of 2,500 feet of stream in the upper part of Vinyard Park is anticipated to decrease sediment discharge by 831 tons/year. This project lowers sediment and E-coli discharges.



Future Capital Improvement Projects

Roanoke County is currently evaluating potential projects to submit for SLAF funding. The SLAF solicitation is anticipated by the end of December 2016 with application deadline at the end of February. The following projects are being considered:

1. Restoration of Glade Creek at Vinyard Park, Phase 2

This project would continue the existing stream restoration through the lower portion of Vinyard Park. It would consist of more localized natural stream features for a distance of approximately 2,500 feet. This project would eliminate excessive sediment discharges and also protect existing playing fields.

2. Restoration of a tributary of Mudlick Creek at Garst Mill Park

There was a project to restore Mudlick Creek at Garst Mill Park around 2010. This project would extend stream restoration for approximately 250 feet up a tributary. This project would eliminate excessive sediment discharges.

3. Stabilization of a Tributary to Glade Creek at Read Mountain Preserve

Read Mountain Preserve is a natural County Park on Read Mountain. There is a steep ephemeral stream with steep barren side slopes through easily erodible material. This approximately 500-foot reach is discharging excessive sediment. This project would stabilize the steep barren side slopes and provide energy dissipation for the main channel.

4. Stabilization of a Tributary to Mudlick Creek at Hidden Valley High School

This tributary is severely eroded. In some cases, the channel has been lowered over 20 feet. This project is complicated by poor construction access and the need to obtain easements from 6 homeowners.

5. Restoration of Wolf Creek at Goode Park/Wolf Creek Greenway

This project would consist of a series of projects that would extend for about 3 miles through Goode Park and along the Wolf Creek Greenway to provide Natural Stream Restoration.

At this time, Roanoke County cannot commit to any of these projects until SLAF funding is obtained.

D. STORMWATER VOLUME AND POLLUTANT LOAD ESTIMATION FOR YEAR 3

The volume of stormwater discharged and the quantity of pollutants is estimated for all water bodies with a Wasteload Allocation (WLA). These calculations are the same as those used in Year 5 of the previous permit as no significant changes have occurred.

In this section, the methods used and results of the calculations are described:

1. Estimated Drainage Area and Percent Impervious, for Sediment and E. coli
2. Annual Precipitation
3. Estimation of Volume of Stormwater Discharged, for Sediment and E. coli Analysis
4. Estimation of Colony Forming Units of E. coli
5. Estimation of Total Suspended Solids Discharged Annually
6. Sediment and E. coli TMDL Studies and Wasteload Allocations
7. Comparison of Discharges to Wasteload Allocations for Sediment and E. coli
8. PCBs TMDL Studies and Wasteload Allocations
9. Issues for Further Study and Clarification

Roanoke County recognizes the need for a better pollutant load estimation methodology. The County anticipates changing its plan assessment methodology to the Watershed Treatment Model, developed by the Center for Watershed Protection, for submission of the next annual report, due by October 1, 2017.

Estimated Drainage Area and Percent Impervious, for Sediment, and E. coli

In Roanoke County's Year Three Annual Report of the previous permit, the percent imperviousness for the County was derived from the *Report on Roanoke County's Existing and Possible Urban Tree Canopy*, which was completed by the Virginia Department of Forestry in collaboration with Roanoke County and the Roanoke Valley-Alleghany Regional Commission. This report only considered impervious cover for the County's "urbanized areas." The report found the total impervious percentage for the County's "urbanized areas" to be 11.2%. This average imperviousness was assumed constant for each drainage area in the County.

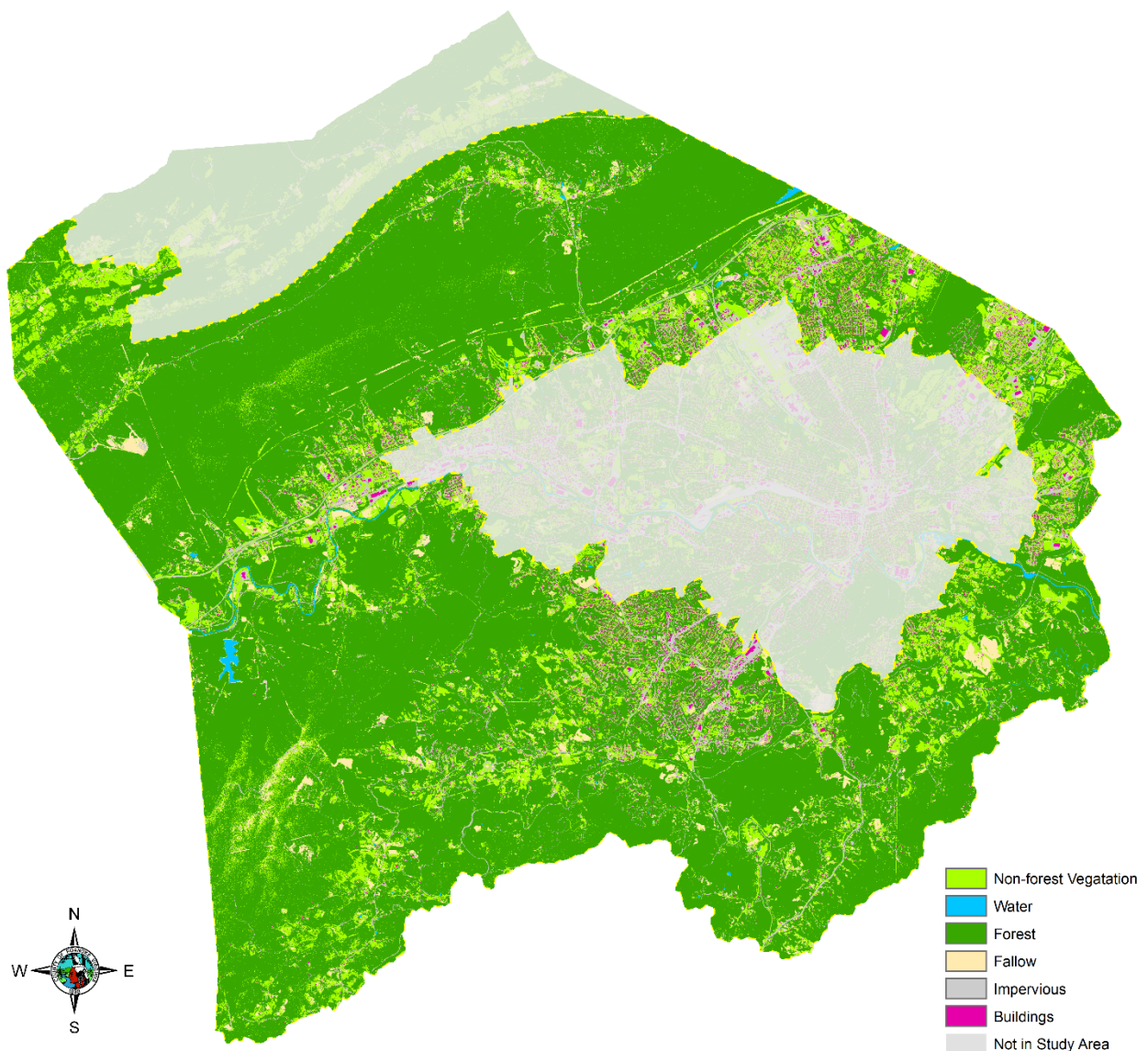
For the Year Four Annual Report under the previous permit, the percent impervious across the entire County was derived from the Roanoke County Land Cover Data Set. This data set is based on imagery from the United States Department of Agriculture's 2008 1 meter National Agriculture Imagery Program (NAIP). The NAIP imagery covers the entire extent of Roanoke County and it defines six delineated classes: water, forest, grasslands, buildings, fallow, and impervious. For the purposes of pollutant load estimation, it was assumed that impervious areas are made up of buildings and impervious classes only. Using this data, imperviousness was calculated for each watershed with an identified wasteload allocation. Also, data used for watershed delineations in Year Four was changed to reflect County boundary changes. As a result, the drainage area of each impaired watershed was changed.

For Year Five of the previous permit, the drainage area and percent impervious for each impaired stream were adjusted to reflect changes in the urbanized areas based on the 2010 U.S. Census. All drainage areas were also re-delineated to ensure that only areas that were within the urbanized areas, based on the 2010 U.S. Census (MS4 regulated areas of the County), were included. The revised drainage areas and impervious percentages are shown in the table on the following page.

Impaired Watershed	Drainage Area (ac)	Percent Impervious
Carvins Creek	3,862	25.22%
Glade Creek	2,368	20.89%
Lick Run	327	35.77%
Ore Branch	882	26.11%
Roanoke River(1)	20,812	20.39%
Roanoke River(2)	27,023	21.10%
Tinker Creek	2,830	13.32%

- (1) For purpose of E. coli TMDL
(2) For purpose of Sediment TMDL

NAIP Imagery, 2008, used to calculate Imperviousness for Regulated Watersheds



Annual Precipitation

Roanoke County gathers its annual precipitation from the Local Climatological Data from the National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center. Roanoke County used the data from the Roanoke Regional/Woodrum Field Airport (KROA) due to its close proximity to the County. This data was collected on a monthly basis from July 1, 2012 to June 30, 2013 and compiled for this report. The total precipitation for the July 1, 2012 to June 30, 2013 period was **42.26 inches**.

Estimation of Volume of Stormwater Discharged, for Sediment and E. coli Analysis

Using the percent impervious for each watershed and the annual precipitation, Roanoke County has used the formula below to derive the volume, in cubic feet, of runoff from the regulated MS4 for each of the watersheds with an identified WLA. The results are shown below:

$$R \text{ ft}^3 (\text{runoff}) = x.xx * \left(\frac{y.yy \text{ in} * 1 \text{ ft}}{12 \text{ in}} \right) \left(\frac{z.zz \text{ mi}^2 * 27,880,000 \text{ ft}^2}{1 \text{ mi}^2} \right)$$

Where: x.xx = Estimated percent impervious
 y.yy = Annual precipitation of reporting period 2012 - 2013 (taken from NOAA, Roanoke Regional Airport Station (KROA), inches
 z.zz = Area of MS4, square miles
 R = Runoff Volume Estimate, cubic feet

Watershed with WLA	Drainage Area of MS4 (ac)	Runoff Depth (in)	Stormwater Runoff Volume (ft ³)
Carvin Creek	3,862	10.66	1.49E+08
Glade Creek	2,368	8.83	7.59E+07
Lick Run	327	15.12	1.80E+07
Ore Branch	882	11.03	3.53E+07
Tinker Creek	2,830	5.25	5.13E+07
Roanoke River(1)	20,812	8.62	8.75E+08
Roanoke River(2)	27,023	8.92	8.75E+08

- (1) For Purpose of E. coli TMDL
 (2) For Purpose of Sediment TMDL

Estimation of Colony Forming Units of E. coli

Roanoke County has utilized the Simple Method (Schueler, 1987) to calculate urban stormwater loading for bacteria. This method was originally derived to calculate bacteria in the form of Fecal Coliform using the National Median Concentrations for Chemical Constituents in Stormwater factor for fecal coliform. To convert to the E. coli standard for bacteria to make this calculation consistent with the WLA, Roanoke County converted Fecal Coliform to E. coli using the regression model developed by the Virginia Department of Environmental Quality. These methods and results are detailed below.

The Simple Method:

$$L(\text{cfu} / \text{year}) = 103 \times R \times C \times A$$

Where:

- L = Annual load (cfu/yr)
- R = (x.xx * y.yy")
= Annual Runoff Estimate, inches
- C = Bacteria Concentration (1,000/mL)
= 15,000/mL (factor for fecal coliform)
- A = (z.zz mi² * 640.09)
= Area (ac)
- 103 is the Conversion Factor for Bacteria

The Virginia Department of Environmental Quality Conversion from Fecal Coliform to E. coli

$$E\ coli = 2^{[-0.0172 - 0.91905 * \text{Log}_2(\text{fecal coliform})]}$$

Watershed with WLA	Drainage Area of MS4 (acres)	Runoff Depth (inches)	E Coli (cfu/yr)
Carvins Creek	3,862	10.66	8.39E+09
Glade Creek	2,368	8.83	4.50E+09
Lick Run	327	15.12	1.20E+09
Ore Branch	882	11.03	2.23E+09
Tinker Creek	2,830	5.25	3.51E+09
Roanoke River	20,812	8.62	3.24E+10

Estimation of Total Suspended Solids Discharged Annually

Roanoke County utilized the Simple Method (Schueler, 1987) to calculate urban stormwater loading for total suspended solids. This method is identical to the method used for Fecal Coliform with different values for pollutant concentration and conversion factors. See method below:

The Simple Method:

$$L \text{ lbs}(\text{annual load}) = 0.226 \times R \times C \times A$$

Where:

L = Annual load (lbs/yr)
R = (x.xx * y.yy")
= Annual Runoff Estimate, inches
C = Pollutant Concentration (mg/L)
= 54.51 mg/L (factor for TSS)
A = (z.zz mi² * 640.09)
= Area (ac)
0.226 is the Conversion Factor for TSS

$$L \text{ tons}(\text{annual load}) = \frac{L \text{ lbs}(\text{annual load})}{2000 \text{ lbs}}$$

Watershed with WLA	Drainage Area of MS4 (acres)	Runoff Depth (inches)	Total Suspended Solids (tons/yr)
Roanoke River	27,023	8.92	1.48E+03

Sediment and E. coli TMDL Studies and Wasteload Allocations

There have been three sediment and E. coli TMDL Studies performed by DEQ, in Roanoke County, with 7 TMDL impairments identified as follows:

TMDL Study	Date Approved by EPA	Impairment	Impaired Streams
Tinker Creek Watershed E. coli TMDL Study	August 5, 2004	E. coli	Glade Creek, Carvin Creek, Lick Run, Tinker Creek
Roanoke River and Ore Branch E. coli TMDL Study	August 2, 2006	E. coli	Ore Branch, Roanoke River
Roanoke River Benthic TMDL Study	September 7, 2006	Benthic (Sediment)	Roanoke River

Tinker Creek Watershed E. coli TMDL Study

<u>Stream</u>	<u>WLA (colony forming units/year)</u>
Glade Creek	8.02E+10
Carvin Creek	4.07E+12
Lick Run	3.29E+09
Tinker Creek	5.36E+11

The study states that an approximate 75% reduction in bacteria from existing developed lands is needed to meet these WLAs.

Roanoke River and Ore Branch E. coli TMDL

		Current Discharge*	WLA	
<u>Stream</u>	<u>colony forming units/Year</u>	<u>colony forming units/Year</u>	<u>% Reduction</u>	
<u>Required</u>				
Ore Branch	2.13E+11	1.07E+09	99.5%	
Roanoke River	2.37E+13	2.84E+11	98.8%	

* Current discharge based on TMDL study

The study states that approximately 99% reduction in bacteria from stormwater runoff from developed lands is needed to meet these WLAs.

Roanoke River Benthic (Sediment) TMDL

<u>Stream</u>	<u>WLA (tons/yr)</u>
Roanoke River	1680.0

The study states that excessive sediment is the most probable stressor identified that is adversely affecting benthic organisms (macro-invertebrates that live on the stream bed). These organisms form the basis of the food chain for larger animals such as fish.

The study states that to reach the WLA, a 69.5% reduction in sediment from all developed lands and in-stream erosion is required.

In-stream erosion is the largest contributor of sediment.

Comparison of Discharges to Wasteload Allocations for Sediment and E. coli

E. coli

Watershed with WLA	Drainage Area of MS4 (acres)	Calculated E. coli (cfu/yr) (2012-2013)	Wasteload Allocation (cfu/yr)	Apparent Compliance Status
Carvins Creek	3,862	8.39E+09	4.07E+12	Compliant
Glade Creek	2,368	4.50E+09	8.02E+10	Compliant
Lick Run	327	1.20E+09	3.29E+09	Compliant
Ore Branch	882	2.23E+09	1.07E+09	50% Reduction Required
Tinker Creek	2,830	3.51E+09	5.36E+11	Compliant
Roanoke River	13,155	3.24E+10	2.84E+11	Compliant

Benthic (Sediment)

Watershed with WLA	Drainage Area of MS4 (acres)	Calculated Total Suspended Solids (tons/yr) (2012 – 2013)	Wasteload Allocation (tons/yr)	Apparent Compliance Status
Roanoke River	27,023	1.48E+03	1.68E+03	Compliant

PCBs TMDL Studies and Wasteload Allocations

According to the US EPA, Polychlorinated Biphenyls (PCBs) are man-made organic chemicals known as chlorinated hydrocarbons. PCBs were previously used in electrical equipment and other industrial uses. Their manufacture was banned in the United States in 1979. However, they are very stable molecules that can persist in the environment for long periods of time. PCBs reach streams from land that is contaminated by PCBs. Once in streams, PCBs are largely contained in stream sediments.

The Virginia DEQ has conducted one PCBs TMDL Study in Roanoke County, with 6 TMDL impairments identified as follows:

TMDL Study	Date Approved by EPA	Impairment	Impaired Streams
Roanoke River PCBs TMDL Study	April 9, 2010	PCBs	Masons Creek, Peters Creek, Tinker Creek, Wolf Creek, Unnamed Tributary, Roanoke River

<u>Stream</u>	<u>Current Discharge (mg/yr)*</u>	<u>WLA (mg/yr)</u>
Masons Creek	14.6	0.1
Peters Creek	490.0	4.7
Tinker Creek	4045.4	38.4
Wolf Creek	1053.2	10
Unnamed Tributary	52.8	0.5
Roanoke R	5038.7	47.9

*Based on DEQ TMDL study

Note that the WLAs for PCBs are very small, on the order of milligrams/year. The WLAs requires a PCB reduction of 99.05%.

Roanoke County's specific Action Plan for PCBs is contained in the attached compact disk under the folder titled TMDLs.

This DEQ TMDL Study inadvertently left out a WLA for the Town of Vinton. It appears that the Town of Vinton's WLA has been lumped into the County's WLA.

PCBs contamination is a result of background levels (due to the ubiquitous nature of PCBs), deposition to the land by air and rain, and continued release from unknown legacy sites. PCBs cannot be addressed by the same stormwater BMPs that may be effective for nutrients, bacteria, and sediment.

Roanoke County has not calculated PCBs discharge on an annual basis, as we do not know any method that correlates with land use and runoff volumes.

Issues for further Study and Clarification

1. Roanoke County understands that the MS4 areas that are covered by the wasteload allocations are the urban lands, as designated by the U.S. Census in its latest census. Due to the 2010 census, Roanoke County's urbanized area was enlarged. Roanoke County's wasteload allocations need to be adjusted by DEQ to account for this regulatory increase in land area.
2. The Tinker Creek TMDL Study and Roanoke River and Ore Branch TMDL Study indicate, respectively, that a 75% and 99% reduction in E. coli would be required to meet the wasteload allocations. However, Roanoke County's calculations using the Simple Method, and information gathered from its GIS system, indicate that all of the County's streams with wasteload allocations for E. coli are **in compliance**, except for Ore Branch. Roanoke County's calculations indicate that Ore Branch requires a 50% reduction in E. coli, rather than the 99% reduction that is identified in the TMDL study. It is understood that Roanoke County's calculations, using the Simple Method, may not be as accurate as the methodology used to develop the wasteload allocations.
3. The Roanoke River Benthic TMDL Study indicates that an approximate 69.5% reduction in sediment from developed lands and from in-stream erosion is necessary to meet the wasteload allocations. However, Roanoke County's calculations using the Simple Method, and information gathered from its GIS system, indicate that the Roanoke River is **in compliance** with its wasteload allocation. It is understood that Roanoke County's calculations, using the Simple Method, may not be as accurate as the methodology used to develop the wasteload allocations.
4. The Roanoke River PCBs TMDL Study needs to be revised to give the Town of Vinton a share of the wasteload allocation.
5. Roanoke County is unaware of any good method to calculate the yearly discharge of PCBs from a watershed.

The calculated E. coli and Sediment discharges are based solely on land use and precipitation values. Impacts from existing BMPs are not reflected in these calculations. As the County's GIS system is improved to better locate and quantify the beneficial effects of BMPs, such BMPs will be integrated into future water quality calculations. Roanoke County plans on developing a local Watershed Treatment Model (WTM) based on the spreadsheet developed by the Center for Watershed Protection for use in the next annual report.

SECTION III

**Supporting Documents
(See attached CD)**