COUNTY of ROANOKE VIRGINIA

Municipal Separate Storm Sewer System (MS4) Annual Report

Permit Year Two: July 1, 2014 – June 30, 2015

Submitted:
October 1, 2015

Prepared By:
Department of Community Development
5204 Bernard Drive
P. O. Box 29800
Roanoke, VA 24018

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

DEQ
Virginia Department of Environmental Quality

County of Roanoke Virginia 1838

Acknowledgements

Roanoke County Board of Supervisors

P. Jason Peters
Vinton Magisterial District
Chairman of the Board

Joseph P. McNamara, CPA
Windsor Hills Magisterial District
Vice Chairman of the Board

Joseph B. "Butch" Church
Catawba Magisterial District

Al Bedrosian
Hollins Magisterial District

Charlotte A. Moore
Cave Spring Magisterial District

Thomas C. Gates
County Administrator

Paul M. Mahoney
County Attorney

Deborah C. Jacks
Clerk to the Board

Report prepared and compiled by

The Roanoke County Department of Community Development
Arnold Covey, Director of Community Development
Tarek Moneir, Deputy Director of Development Services
David Henderson, County Engineer
Cynthia S. Linkenhoker, Stormwater Program Manager
Butch W. Workman, Stormwater Operations Manager

Contributing agencies and organizations

Clean Valley Council
The City of Roanoke
The Town of Vinton
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.

9/24/15

Responsible Official Signature **Date**

Thomas C. Gates

VAR040022 County of Roanoke

Permit Number MS4 Name

Table of Contents

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 two Action Plans to identify County actions to decrease discharges of sediment and E.coli (bacteria). This report is the second 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, 2014 - June 30, 2015) 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

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

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

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 2 of the reissued permit, the County developed an informative stormwater newsletter that was mailed to every resident, just over 35,000 addresses. In addition, the County circulated stormwater educational articles by way of its electronic newsletter, produced and distributed by the Department of Community Development, and this monthly newsletter is emailed to 868 people, including staff and residents. Also, 185 people "like" the Roanoke County Planning Services page on Facebook and may see the posts.

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.**

June 2015
Volume 1, Issue 1

A Stormwater Guide for Homeowners

What is Stormwater?

Inside this issue:

Of Special Interest:
- What is an Illicit Discharge?
- Is Pet Waste Harmful to Local Waters?
- Where Can Hazardous Household Wastes Be Safely Discarded?
- What is an MS4 Permit?

Stormwater is the excess runoff water that comes primarily from precipitation (rain or snow) that runs off of impervious surfaces like streets, driveways, sidewalks, parking lots and building rooftops. These impervious surfaces block the ability of the precipitation to absorb into the soil, which creates runoff. As the stormwater travels across these and other surfaces, like lawns and construction sites, it picks up pollutants along the way, such as fertilizers, trash, debris, leaves, litter, pet waste, and sediment, and carries it all straight to the nearest receiving river, creek, or stream. The stormwater is transported overland or by way of an open ditch, swale, or underground storm pipe, the latter of which collects the stormwater through a catch basin or a drainage inlet in a parking lot or along the street curb.

Household wastewater travels from toilets, sinks, and showers to a wastewater treatment plant through the underground sanitary sewer system. However, *stormwater runoff is not treated!* Thus, most pollutants that end up on the ground ultimately end up in the area's local waterways, where they have a direct affect on water quality. The Roanoke River and most of its tributaries have been negatively affected by polluted stormwater runoff and, as a result, the Virginia Department of Environmental Quality (DEQ) has classified them to be impaired due to three main pollutants: Sediment, bacteria, and polychlorinated biphenyls (PCBs).

Household wastewater (toilet, sinks, etc.)
Catch basin
Sanitary Sewer Pipe
Storm Sewer Pipe
2 Underground Systems

Diagram courtesy of City of Fairchild, OH

What are the Main Pollutants in Stormwater?

Polluted stormwater may carry a host of different contaminants, which can be divided into three main categories: *(1) Natural* - leaves, shrubs and grass clippings, sediment, pet waste; *(2) Chemical* - detergents, oil, grease, gasoline, pesticides, fertilizers; and *(3) Litter* - cigarette butts, plastic bags, drink containers, food wrappers, etc. How these products affect waterways varies somewhat. For example, **sediment** clouds waters, clogs storm drain pipes, smothers fish eggs, and limits the ability of water plants to use light as their energy source. **Organic material** (leaves, grass, etc.) uses up vital oxygen in water, making it hard for fish and other critters to breathe. **Litter** clogs pipes and waterways; it also causes toxicity from the breakdown of materials. The latter negatively affects plants, fish, and wildlife.

Pollutants reach streams thru storm drainage inlets and underground pipes.

TMDL Consistency:

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

Evaluation and Modification:

Previously, the County had included a page in a mailer periodically written and mailed by the Department of Parks, Recreation, and Tourism. By developing a stand-alone stormwater newsletter, the County believes that the message is better delivered to citizens. The County will continue to review this BMP for possible expansion. The County's goal continues to be to perform effective outreach to its citizens.

Year	Distribution Statistics
2013-2014 (YEAR 1)	-
2014-2015 (YEAR 2)	32,599 stormwater newsletters; 868 e-newsletters

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 and 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 **30** outdoor stream monitoring sessions 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 **551**, serving 536 youths and 15 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 and 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

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 County and private schools across the Roanoke Valley region. Some **86** presentations were made to Roanoke County schools and another **35** were held for private schools. These programs reached **2,436** students between pre-kindergarten through the 12th grade:

1. Drains to Rivers
2. Enviroscape
3. Groundwater
4. Indoor Stream School
5. Land Use
6. Oceans of Trash
7. Macro-invertebrates
8. Recycling Game
9. Reeling the Runoff
10. Rigsby
11. Soil: Who Needs It?
12. Storm Drain Stenciling
13. Stormwater
14. Stormwater BMPs
15. Stream School
16. Trash to Treasure (Recycled Boats)
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

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 give-aways of stormwater-related merchandise.

Measurable Goals:

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

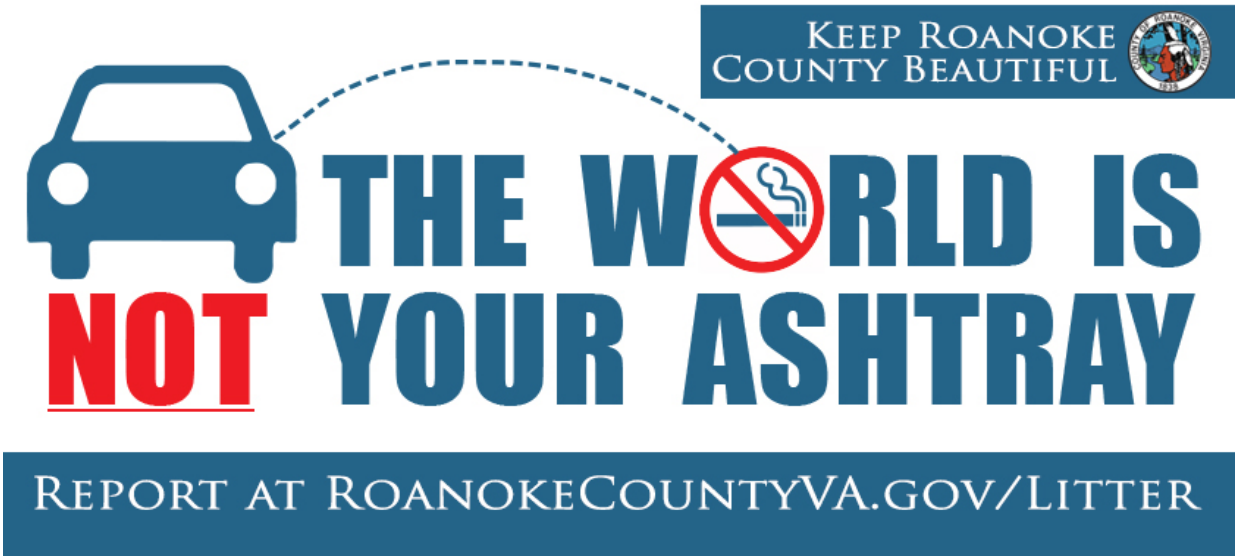
- Ashtrays
- Backpack Tags
- Bug Cards
- Car Wash PC
- "Doody" fliers
- Chip Clips
- Crayons
- Earth Crowns
- Funnels
- Lanyards
- Litter Activity Books
- Litter Bags
- Litter Rulers
- Magnets
- Pencils
- Rain Gauges
- Rain Barrel Pamphlets
- Rulers
- Stickers
- Stormwater Bookmarks
- Stormwater Pamphlets

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 addition, CVC completed **two** articles in the local papers regarding stormwater runoff and associated pollutants on behalf of Roanoke County and the surrounding localities.

In total, the CVC gave out **4,014** 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**.

Roanoke County, in conjunction with RVTV3, Town of Vinton, City of Roanoke, and City of Salem developed five Public Service Announcements (PSAs) to share information with the public as part of the localities' stormwater public awareness/education programs. The PSA's were primarily focused on the three high priority water quality issues: Bacteria, nutrients, and sediments, and topics included the proper techniques for lawn care, car washing, and the handling of kitchen oils and grease, the need to scoop up pet poop, and the value of rain barrels. A copy of these PSA's may be found on the attached compact disk under the folder titled **BMP 1-5**. These PSA's are also posted on several websites, including but not limited to CVC, Roanoke County, and RVTV3.

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, 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 last year's report, the County has 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 120 visits to the online videos and 186 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)	• 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)	• 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)

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 get 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 **4,197 visits, with 5,883 page** views to the stormwater website between July 1, 2014 and June 30, 2015. The number of visitors to each webpage for this second 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: 7/1/2014-6/30/2015			
Page Name	**Visits**	**Pageviews**	**%**
Roanoke County, VA - Official Website - Flood Warning System	84	98	2%
Roanoke County, VA - Official Website - Flooding in Roanoke County	196	245	4%
Roanoke County, VA - Official Website - Floodplain Management	336	488	8%
Roanoke County, VA - Official Website - Local Projects	166	185	3%
Roanoke County, VA - Official Website - NPS Pollution	537	617	10%
Roanoke County, VA - Official Website - Roanoke County Watersheds	203	266	5%
Roanoke County, VA - Official Website - Stormwater Advisory Committee	202	300	5%
Roanoke County, VA - Official Website - Stormwater Documents & Ordinances	767	1250	21%
Roanoke County, VA - Official Website - Stormwater Management	927	1425	24%
Roanoke County, VA - Official Website - Stormwater Management Public Education	92	120	2%
Roanoke County, VA - Official Website - Stormwater Public Education Videos	120	186	3%
Roanoke County, VA - Official Website - Stormwater Resources	110	146	2%
Roanoke County, VA - Official Website - Stream Impairments & TMDLs	181	222	4%
Roanoke County, VA - Official Website - Volunteering Opportunities	276	335	6%
Total	**4197**	**5883**	**100%**

TMDL Consistency:

The County's stormwater website highlights a page discussing "Non-point Source Pollution." 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 tie directly 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

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 2 of the re-issued permit, Roanoke County partnered with the Clean Valley Council, Roanoke City, and Town of Vinton to develop and distribute 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 several brochures, Fact Sheets, 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**.

As mentioned in BMP 1-5, Roanoke County, in conjunction with RVTV3, Town of Vinton, City of Roanoke, and City of Salem developed five Public Service Announcements (PSAs) to share information with the public as part of the localities' stormwater public awareness/education programs. The PSA's were primarily focused on the three high priority water quality issues, and topics included the proper techniques for lawn care, car washing, and the handling of kitchen oils and grease, the need to pick up pet waste, and the value of rain barrels.

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	16	• All wash water to sanitary sewer. • Potential damage caused to streams by wash water.	• 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 wash water to sanitary sewer. • Potential damage caused to streams by wash water.	• 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	• All wash water to sanitary sewer. • Potential damage caused to streams by wash water.	• Mailer, annually • PSAs on local cable station	
	Homeowners	Tax Records	36,000	• 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.	• 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	• 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.	• 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	115	• 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.	• 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	• Excessive bacteria hinders stream usage. • Dog waste ends up in streams. • Pick up after your pet and properly dispose of waste.	• 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	• Excessive bacteria hinders stream usage. • Dog waste ends up in streams. • Pick up after your pet and properly dispose of waste.	• 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	• Excessive bacteria hinders stream usage. • Dog waste ends up in streams. • Pick up after your pet and properly dispose of waste.	• 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		• Excessive bacteria hinders stream usage. • Dog waste ends up in streams. • Pick up after your pet and properly dispose of waste.	• 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	36,000	• How nutrients damage streams. • Do not over-fertilize. Use soil tests. • Keep fertilizer off of pavements. • Do not over-water lawns.	• 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	2	• How nutrients damage streams. • Do not over-fertilize. Use soil tests. • Keep fertilizer off of pavements.	• Mailer, annually • PSAs on local cable station	
	Lawn Care Services	Business Licenses/ Yellow Pages	58	• How nutrients damage streams. • Do not over-fertilize. Use soil tests. • Keep fertilizer off of pavements. • Encourage use of organic products.	• Mailer, annually • PSAs on local cable station	

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

Type	Name	TMDLS Addressed
Poster	"There's No Such Thing as the Poop Fairy"	Bacteria
Newsletter	"A Stormwater Guide for Homeowners"	Bacteria, Sediment, PCBs, and more
Brochure	"It's Just Dirt"	Sediment
	"It's Your Doodie"	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

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	125	Stormwater Management BMPS for Restaurants; MS4 permit requirements.
	Postcard	Mailed	125	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	196	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	34	Pet waste pollutes receiving streams; owners are encouraged to pick up after their pets.
Landscaping Professionals	Letter and Fact Sheet (RoCo only*)	Mailed	12	Grass/shrub clippings, leaves, sediment, fertilizers, etc. cause pollution to receiving waters; use BMPs to minimize lawn debris, reuse stormwater, install erosion controls, employ alternative lawn care practices.
Violators of Illicit Discharge Ordinance	Fact Sheet	Mailed at time of violation	2	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	25	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	12	"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; mailed with Illicit Discharge notices	3	"Reduce, Reuse, Recycle and properly dispose of hazardous household wastes" brochure.
Residents	Newsletter	Mailed	32,599	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 the mail-out of the various materials, the County received numerous inquiries from business owners as to how to properly address their car wash operations and restaurant kitchen cleaning practices. Although some of the feedback was negative (i.e., "too much government in my business"), 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	# of Businesses/ # Sent	% 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	Residents	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%

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 second year of the new permit cycle, the Clean Valley Council, on behalf of the County, hosted **two** storm drain stenciling events, with **64** 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

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:

Roanoke County was active in **6** regional events throughout the year that involved 6,050 people:

- Clean Valley Day
- Earth Day
- Fall Waterways Cleanup
- Public Works Expo
- Roanoke River Duck Race
- Tons of Fun

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:

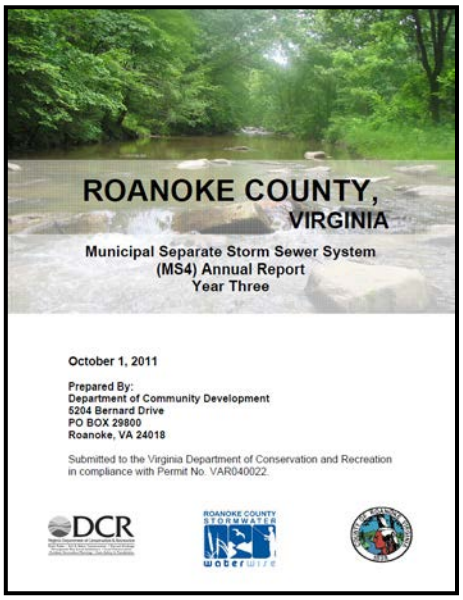
Based upon the attendance at these public events, Roanoke County finds this BMP to be an effective method of allowing the citizens to inquire about issues and allowing the County an opportunity to receive public input and also to provide pertinent stormwater-related information.

Year	Public Event(s)	Attendance
2013 – 2014 (YEAR 1)	14	23,490
2014 - 2015 (YEAR 2)	6	6,050

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:

- Annual Report, Year 1, dated October 1, 2014, revised March 23, 2015 for Reissued Permit (eff. 2013 – 2018)
- Previous Years One through Year Five Annual Reports
- Evidence of MS4 Permit Coverage letter from DEQ, dated July 1, 2013. This was posted, along with the MS4 permit, on the County's website on July 3, 2014
- 2013 VSMP General Registration Statement for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems, dated March 25, 2013
- MS4 Program Plan, revised March 21, 2013
- MS4 Program Plan, revised March 23, 2015

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 the revised Program Plan, 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).

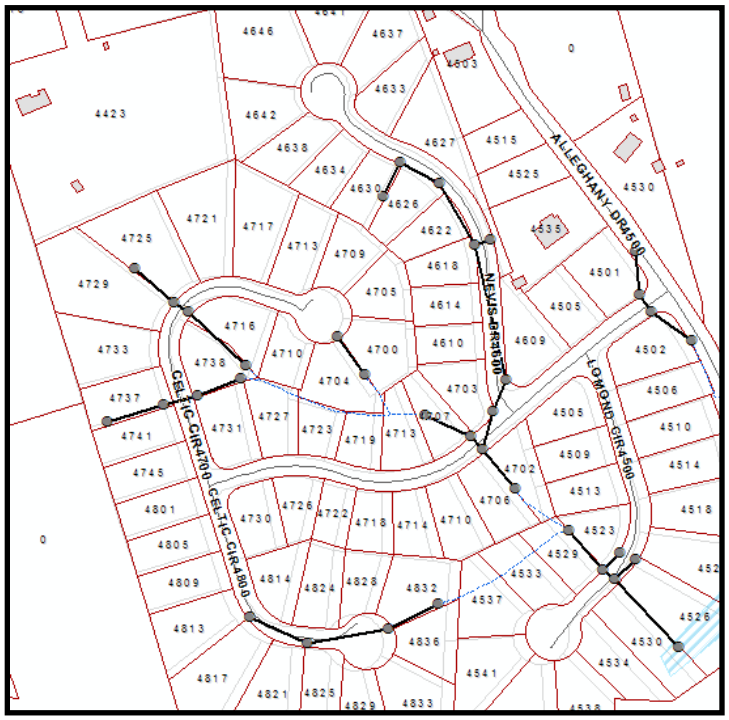
BMP 3-1: Storm Drain Map

Goal:

The goal of this program is to develop, and keep updated, a storm drain map which 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 2, there were 33 new outfalls added, draining 469.53 acres.



TMDL Consistency:

An updated and accurate storm drain map which identifies 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 a new 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 method will aid the County in eliminating illicit connections and discouraging a variety of illicit discharges to the system. (EC)

Evaluation and Modification:

Due to changes in the Virginia Stormwater Law and Regulations, Roanoke County adopted a new Stormwater Management Ordinance last year. 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

BMP 3-3: MS4 Outfall Inspections

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 this second year of the reissued permit, 85 outfalls were inspected with no identified illicit discharges. The selection process in both years 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:

Inspecting stormwater outfalls is 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 believed to be an effective technique of identifying illicit discharges and illegal connections when they exist/occur.

Year	# Outfalls Inspected	# of Illicit Discharges Found
2013 - 2014 (Year 1)	96	None
2014 – 2015 (Year 2)	85	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 has developed procedures to detect, address, and report illicit discharges that enter the municipal separate storm sewer system. The Illicit Discharge Ordinance (BMP 3-2) includes procedures to prohibit illicit discharges through the enforcement process.

In this Permit Year 2 of the reissued permit, Roanoke County responded to 15 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 2 summarizes the complaints, the associated investigations, how the issue was resolved, and the date the investigation was closed. This log is on the attached compact disk under the folder titled **BMP 3-4.**

The results of Permit Year 2 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 follow up on 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

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 current Erosion and Sediment Control Ordinance is 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 adoption of the new state stormwater regulations, the County has proposed revisions to its ordinance to meet the newer requirements, subject to Board of Supervisors' approval. A copy of the ordinance is on the attached compact disk under the folder titled **BMP 4-1**.

During this second year of the reissued permit, the County had **189** regulated land-disturbing activities, and a total of **66.31** 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**.

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 will be revised to align with the new state regulations, as noted above. Roanoke County believes that the Erosion and Sediment Control Ordinance is a critical component in reducing pollutants in stormwater runoff to its MS4 from construction activities. To that end, it is also critical that the ordinance remain in compliance with the Virginia Erosion and Sediment Control Regulations.

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.

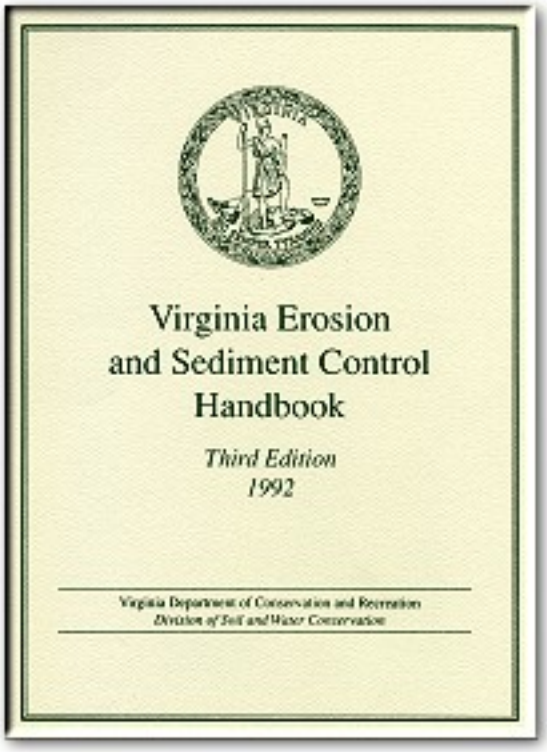
BMP 4-2: Erosion and Sediment Control Certification

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 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.

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.

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, which may be found on the attached compact disk under the folder titled **BMP 4-3**.

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.

BMP 4-4: Erosion and Sediment Control Inspection

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

SFR = Single Family Residential

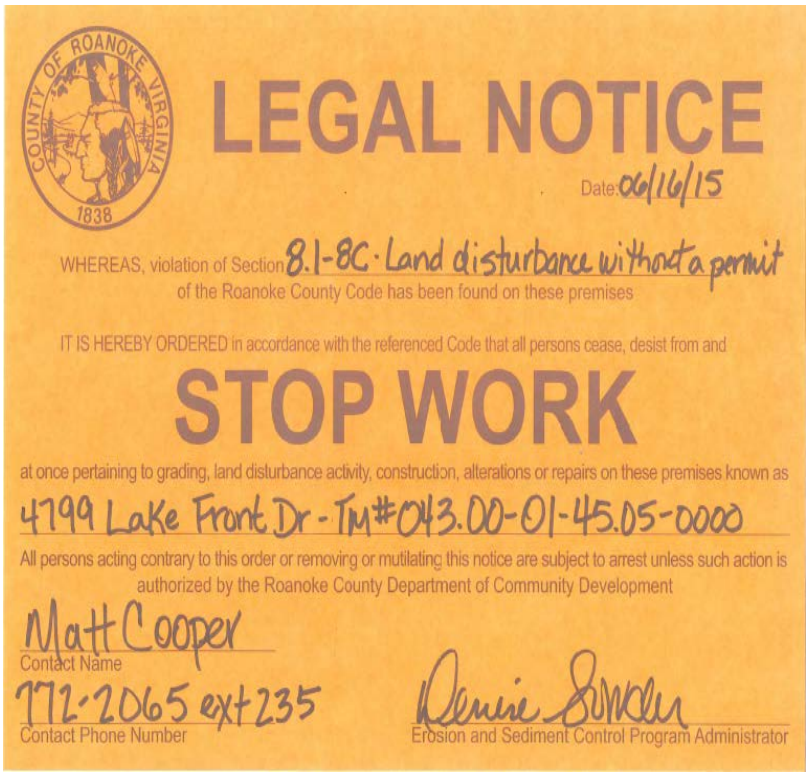
BMP 4-5: Erosion and Sediment Control Compliance and Enforcement

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 2, including the total number and type of enforcement actions is included on the attached compact disk under the folder titled **BMP 4-5**.



COUNTY OF ROANOKE VIRGINIA 1838

LEGAL NOTICE

Date: 06/16/15

WHEREAS, violation of Section 8.1-8C · Land disturbance without a permit of the Roanoke County Code has been found on these premises

IT IS HEREBY ORDERED in accordance with the referenced Code that all persons cease, desist from and

STOP WORK

at once pertaining to grading, land disturbance activity, construction, alterations or repairs on these premises known as 4799 Lake Front Dr - TM# 043.00-01-45.05-0000

All persons acting contrary to this order or removing or mutilating this notice are subject to arrest unless such action is authorized by the Roanoke County Department of Community Development

Matt Cooper
Contact Name

772-2065 ext 235
Contact Phone Number

Erosion and Sediment Control Program Administrator

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
2014 – 2015 (Year 2)	19 - NTC 1 - SWO

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.


COUNTY OF ROANOKE

STORMWATER MANAGEMENT
DESIGN MANUAL

JULY 1, 2014

Department of Community Development
5204 Bernard Drive
Roanoke, Virginia 24018

JULY 1, 2014

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 this Permit Year 2, the County made further revisions to the Stormwater Design Manual and to the Stormwater Management Ordinance, which are pending Board of Supervisors' approval. Copies of these documents are on the attached compact disk in the folder titled **BMP 5-1**.

TMDL Consistency:

This 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. Proposed revisions to the county's Stormwater Management Ordinance and Stormwater Design Manual are currently pending approval of the County Board of Supervisors.

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

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

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

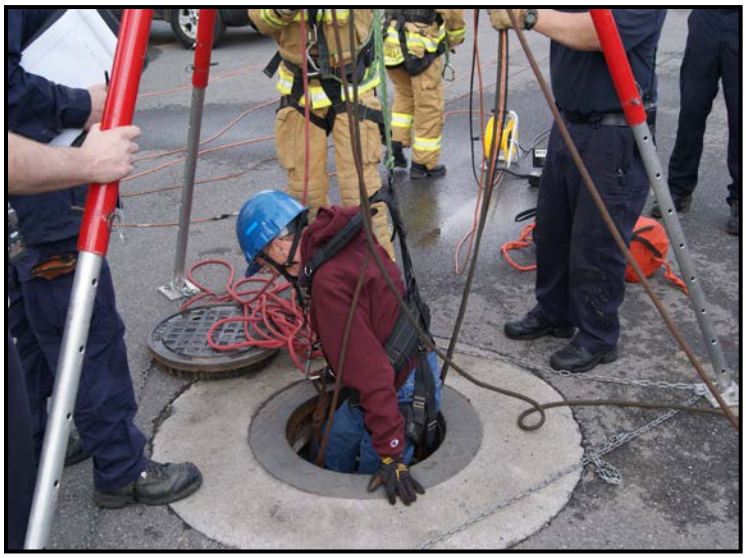
BMP 5-4: Stormwater Management Facility Post-Construction Inspection

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 2, Roanoke County was unsuccessful in inspecting all of its publicly-owned SWMFs, as required by the permit, due to a loss of several key personnel. The County is currently interviewing applicants to fill the vacancies and will complete these inspections within the next few months.

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

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. [Note that the MS4 Program Plan, as revised March 23, 2015, misstated the measurable goal for this BMP. The measurable goal has been revised, as stated herein, to better correlate with the goal of this BMP.] In this Permit Year 2, there were 20 new Stormwater Management Facilities brought online, serving 53.20 acres; 18 of them are located in the County's MS4 area. 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 is in the process of adding 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
30101010301	1	1.64
30101010302	1	4.49
30101010401	2	14.75
30101010402	2	2.37
30101010403	5	4.58
30101010404	5	22.22
30101010405	3	3.13
Total	**20**	**53.20**

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. Some 34 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 individual SFRs were reached with homeowner education and outreach materials using direct mail. (For this Permit Year 2, the newsletter entitled *A Stormwater Guide for Homeowners* was used to satisfy this mailing requirement.) A more targeted brochure may be used for future permit years.

Maintenance information for stormwater practices can be found under "Stormwater Public Education Documents" on the County's website at:
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

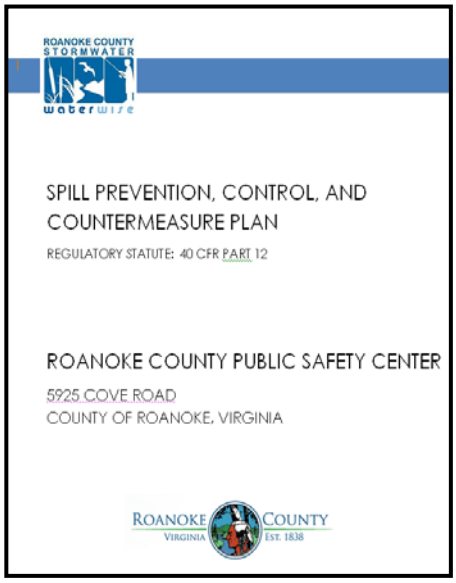
Employees that oversee the performance of regulated land disturbance activities by County employees shall be recognized as a Responsible Land Disturber by DEQ.

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 currently have a SPCC Plan include:

- Cave Spring Fire Station, last reviewed 2010
- Clearbrook Fire Station, last reviewed 2010
- Fort Lewis Fire Station, last reviewed 2010
- Hollins Fire Station, last reviewed 2010
- Fleet Service Center, prepared 2015

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. A SPCC plan needs to be prepared for the Public Safety Building; and the SPCC plans for the four fire stations need to be reviewed by the end of 2015. These actions will be recorded in next year's MS4 annual report.

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 **12** Household Hazardous Waste (HHW) Collection events with the Roanoke Valley Resource Authority; **339** 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, **one** drug take back event was held with a total of 2,168 pounds of medication collected from the following localities: Roanoke County, Roanoke City, City of Salem, Botetourt County, and 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 27, 2014**
  Roanoke County: 807 pounds
  Total: 2,168 pounds

Since this program was started in 2010, 14,431 pounds of medication have been collected in Roanoke Valley locations.

TMDL Consistency:

Currently there is no known 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

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.

Measureable 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 and 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 **50** maintenance and improvement projects were completed, resulting in the following:

- Feet of line repaired = 8
- Feet of ditches repaired = 960
- Feet of culverts replaced/added = 1,742
- BMPs maintained = 1
- Storm drain inlets repaired, added, or replaced = 11
- Tons of sediment removed = 400
- Total Labor Hours = 6,090
- Value = $997,762
- Contractor cost = $569,995 bid projects
- Number of large projects = 2
- Number of small projects = 46
- Number of emergency projects = 2

A total of **6,090 labor** hours were committed towards storm sewer system maintenance and improvements to the municipal storm sewer system. The value of these improvements, performed in-house, was estimated to be **$997,762**; additionally, the County contracted for **$569,995** in drainage improvements. Therefore, the total County investment in drainage maintenance and improvement was **$1,657,757**.

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. (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	Total in Improvements
2013 - 2014 (YEAR 1)	51	$950,250	$950,250
2014 - 2015 (YEAR 2)	50	$1,657,757	$2,608,007

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.

Measureable Goals:

This BMP is measured by the number of County employees that receive this training. Employees in eleven departments received training on various 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 are all included on the attached compact disk in the folder titled **BMP 6-4**. 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 160 uniformed employees. The number of volunteers is always in flux, but the County estimates that there are also 100 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)

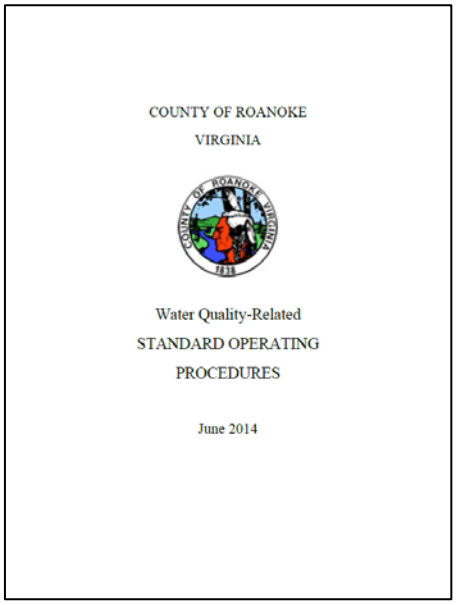
Evaluation and Modification:

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.


COUNTY OF ROANOKE
VIRGINIA

Water Quality-Related
STANDARD OPERATING
PROCEDURES

June 2014

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 are in the process of finalizing 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**. A formal written SOP will be finalized in the next few months.

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**.

Measureable 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)

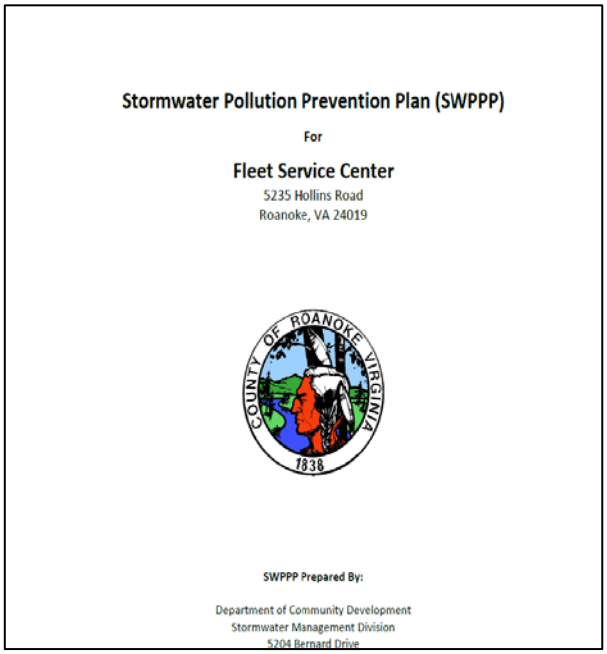
Evaluation and Modification:

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.


Stormwater Pollution Prevention Plan (SWPPP)

For

Fleet Service Center

5235 Hollins Road

Roanoke, VA 24019

SWPPP Prepared By:

Department of Community Development

Stormwater Management Division

5204 Bernard Drive

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.

Measureable Goals:

Success for this BMP will be measured by the development, implementation, and maintenance of the required SWPPPs. In this Permit Year 2, the following SWPPPs were completed and are enclosed on the attached compact disk in a folder titled **BMP 6-6**.

- Public Service Center
- Fleet Service Center
- Roanoke County Public Schools - Municipal Yards, covering the following sites:
    - Small Engine Repair and Welding Shop
    - Transportation Dept. - Bus Maintenance Shop/parking Lot
    - Maintenance Dept. - Maintenance Shop, Warehouse, and Office

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.

Measureable Goals:

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

For this Permit Year 2, the County's Department of Parks, Recreation, and Tourism 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 the Parks Dept. 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 will be covered under the Schools' Nutrient Management plans.

Parks and Rec currently fertilizes roughly **105 acres on 30 sites**. The **Phase 1 grouping** of sites currently listed in the Nutrient Management Plan encompasses **36.65 acres**. The **Phase 2 grouping** will add roughly another **37 acres** to the plan in Spring of 2016 and 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.

Current Sites covered by Phase 1 grouping in the Parks NMP plan are as follows:

- 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

In addition, the Roanoke County Public Schools completed Nutrient Management Plans for all of their necessary lands, covering 100% of their 45.66 acres, as follows:

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.

Measureable 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 of Fertilizer Applicator certifications:

EMPLOYEE	CERTICATION TYPE	CERTICATION #	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.

Measureable 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 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.

SECTION II

Total Maximum Daily Loads (TMDLs)

Total Maximum Daily Loads (TMDLs)

A. TMDL ACTIVITIES

Roanoke County is currently undertaking a number of activities to enhance its stormwater program and address its TMDL wasteload allocations that are not properly described under the Minimum Control Measures:

1. Upgrade record-keeping system

The County has a technology implementation project underway to utilize a software package (CityWorks®) to improve project, inspection, and enforcement scheduling and tracking. It is anticipated that this system will improve the County's ability to manage its stormwater BMP infrastructure and inspections.

2. Stream Assessments

The County has commissioned an engineering consultant to begin assessments of streams within the County's MS4 area. The purpose of this assessment is to provide the County with the information that it needs to determine where improvements or other actions may be necessary; and to prioritize them based on severity of need.

3. Stream Restoration

Roanoke County currently has stream restoration projects for Glade Creek (~3,000 linear feet) and Murray Run (~1,400 linear feet) underway. Limited local funds are being leveraged by using the Virginia Stormwater Local Assistance Fund, and by partnering with the private sector using a public/private partnership (PPEA).

B. TMDL ACTION PLANS

Section 1.B.1 of the MS4 General Permit requires that the County's MS4 Program Plan include 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.

- **TMDL Action Plan for Escherichia coli (E. coli)**
  This TMDL Action Plan has been prepared and is included in Section III.

- **TMDL Action Plan for Sediment**
  This TMDL Action Plan has been prepared and is included in Section III.

- **TMDL Action Plan for Polychlorinated biphenyls (PCBs)**
  The wasteload allocation for PCBs was approved after July 1, 2008; therefore, this TMDL Action Plan is required by July 1, 2016. This TMDL Action Plan will be developed in the upcoming permit year.

C. STORMWATER VOLUME AND POLLUTANT LOAD ESTIMATION FOR YEAR 2

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

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.

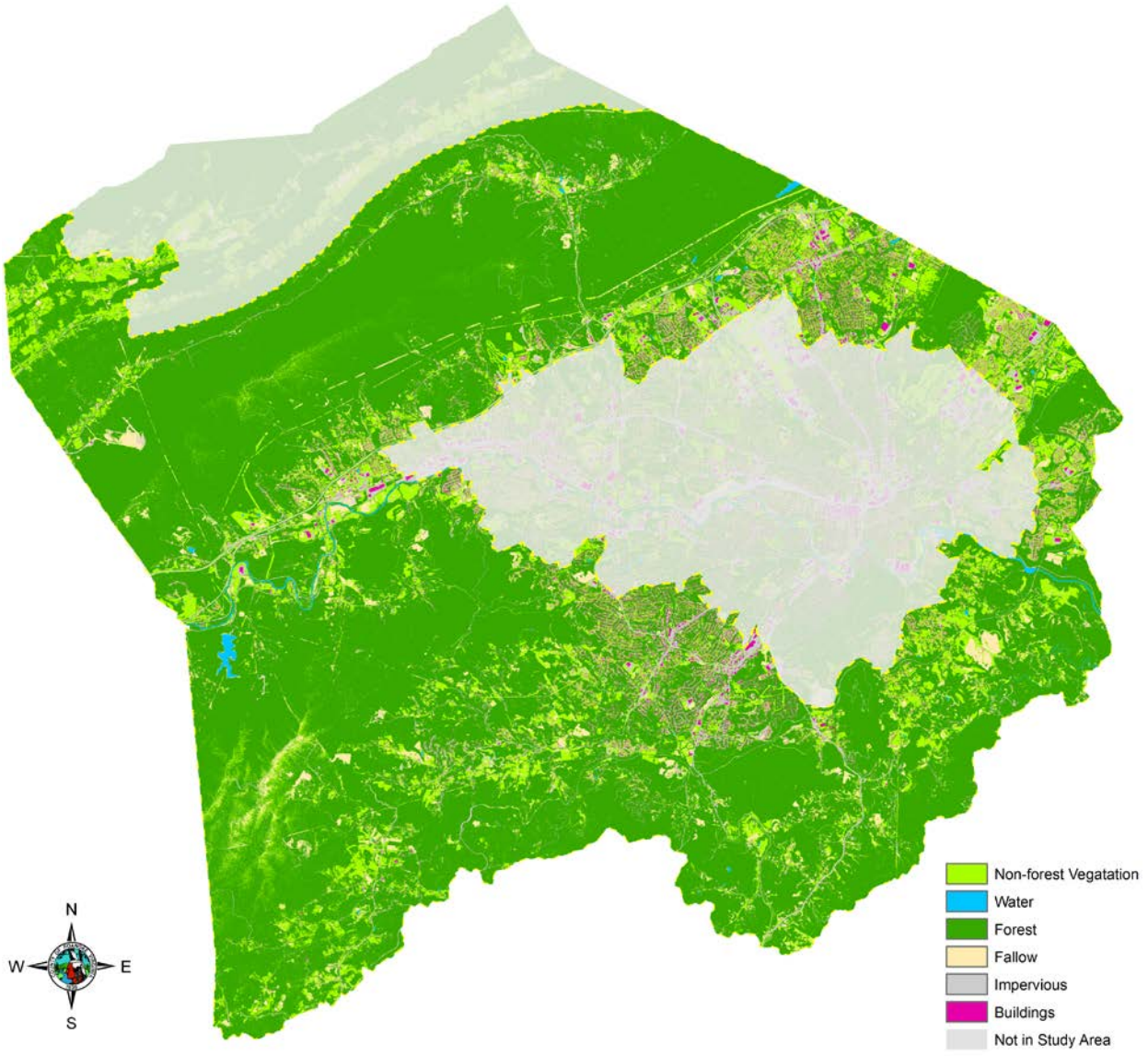
For the Year Four Annual Report under the previous permit, the percent impervious across the entire County was derived from the Roanoke County Land Cover Data Set. This data set is based on imagery from the United States Department of Agriculture's 2008 1 meter National Agriculture Imagery Program (NAIP). 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:

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

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:

$$L\left(cfu/year\right)=103\times R\times C\times A$$

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 mi^2 * 640.09)
= Area (ac)
103 is the Conversion Factor for Bacteria

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

$$E\,coli = 2^{\left[-0.0172-0.91905*Log_2\left(fecal\,coliform\right)\right]}$$

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:

$$L\ lbs\left(annual\ load\right) = 0.226 \times R \times C \times A$$

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 mi^2 * 640.09)
= Area (ac)
0.226 is the Conversion Factor for TSS

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

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

Stream	WLA (colony forming units/year)
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

Stream	Current Discharge* colony forming units/Year)	WLA colony forming units/Year)	% Reduction Required
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

Stream	WLA (tons/yr)
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

Stream	Current Discharge (mg/yr)*	WLA (mg/yr)
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 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%.

PCBs cleanup will most probably consist of testing suspected contaminated sites and performing site-specific clean ups.

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 empirical 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. Also, the MS4 area currently delineated contains lands operated by VDOT, which has its own MS4 permit. In the future, Roanoke County may improve its delineation of MS4 area by excluding VDOT operated areas.

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 empirical method to calculate the yearly discharge of PCBs from a watershed.

6. 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.

SECTION III

Supporting Documents
(See attached CD)