



COUNTY of ROANOKE VIRGINIA

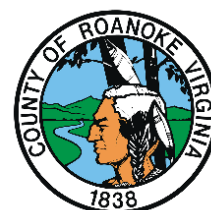
Municipal Separate Storm Sewer System (MS4) Annual Report

Permit Year Four: July 1, 2016 – June 30, 2017

Submitted:
October 1, 2017

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



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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.*

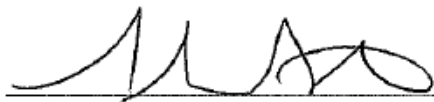
Duly Authorized Representatives

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.


Responsible Official Signature

9/27/2017
Date

VAR040022
Permit Number

County of Roanoke
MS4 Name

Table of Contents

Acknowledgements	i
Signed Certification Statement and Requirements	ii
Table of Contents	1
Executive Summary	3
SECTION I. Minimum Control Measures (MCMs) for Stormwater Quality	4
MCM 1: Public Education and Outreach on Stormwater Impacts	5
BMP 1-1: Educational Programs Review	6
BMP 1-2: Roanoke County Stormwater Informational Mailer	9
BMP 1-3: Stream Monitoring and Education	11
BMP 1-4: Stormwater Education Program	13
BMP 1-5: Stormwater Public Awareness Program	15
BMP 1-6: Roanoke County Stormwater Webpage	20
BMP 1-7: Targeted Education Program	22
MCM 2: Public Involvement and Participation	30
BMP 2-1: Storm Drain Stenciling Program	31
BMP 2-2: Stormwater Public Event	32
BMP 2-3: Stormwater Program Information Posted on Stormwater Website for Citizens to View	34
MCM 3: Illicit Discharge Detection and Elimination (IDDE)	36
BMP 3-1: Storm Drain Map	37
BMP 3-2: Illicit Discharge Ordinance	38
BMP 3-3: MS4 Outfall Inspections	39
BMP 3-4: Illicit Discharge Detection and Elimination (IDDE) Program	40
MCM 4: Construction Site Stormwater Runoff Control	42
BMP 4-1: Erosion and Sediment Control Ordinance	43
BMP 4-2: Erosion and Sediment Control Certification	45
BMP 4-3: Erosion and Sediment Control Plan Review	47
BMP 4-4: Erosion and Sediment Control Inspection	48
BMP 4-5: Erosion and Sediment Control Compliance and Enforcement	49
MCM 5: Post-Construction Stormwater Management in New Development and Development on Prior Developed Lands	50
BMP 5-1: Stormwater Management Ordinance and Manual	51
BMP 5-2: Stormwater Management Plan Review	53
BMP 5-3: Stormwater Management Facility Construction Inspection	54
BMP 5-4: Stormwater Management Facility Post-Construction Inspection	55
BMP 5-5: Stormwater Management Facility Tracking	56
BMP 5-6: Strategies to Encourage Long-Term Maintenance of Stormwater Control Measures for Individual Residential Lots	57
MCM 6: Pollution Prevention and Good Housekeeping for Municipal Operations	58

BMP 6-1: Spill Prevention, Control, and Countermeasures Plans	60
BMP 6-2: Household Hazardous Waste Event	61
BMP 6-3: Storm Sewer Maintenance Program	63
BMP 6-4: Employee Training	65
BMP 6-5: Standard Operating Procedures	67
BMP 6-6: Stormwater Pollution Prevention Plans (SWPPPs) for Municipal Facilities	68
BMP 6-7: Nutrient Management Plans	70
BMP 6-8: Pesticide Applicator Certification	73
BMP 6-9: Responsible Land Disturber	74
SECTION II. Total Maximum Daily Loads (TMDLs)	75
A. TMDL Activities	76
B. TMDL Action Plans	76
C. BMPs to Address E. coli and Sediment TMDLs	76
T-1 Initial Stream Assessments and BMP Planning (EC and SED)	78
T-2 Enhanced Public Education and Outreach (EC and SED)	80
T-3 Enhanced Employee Training (EC and SED)	83
T-4 County Facilities Assessments and Corrections (EC and SED)	84
T-5 Enhanced Illicit Discharge Detection and Elimination Program (EC)	85
T-6 Erosion and Sediment Control Enhanced Enforcement (EC and SED)	86
T-7 Dog Waste Stations (EC)	88
T-8 Dog Waste Ordinance (EC)	89
T-9 Onsite Sewage Disposal System Maintenance Ordinance (EC)	90
T-10 Stream Buffers (EC and SED)	91
Capital Improvements	92
D. Strategies to Address PCBs TMDL	95
E. Stormwater Volume and Pollutant Load Estimation for Permit Year 3	98
Section III. Supporting Documents (See attached CD)	104

Executive Summary

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

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


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

The Minimum Control Measures and associated BMPs used by the County for this reporting period (July 1, 2016 - June 30, 2017) 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=1755>.

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.

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) The PCBs Fact Sheet is also available on the County's website. (PCBs)

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, the County believes this BMP to be successful.

Year	Viewing Statistics
2013 – 2014 (YEAR 1)	716 (Stormwater webpage)
2014 - 2015 (YEAR 2)	110 visits; 147 page views
2015 - 2016 (YEAR 3)	716 visits; 1217 page views
2016 - 2017 (YEAR 4)	741 visits; 1136 page views (Stormwater Management)

Table 1-1. CVC Handouts and Web Resources



Annual Report for Stormwater Programs Roanoke County FY 2016-2017

MCM 1: BMP# 1.1 Public Education and Outreach on Stormwater Impacts

Title of Resource:	Date Added	Comment
Available Resources:		
Video: The Poop Fairy	2015	Tips for managing pet waste
Handout: How to manage Stormwater: Rain Barrels	2015	How to Manual: How to build a rain barrel
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
Brochure: Roanoke Stormwater Ideabook (City of	2014	A stormwater guide for homeowners
Brochure: Stormwater Utility Fee Credit Manual (City	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 barrels
http://www.cleanvalley.org/stormwaterbusinesses	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	2014	5 keys for protecting SW when car washing
Postcard: Only Rain Down the Drain - Restaurants	2014	5 keys for protecting SW at restaurants
Brochure: Native Plants for Conservation,	2013	Gardening Information for reducing SW impacts
Brochure: A Virginian's Guide to Year-Round Yard	2013	Gardening Information for reducing SW impacts
Brochure: Stormwater Best Management Practices	2013	Restaurant BMP's
Teaching Manual: Project Wet: Curriculum and	2013	Teaching Curriculum for water related programs,
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 Pub)	2012	Gardening Information for reducing SW impacts and improving water quality
Book: Best Management Practices: Integrated Pest	2012	Gardening Information for reducing SW impacts
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
Book: Clean and Green: The complete Guide to	2012	Household Information for reducing SW impacts
Card: Important Water Quality Measurements (VA	2011	Macroinvertebrate and water quality measure
Documentary: Bag It!	2011	Documentary about plastics in 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

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 4 of the reissued permit, the County developed an informative stormwater newsletter that was mailed to every residence, some 34,963 addresses. In addition, the County circulated the newsletter and other stormwater educational articles by way of its electronic newsletter, produced and distributed by the Department of Community Development, and this monthly e-newsletter is emailed to 1,040 people, including staff and residents. Also, 490 people "like" the Roanoke County Planning Services page on Facebook and may see the posts. In addition to the above, 50 copies of the stormwater newsletter were provided to each of the County's six libraries and several hundred were provided to the Town of Vinton and to the Clean Valley Council for use at public events.

The stormwater newsletter may be found on the attached compact disk, in folder entitled **BMP 1-2**. The newsletter is also available on the County's website, which can be accessed here: <http://www.roanokecountyva.gov/DocumentCenter/View/9252>

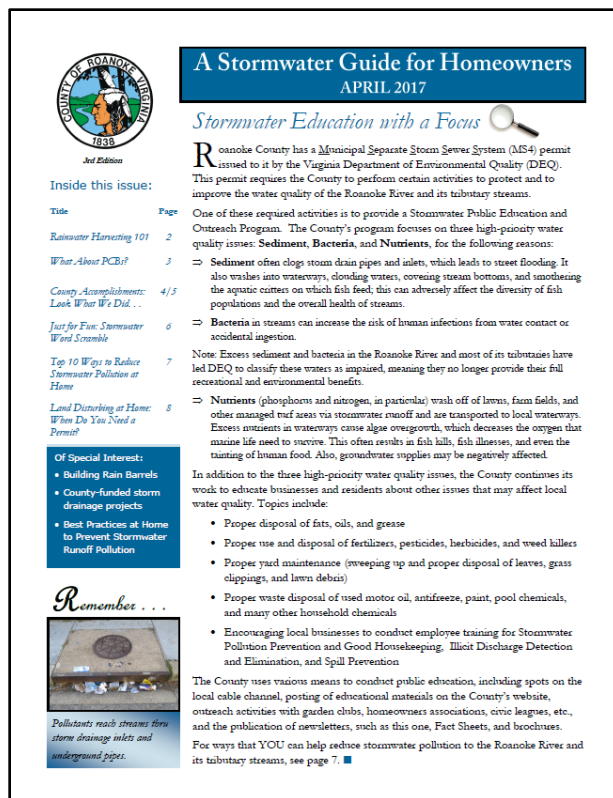
The electronic Community Development newsletters may be found here:

April 2017: <http://roanokecountyva.gov/ArchiveCenter/ViewFile/Item/1912>

May 2017: <http://roanokecountyva.gov/ArchiveCenter/ViewFile/Item/1911>

June 2017: <http://roanokecountyva.gov/ArchiveCenter/ViewFile/Item/1910>

October 2016 (all 2016 newsletters combined), page 86:
<http://roanokecountyva.gov/ArchiveCenter/ViewFile/Item/1836>



TMDL Consistency:

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

Evaluation and Modification:

This stand-alone newsletter is exclusively focused on stormwater issues for homeowners. It has been well received by County residents, making it an effective BMP for delivering stormwater-related information and education to its citizens.

Year	Distribution Statistics
2013 - 2014 (YEAR 1)	-
2014 - 2015 (YEAR 2)	32,599 stormwater newsletters; 868 e-newsletters
2015 - 2016 (YEAR 3)	32,493 stormwater newsletters mailed to residences; 980 e-newsletters; 300 newsletters delivered to County libraries; several hundred copies each to Town of Vinton and to Clean Valley Council.
2016 - 2017 (YEAR 4)	34,964 stormwater newsletters mailed to residences; 1,040 e-newsletters; 300 newsletters delivered to County libraries; several hundred copies each to Town of Vinton and to Clean Valley Council.

BMP 1-3: Stream Monitoring and Education

Goal:

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



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

Measurable Goals:

During this annual period, on behalf of Roanoke County, the Clean Valley Council provided **24** stream schools targeting both adults and school-age children between 6th and 10th grade. Similar events were conducted across the region, including the City of Roanoke and Town of Vinton. Total attendance at the events held in the County only was **546**, serving **521** youths and **25** adults. Supporting files can be found on the attached compact disk under the folder titled **BMP 1-3**.

TMDL Consistency:

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

Evaluation and Modification:

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

Year	# of Stream Schools (CVC)	Attendance
2013 - 2014 (YEAR 1)	2- Indoor Seminars 11 - Stream Monitoring Sessions	907
2014 - 2015 (YEAR 2)	30 - Stream Monitoring Sessions	536 youths 15 adults
2015 - 2016 (YEAR 3)	26 - Stream School Seminars	705 youths 18 adults
2016 - 2017 (YEAR 4)	39 - Stream School Seminars*	466 youths* 237 adults*

* Includes Roanoke County and Roanoke Valley Private Schools & Family Programs – see below

ROANOKE COUNTY - TOTAL STREAM SCHOOL				
Area	# Programs	# Students or Youth Participants	# Teachers or Adult Participants	Materials Distributed
Roanoke Valley Private Schools & Family Programs	15	466	237	864
Roanoke County Only	24	521	25	180
Total	39	987	262	1044

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, through its partnership with Clean Valley Council, continued to provide stormwater education to school-age children. The following education programs were held in public and private schools across the Roanoke Valley region (Roanoke County, Roanoke City, and Town of Vinton). In the County alone, a total of **197** presentations were made, and **18** others that were held for private schools/groups across the region. Together, these various programs reached **5,029** students between pre-kindergarten through the 12th grade and 3,210 giveaways (pencils, stickers, etc.) were distributed.



1. All About Natural Resources
2. Bag It
3. Chemistry of Plastics
4. Environmental Jeopardy
5. Green Game
6. Groundwater
7. Land Use
8. Lorax
9. Oceans of Trash
10. Planet in Peril
11. Rigsby
12. Soil: Who Needs It?
13. Trash to Treasure
14. Think Earth
15. Wartville Wizard
16. Water Game
17. Watersheds to Oceans
18. Who Polluted the River?

The Stormwater Education Program descriptions, the high priority water quality issues they address, 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 "Oceans of Trash" and "Watersheds to Oceans." (EC). Others target potential sources of sediment, such as "Land Use" and "Soil: Who Needs It?" (SED). Program descriptions and the high priority water quality issues they address are included on the attached compact disk under the folder titled **BMP 1-4**.

Evaluation and Modification:

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

Year	Programs Given	Students Reached
2013 - 2014 (YEAR 1)	135 (County + Private Schools)	3,410
2014 - 2015 (YEAR 2)	121 (County + Private Schools)	2,436
2015 - 2016 (YEAR 3)	131 (County + Private Schools/Groups)	2,991
2016 - 2017 (YEAR 4)	220 (County + Private Schools/Groups)	5,029

Roanoke County - Total Stormwater Educational Programs				
Area	# Programs	# Students or Youth Participants	# Teachers or Adult Participants	Materials Distributed
Roanoke Valley Private Schools	23	268	50	168
Roanoke County Only	197	4761	185	3042
Total	220	5029	235	3210

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 and RVT3, to distribute information and messages, public service announcements, printed materials (i.e., brochures and newsletters), radio and TV advertisements, use of websites and social media, and through giveaways of stormwater-related merchandise.

Measurable Goals:

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

- Chip Clips
- Funnels
- Lanyards
- Litter Bags
- Magnets
- Pencils
- Rain Gauges

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

In total, the CVC gave out **1,215** pieces of merchandise to citizens in Roanoke County and beyond. The types and amounts of merchandise provided by the CVC can be found on the attached compact disk under the folder titled **BMP 1-5**.



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

- In June 2017, County staff participated in a brief radio segment on WFIR News Talk Radio and made a presentation to the County Board of Supervisors to announce the roll-out of its new Contractor Appreciation Program. Selected projects receive a “Stormwater Clean Award” banner, which is prominently posted at the site; the program is aimed at reducing stormwater runoff and sediment from active construction sites. Video for these events area available and may be accessed at the following links:

<https://wfirnews.com/local-news/roanoke-county-rolls-out-new-award-for-developers>

<http://roanokecountyva.igm2.com/Citizens/SplitView.aspx?Mode=Video&MeetingID=1039&Format=Minutes>

- In conjunction with RVTv3, Roanoke County developed a new pet waste poster focused on “scooping the poop,” as a strategy to reduce the amount of bacteria that enters receiving waters. The poster was shared on the County’s website and on both organizations’ Facebook pages.

Who Left the Dogs’ Poop?

Who, Who, Who, Who, WHO. . .



Dogs have to poop outside, and that is just THE WAY IT IS.

They do not know how to use a toilet.

Sadly, POOP POLLUTES:

Neighborhoods • Rivers • Streams • Lakes • The Beach

So, do the right thing.

SCOOP THE POOP.



For more information, contact:
COUNTY OF ROANOKE
Community Development - Stormwater Management
5204 Bernard Drive, SW, 2nd Floor
Roanoke, VA 24018
Phone: 540-772-2080

- The County's Community Development Department sends out a monthly email newsletter entitled *Community Developments*. Pertinent stormwater messages are included from time to time, and the e-newsletter reaches 1,040 individuals.
- In April 2017, County staff was interviewed on a "Roanoke County Today" television segment to provide residents with stormwater tips and ways to prevent illicit discharges. The RVTv3 video can be viewed here:
https://www.facebook.com/roanokevalleytelevision/videos/10156268711448747/?hc_ref=ARSotBFPHvVapjR8RkJr-OhZ3t9Yhd9mhnk3v9Q5TznF-JBYINF8MR6f4W6UR4-LDk&pnref=story
- The County continues to run its various Public Service Announcements (PSA) to share information with the public as part of its stormwater public awareness/education program. The PSAs encourage folks to "do the right things," such as not littering, bagging or mulching leaves and grass clippings, bagging pet waste, washing cars on the grass, and pouring nothing down the storm drain. The overarching goal for these PSAs is to address the three high priority water quality issues: bacteria, nutrients, and sediments. The PSAs may be found on the attached compact disk under the folder titled **BMP 1-5**. All of the County's PSAs are also posted on the County's website at: <http://roanokecountyva.gov/index.aspx?NID=1598> and also on the CVC and RVTv3 website.



REPORT AT ROANOKECOUNTYVA.GOV/LITTER

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

As noted in previous reports, the County purchased a set of video programs that were designed for educating the general public on Illicit Discharge Detection and Elimination (IDDE) to the storm drainage system; such discharges include the selected three high-priority water quality issues: excess bacteria, sediment, and nutrients. The kit includes five videos of varying run times, which are designed to be used in specific medium/media or to reach a specific audience. The County tracks the size of audiences exposed to the various videos, as reported in **BMP 1-6**. Along with the aforementioned PSAs, the videos are posted on the County's website at the following location: <http://www.roanokecountyva.gov/index.aspx?NID=1598>; they are also posted on its Facebook page. As shown in **BMP 1-6**, there were 87 visits to the online videos and 103 page views.

TMDL Consistency:

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

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

Evaluation and Modification:

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

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

Year	Materials Distributed	Media Sources Used
2013 - 2014 (YEAR 1)	4,719 (across entire Roanoke Valley region)	<ul style="list-style-type: none"> • 3 Radio Segments on 2 stations (CVC) • 8 TV Segments on 3 stations (CVC) • 2 Newspaper Articles (1 newspaper) (CVC) • 2 Public Service Announcements (RoCo)
2014 – 2015 (YEAR 2)	4,014 (across entire Roanoke Valley region)	<ul style="list-style-type: none"> • 5 Public Service Announcements (RVTv3) • 120 visits to the online videos and 186 page views • 2 Newspaper Articles (CVC) • 2 Newspaper Articles (1 newspaper) (CVC)
2015 – 2016 (YEAR 3)	1,975	<ul style="list-style-type: none"> • 115 visits to the online videos; 180 page views • 112 visits to online SW Public Education Documents; 243 page views • 1 Presentation • 1 Riparian Buffer Planting event • 1 Public Service Announcement (RoCo)
2015 – 2016 (YEAR 4)	1,215	<ul style="list-style-type: none"> • 1-Radio Segment (WFIR News Talk Radio) • 1-Presentation to the Board of Supervisors • 147 visits to online SW Public Education Documents; 233 page views • 1 Pet Waste Poster • 1 TV interview (Roanoke County Today)

CVC = Clean Valley Council; RoCo = Roanoke County

BMP 1-6: Roanoke County Stormwater Webpage

Goal:

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

Measurable Goals:

This website is devoted to stormwater management, water quality, floodplain management, and local water quality issues and information. The website continues to inform citizens about current issues within the Roanoke Valley region, and it provides phone, e-mail, and website contact information for the County's stormwater staff in the event that citizens require additional information. There is also a reporting feature for Illicit Discharges, as found in this page <http://roanokecountyva.gov/index.aspx?NID=306>.



For this reporting year, there were a total of **3,511 visits, with 4,948 page** views to the stormwater website between July 1, 2016 and June 30, 2017. The number of visitors to each webpage for this fourth year of the reissued permit is shown below and is also on the attached compact disk (CD) under the folder titled **BMP 1-6**.

TMDL Consistency:

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

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

Evaluation and Modification:

Roanoke County Stormwater Webpage Statistics			
Visits/Pageviews			
Period: 7/1/2016 - 6/30/2017			
Page Name	Visits	Pageviews	%
Roanoke County, VA - Official Website - Stormwater Management	741	1136	23%
Roanoke County, VA - Official Website - Stormwater Documents & Ordinances	651	1008	20%
Roanoke County, VA - Official Website - Floodplain Management	398	614	12%
Roanoke County, VA - Official Website - Flooding in Roanoke County	357	436	9%
Roanoke County, VA - Official Website - NPS Pollution	267	301	6%
Roanoke County, VA - Official Website - Stormwater Public Education Documents	147	233	5%
Roanoke County, VA - Official Website - Roanoke County Watersheds	144	175	4%
Roanoke County, VA - Official Website - Flood Insurance	140	171	3%
Roanoke County, VA - Official Website - Stream Impairments & TMDLs	102	133	3%
Roanoke County, VA - Official Website - Flood Warning System	103	131	3%
Roanoke County, VA - Official Website - Public Education	91	111	2%
Roanoke County, VA - Official Website - Stormwater Public Education Videos	87	103	2%
Roanoke County, VA - Official Website - Community Rating System (CRS)	85	116	2%
Roanoke County, VA - Official Website - Property Protection	75	98	2%
Roanoke County, VA - Official Website - Stormwater Resources	63	95	2%
Roanoke County, VA - Official Website - Stormwater Advisory Committee	60	87	2%
Contractor Appreciation (New for 2017) No Data Available	0	0	0%
County Stormwater Management Projects (New for 2017) No Data Available	0	0	0%
Glade Creek (New for 2017) No Data Available	0	0	0%
Murray Run (New for 2017) No Data Available	0	0	0%
The Orchards (New for 2017) No Data Available	0	0	0%
Stormwater MS4 Permit (New for 2017) No Data Available	0	0	0%
Total	3511	4948	100%

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

Year	Webpage Views	Most Popular (MP) and Least Popular Page (LP)
2013 - 2014 (YEAR 1)	5,692	MP: Stormwater Management page LP: Flood Insurance page
2014 - 2015 (YEAR 2)	5,883	MP: Stormwater Management page LP: Flood Warning System page
2015 - 2016 (YEAR 3)	5,748	MP: Stormwater Documents & Ordinances page LP: Stormwater Resources page
2016-2017 (YEAR 4)	4,948	MP: Stormwater Management page LP: Stormwater Advisory Committee

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 4 of the re-issued permit, Roanoke County distributed previously revised postcards to **two targeted** audiences: auto car wash/detailing operations and restaurants. These business types were chosen because car washing operations can have an adverse impact on local water quality through direct discharges of polluted wash waters; restaurants often rinse greasy range hoods and kitchen mats into the storm drainage system.

What Would Granny Say?
WHEN YOU . . .

- Throw litter onto the street?
- Leave your dog's poop in the yard?
- Pour oil down the storm drain?
- Blow your lawn clippings into the gutter?
- Drop cigarette butts from the car window?
- Toss your beer can into the creek?

"Follow the Rules!"


Stormwater runoff travels over land surfaces and roads, carrying many pollutants picked up along the way. Unfortunately, it all goes "right straight to the creek!" So, *Granny* says:

- ◇ Throw all trash in a trash can.
- ◇ Clean up spilled oil by pouring cat litter on it; then sweep it up and put it in the trash.
- ◇ Put cigarette butts in ashtrays.
- ◇ Pick up after your pet.
- ◇ Bag leaves and grass clippings.
- ◇ Take your beer cans home; put 'em in the recycle bin.
- ◇ DO THE RIGHT THINGS!

For more information, contact:
COUNTY OF ROANOKE
Community Development
Stormwater Management Division
5204 Barnard Drive, SW
Roanoke, VA 24018
540-773-2880
<http://www.roanokecountyva.gov>



Who Left the Dogs' Poop?
Who, Who, Who, Who, WHO. . .



Dogs have to poop outside, and that is just THE WAY IT IS.
They do not know how to use a toilet.
Sadly, POOP POLLUTES:
Neighborhoods - Rivers - Streams - Lakes - The Beach
So, do the right thing.
SCOOP THE POOP.

For more information, contact:
COUNTY OF ROANOKE
Community Development
Stormwater Management
5204 Barnard Drive, SW, 2nd Floor
Roanoke, VA 24018
Phone: 540-773-2880

The County continued to use its previously-developed brochures, fact sheets, and posters 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 and RVTV3 cooperated to develop a new pet waste poster focused on "scooping the poop," as a strategy to reduce the amount of bacteria that enters receiving waters. The poster was shared on the County's website and on both organizations' Facebook pages. The County website is provided below:

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

This poster was also mailed to the following types of businesses in the County: veterinarian offices, dog grooming and boarding facilities, doggie daycare facilities, pet food stores, and stables.

Roanoke County developed a new newsletter, entitled “*It’s Just Dirt*,” which is entirely focused on Land-Disturbing Contractors. The document covered the 19 minimum standards for compliance, as excerpted from the Virginia Erosion and Sediment Control Regulations. It also unveiled the County’s new Contractor Appreciation Program, which recognizes contractors who excel in stormwater management and erosion control on their active construction projects.

Other topics included the minimization of PCBs, reducing stormwater runoff on construction projects, and when Erosion & Sediment Control Permits are needed for residential projects. This newsletter was mailed to every land-disturbing contractor and developer in the County’s database, and also to the Roanoke Regional Home Builders Association. It is posted on the County’s website:

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

TMDL Consistency:

The Contractor newsletter is primarily focused on “keeping the dirt out of the river.” 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 documents address the TMDL for sediment (SED). Similarly, the restaurant postcard addresses rinsing of kitchen equipment and accessories, which may contribute bacteria to receiving waters. The “Who Left the Poop” poster focuses on bagging pet waste and placing it in the trash. Thus, these documents help address the County’s TMDL for bacteria (EC). The Stormwater Newsletter for Residents and “PCBs Fact Sheet” both help address the County’s TMDL for PCBs. Other materials previously developed by the County also address the TMDLs, as shown in **Table 1-7B**.



IT'S JUST DIRT
A Newsletter for Contractors
APRIL 2017

What's This About Dirt?

Roanoke County is proud to present its first newsletter designed specifically for land-disturbing contractors who “work in the dirt” in and around the County. This targeted publication is not only meant to satisfy the Public Education and Outreach requirements of the County’s Municipal Separate Storm Sewer System (MS4) permit, but it is also designed to bring contractors meaningful information for everyday use and application on the job.

You might ask: “Why are you focusing on dirt?”
The answer is easy. It all has to do with keeping the fish happy and healthy! You see, when vegetation and topsoil are stripped from a construction site, soil erosion soon follows. Exposed soil, or dirt, erodes when there is nothing to protect it from rain, wind, and stormwater runoff. This eroded dirt doesn’t just disappear; unfortunately, it usually ends up in a nearby waterway, where it eventually settles to the bottom to become sediment. In fact, this sediment just might find its way to your favorite fishing hole. If so, it won’t help your odds of landing “the big one” there, because it smothers the fish eggs and blocks needed sunlight!

But it’s just dirt; why is “plain old dirt” considered a contaminant? There are a variety of reasons. For example, dirt pollutes by clouding waters, obstructing waterways, clogging storm drain pipes (which also leads to street flooding), damaging adjacent properties, and interfering with recreational use and navigation. Further, it smothers fish and shellfish spawning grounds. Ultimately, excessive sedimentation alters the diversity of fish populations in waterways and affects the organisms on which fish feed.

Excess sediment [and bacteria] in the Roanoke River and most of its tributaries have led the Virginia Department of Environmental Quality (DEQ) to classify these waters as impaired, meaning they no longer provide their full recreational and environmental benefits. As a result of this classification, the County has developed an Action Plan that identifies the strategies it will use to help reduce both pollutants. One such strategy aimed at sediment reduction is to focus the County’s Public Education and Outreach efforts on certain target audiences that can help make a difference; hence, a **Dirt Newsletter for contractors!**

Why focus on land disturbance contractors? It turns out that the rate of erosion on most construction sites is 500 times greater than that which would naturally occur on a site that is undisturbed and vegetated. That’s why land development is a major source of sediment pollution. In fact, by volume, sediment is currently the greatest pollutant of Virginia’s rivers and streams, and land-disturbing construction activity has the highest erosion rate.

But do not despair! There are many easy and affordable ways to **keep your dirt on your project!** Here are a few: (1) Immediately stabilize disturbed areas after final grading; (2) use properly installed perimeter controls around your site; (3) slow down stormwater runoff before it leaves your site; and (4) clear the smallest area to complete your project. For more

Of Special Interest:

- What are the 19 Minimum Standards?
- On-site Practices to Prevent Stormwater Runoff Pollution
- Earning Kudos for Protecting “The River”

Remember . . .

Dirt that leaves YOUR site ends up, UNTREATED, in the nearest creek or river . . .

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	14	<ul style="list-style-type: none"> • All wash water to sanitary sewer. • Potential damage caused to streams by wash water. 	<ul style="list-style-type: none"> • Mailer, annually • PSAs on local cable station 	Commercial car wash facilities can contribute significant sediment if wash water is discharged into the County's MS4.
	Car Dealers	Business Licenses/Yellow Pages	20	<ul style="list-style-type: none"> • All wash water to sanitary sewer. • Potential damage caused to streams by wash water. 	<ul style="list-style-type: none"> • Mailer, annually • PSAs on local cable station 	Vehicle washing/detailing can contribute significant sediment if wash water is discharged into the County's MS4, which drains, untreated, to local streams. Residential car washing is specifically allowed; but, it still may contribute significant sediment if wash water is not properly handled.
	Auto Body Shops	Business Licenses/Yellow Pages	44	<ul style="list-style-type: none"> • All wash water to sanitary sewer. • Potential damage caused to streams by wash water. 	<ul style="list-style-type: none"> • Mailer, annually • PSAs on local cable station 	
	Homeowners	Tax Records	34,963	<ul style="list-style-type: none"> • Potential damage caused to streams by wash water. • Direct wash water to grass area for filtration and infiltration. • Never allow wash water to flow into street or storm drains. 	<ul style="list-style-type: none"> • County Publication sent annually to homeowners • PSAs on local cable station • Handouts at local environmental events, 4 per year minimum 	
	Contractors Involved in Land-Disturbing Activities	Community Development Permit Records and Yellow Pages	187	<ul style="list-style-type: none"> • Damage caused to streams by sediments. • Healthy fish populations require clear stream bottoms. • Silt fence is not enough. • Limit disturbed areas. • Stabilize as quickly as possible. 	<ul style="list-style-type: none"> • Brochure given to land-disturbance permittee when permit is issued. • Brochure given with enforcement actions 	Erosion and sediment control is required by regulations; however, more effective implementation may occur with additional education.

High-Priority Water Quality Issue	Target Audiences	Means to Determine Audience Size	Estimated Audience Size	Overall Messages	Means to Deliver Messages	Rationale
#2 BACTERIA	Restaurants	Business Licenses/ Yellow Pages	76	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage and contributes to algae overgrowth, which hurts aquatic life. All wastewater to sanitary sewers. Keep exterior trash receptacles and dumpsters covered and do not wash out into storm drain. Clean kitchen hoods and floor mats; properly dispose of wastewater. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	Uncovered dumpsters containing garbage and dumpsters and greasy floor mats that are rinsed out onto the pavement can contribute bacteria to our MS4, which discharges directly to our streams.
	Pet Owners (dogs/cats)	Pet Licenses	4,211 dogs 319 cats	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> County Publication sent annually to Homeowners PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Veterinarian Offices	Business Licenses/ Yellow Pages	11	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in Veterinarian offices, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Pet Stores/Pet Boarding/ Grooming	Business Licenses/ Yellow Pages	38	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in pet stores, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	County Police and Firemen; Animal Control Officer	County Records	2	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> In-house training 	Dog waste is a major source of bacteria in our streams; these County employees own or handle dogs as part of their work.

High-Priority Water Quality Issue	Target Audiences	Means to Determine Audience Size	Estimated Audience Size	Overall Messages	Means to Deliver Messages	Rationale
#3 NUTRIENTS	Homeowners	Tax Records/GIS	34,963	<ul style="list-style-type: none"> How nutrients damage streams. Do not over-fertilize. Use soil tests. Keep fertilizer off of pavements. Do not over-water lawns. 	<ul style="list-style-type: none"> County Publication sent annually to Homeowners PSAs on local cable station 	Excessive nutrients are carried off lawns and other managed turf areas to the County's MS4 and then to local streams; this leads to algae overgrowth in the streams, which adversely impacts fish and other marine life.
	Nurseries/Greenhouses	Business Licenses/Yellow Pages	6	<ul style="list-style-type: none"> How nutrients damage streams. Do not over-fertilize. Use soil tests. Keep fertilizer off of pavements. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	
	Lawn Care Services	Business Licenses/Yellow Pages	100	<ul style="list-style-type: none"> How nutrients damage streams. Do not over-fertilize. Use soil tests. Keep fertilizer off of pavements. Encourage use of organic products. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	

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

Type	Name	TMDLS Addressed
Poster	"No, I am NOT the Poop Fairy"	Bacteria
	"Who Left the Dogs' Poop?"	Bacteria
	"Granny Says. . ."	Bacteria, Sediment, PCBs, and more
Newsletter	"A Stormwater Guide for Homeowners" April 2017	Bacteria, Sediment, PCBs, and more
	"It's Just Dirt, A Newsletter for Contractors" April 2017	Sediment, PCBs, Minimum ESC Standards, and more
Brochure	"It's Just Dirt"	Sediment
	Stormwater Best Management Practices for Proper Pet Waste Disposal	Bacteria
	"Stormwater Best Management Practices for Restaurants"	Bacteria
	"Reduce, Reuse, Recycle and Properly Dispose of Hazardous Household Wastes"	Bacteria, Sediment, PCBs, and more
Fact Sheet	"Illicit Discharge Facts"	Bacteria, Sediment, PCBs, and more
	"Facts for Plumbers"	Bacteria, Sediment, PCBs, and more
	"Facts for Landscapers"	Sediment
	"Fall Foliage Facts"	Bacteria, Sediment, and more
	"Fact Sheet for Mosquito Control"	None - published as a Public Health issue
	"Tips for Homeowners - Stormwater Best Practices"	Bacteria, Sediment

■ New in 2016- 2017

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	76	Stormwater Management BMPs for Restaurants; MS4 permit requirements
	Postcard	Mailed	76	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 and Letter	Mailed	78	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	50	Pet waste pollutes receiving streams; owners are encouraged to pick up after their pets.
Landscaping Professionals	Letter and Fact Sheet (RoCo only*)	Mailed	106	Grass/shrub clippings, leaves, sediment, fertilizers, etc. cause pollution to receiving waters; use BMPs to minimize lawn debris, reuse stormwater, install erosion controls, and employ alternative lawn care practices.
Violators of Illicit Discharge Ordinance	Letter, Fact Sheet(s), and ordinance	Mailed at time of violation	10	It is illegal to discharge anything into the MS4 system except for the allowable non-stormwater discharges listed in the permit.
Plumbers	Fact Sheet	Provided in Lobby	unknown	It is illegal to discharge anything into the MS4 system except for the allowable non-stormwater discharges listed in the permit.
Contractors involved in Land-disturbing activities	Brochure	Distributed with ESC Permits	44	"It's Just Dirt" brochure and newsletter describe the harm to receiving waters from excess sediment from construction sites, explains permit requirements, & provides techniques to "keep the dirt on the project."
	Newsletter	Mailed	187	
Residents	Brochure	Provided in Lobby	30	"Reduce, Reuse, Recycle and properly dispose of hazardous household wastes" brochure.
Residences	Newsletter	Mailed	34,963	MS4 Permit requirements; high-priority water quality issues; PCBs, reducing stormwater pollution at home, rainwater harvesting, illicit discharges

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

Evaluation and Modification:

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

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


Annual Period	Type of Educational Material	Target Group	# Sent /Total # in Target Group	% of Target Audience Reached
2013-2014 (YEAR 1)	Car Wash Postcard	Businesses with Car Washes	107 / 107	100%
	Restaurant Postcard	Restaurants	115 / 115	100%
	MS4 Permit Brochure for Businesses	All County Businesses	1,209 / 1,209	100%
2014-2015 (YEAR 2)	Car Wash Postcard	Businesses with Car Washes	196 / 196	100%
	It’s Just Dirt Brochure	Land-disturbing Contractors	12 / 51	23.5%
	Stormwater Newsletter	Residences	32,599 / 32,599	100%
	Restaurant Postcard + Brochure	Restaurants	125 / 125	100%
	Landscaping Fact Sheet	Professional Landscapers, Nurseries, Greenhouses	88 / 88	100%
	Pet Waste Poster + Brochure	Veterinarians, Groomers, Stables, Pet Daycare, Pet Boarding, etc.	34 / 34	100%
2015-2016 (YEAR 3)	Car Wash Postcard	Businesses with Car Washes	103 / 103	100%
	Restaurant Postcard, Letter, and Brochure	Restaurants	127 / 127	100%
	It’s Just Dirt Brochure	Land-disturbing Contractors	162 / 97*	>100%
	Stormwater Newsletter	Residences	32,493 / 32,493	100%
	Landscaping Fact Sheet	Professional Landscapers, Nurseries, Greenhouses	117 / 117	100%
	Pet Waste Poster, Letter, and Brochure	Veterinarians, Groomers, Stables, Pet Daycare, Pet Boarding, Animal Control, etc.	34 / 34	100%
	“Tips for Homeowners - Stormwater Best Practices”	Residential lots using individual stormwater control measures without maintenance agreements	66 / 66 (no new ones for this Permit Year)	100%

2016-2017 (YEAR 4)	Car Wash Postcard and Letter	Businesses with Car Washes	78 / 78	100%
	Restaurant Postcard, Letter, and Brochure	Restaurants	76 / 76	100%
	It's Just Dirt Newsletter	Land-disturbing Contractors	187 / 187	100%
	It's Just Dirt Brochure	Land-disturbing Contractors	162 / 32**	>100%*
	Stormwater Newsletter	Residences	34,963 / 34,963	100%
	Landscaping Fact Sheet	Professional Landscapers, Nurseries, Greenhouses	106 / 106	100%
	Pet Waste Poster, Letter, and Brochure	Veterinarians, Groomers, Stables, Pet Daycare, Pet Boarding, Animal Control, etc.	50 / 50	100%
	"Tips for Homeowners - Stormwater Best Practices"	Residential lots using individual stormwater control measures without maintenance agreements	66 / 66 (no new ones for this Permit Year)	100%

* Total # of RLDs entered into County's LDO tracking system July 1, 2015 - June 30, 2016; each RLD may obtain multiple permits

**Total # of RLDs entered into County's LDO tracking system July 1, 2016 - June 30, 2017; each RLD may obtain multiple permits

In addition to all of the mailings listed above, the County developed a Pool Fact Sheet that is annually mailed to every pool owner (1,551 of them) within the County. Although the document does not address a specific TMDL, it is believed to be of value in helping to keep chemicals, such as chlorine and algaecide, out of the area's receiving waters.



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 fourth year of the new permit cycle, the Clean Valley Council, on behalf of the County, hosted **four** storm drain stenciling events, with **55** storm drain inlets being stenciled.

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

TMDL Consistency:

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



Evaluation and Modification:

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

Year	# of Storm Drain Inlets Stenciled	Attendance
2013 - 2014 (YEAR 1)	106	63
2014 - 2015 (YEAR 2)	64	30
2015 - 2016 (YEAR 3)	72	18
2016 - 2017 (YEAR 4)	55	38

BMP 2-2: Stormwater Public Event

Goal:

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

Measurable Goals:

Through the CVC, Roanoke County was active in **4** regional events during the year that involved **16,751** people:

- Clean Valley Day
- Go Fest (booth, stream school, and program)
- Fall Waterways Cleanup
- Tons of Fun



During these events, 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**.

In addition to the events mentioned above, the County's Department of Parks, Recreation, and Tourism (PRT) participated in a variety of Public Events, including river cleanups and stream buffer maintenance. Also, the PRT Department received matching grant funds through the Virginia Trees for Clean Water program; this money was administered by the Roanoke Valley-Alleghany Regional Commission, and it was used to purchase



fourteen trees that were planted at Green Valley Elementary School, Mountain View Elementary School, and Garst Mill Park. In addition, Roanoke County formally celebrated Arbor Day on Friday, April 28, 2017 with a celebration at Green Valley Elementary School. The Roanoke County Board of Supervisors recognized National Arbor Day by encouraging citizens to plant a tree in their community. Public outreach included the Arbor Day program with the school system, Roanoke Valley Television, and social media. Photos and more information about these various events 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 the aforementioned events in which CVC participated, because they are key regional water quality issues. (EC & SED) In addition, the tree planting events focus on the value of stream buffers for protecting water quality, through their pollution-filtering capabilities, (EC & SED) and for maintaining wildlife habitat.

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 have hands-on involvement in projects that help to improve water quality. Also, they provide the County with an opportunity to receive public input and also to disseminate pertinent stormwater-related information.

Year	Public Event(s)	Attendance
2013 – 2014 (YEAR 1)	14	23,490
2014 - 2015 (YEAR 2)	6	6,050
2015 - 2016 (YEAR 3)	5	3,407 - CVC events; 1,825 - Fall Home Show
2016-2017 (YEAR 4)	4	16,751 – CVC events; 3 - Tree Planting events

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. This form of public viewing allows Roanoke County citizens to become knowledgeable about the goals of the program. It also allows them to become better informed such that they can comment on existing issues and influence changes in future programs and direction. Each annual report will be posted on the website to keep citizens informed about annual evaluations of program effectiveness and proposed changes. In addition, the MS4 General Permit and MS4 Program Plan are also posted for public viewing.

Measurable Goals:

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

2013-2018 MS4 Permit

- 2014 MS4 Program Plan, revised March 2015
- 2014 Revised MS4 Program Plan
- 2013 Revised MS4 Program Plan
- 2013 MS4 General Registration Statement
- 2016-2017 MS4 Annual Report
- 2015-2016 MS4 Annual Report
- 2014-2015 MS4 Annual Report
- 2013-2014 MS4 Annual Report, revised March 2015
- 2013-2014 MS4 Annual Report

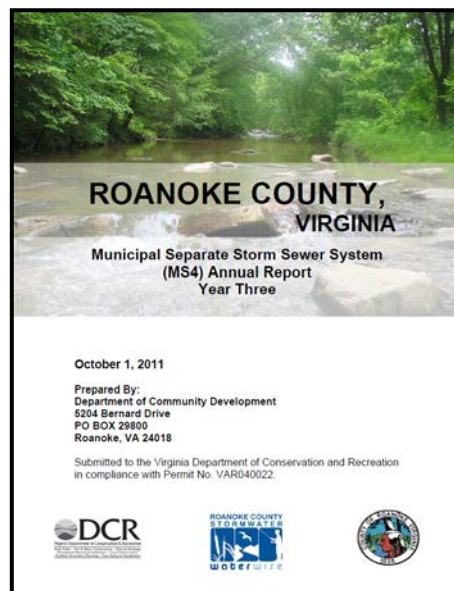
2008-2013 Permit

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

2003-2008 Permit

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

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



TMDL Consistency:

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

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

Evaluation and Modification:

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

MCM 3: Illicit Discharge Detection and Elimination (IDDE)

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

BMP 3-1: Storm Drain Map

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

BMP 3-2: Illicit Discharge Ordinance

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

BMP 3-3: MS4 Outfall Inspections

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

BMP 3-4: Illicit Discharge Detection and Elimination Program

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

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

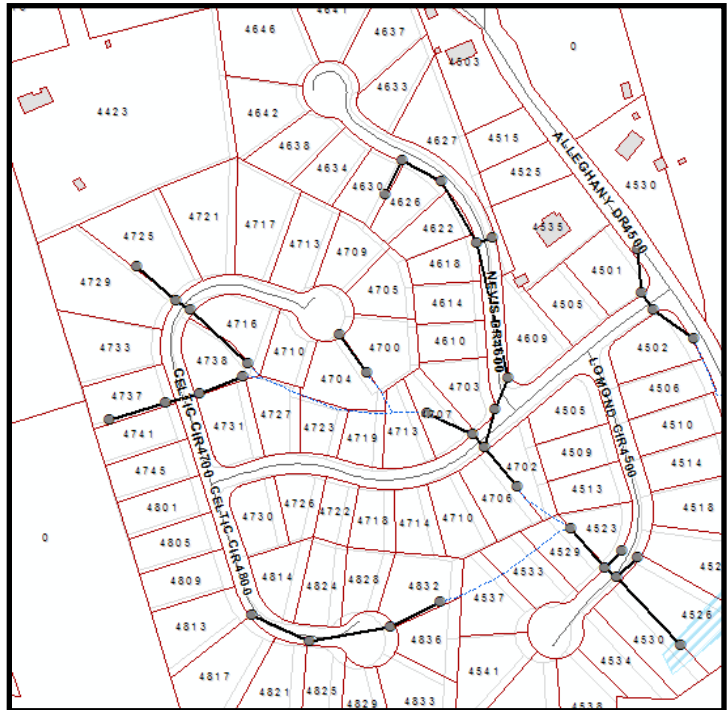
BMP 3-1: Storm Drain Map

Goal:

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

Measurable Goals:

Roanoke County has continued this program by expanding and updating the storm sewer map of Roanoke County. In addition to locating any new storm sewer outfalls, the map has been updated to show the current outfalls and their associated Hydrologic Unit Code (HUC) for the watershed in which they discharge, the names and locations of all the impaired surface waters that receive discharges from these systems, and the estimated acreage draining to the storm sewer outfall. Note that for Year 4, there were **eleven** new outfalls added serving **15.54** acres. The pertinent data about each outfall is provided on the attached compact disk under the folder titled **BMP 3-1**. Click on the "Outfall" tab in the spreadsheet.



TMDL Consistency:

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

Evaluation and Modification:

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

BMP 3-2: Illicit Discharge Ordinance

Goal:

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

Measurable Goals:

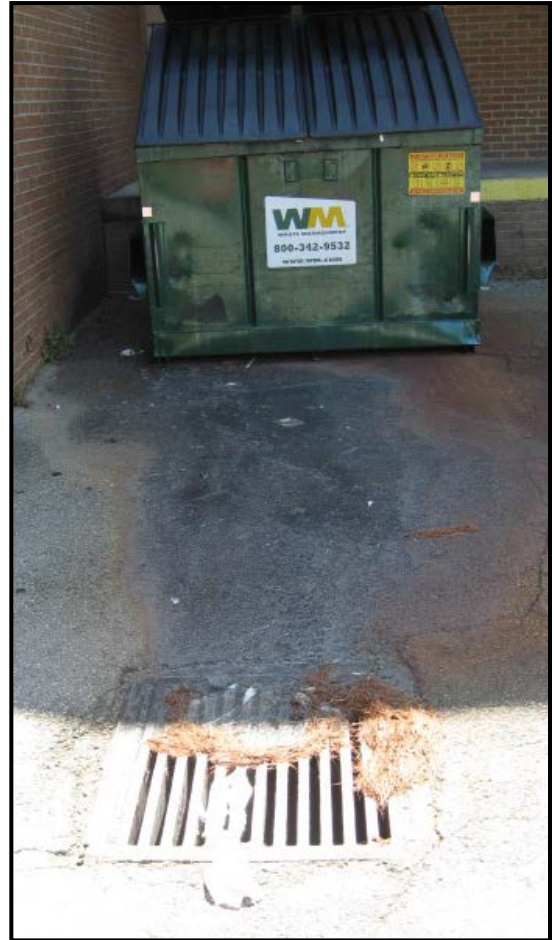
Roanoke County adopted an Illicit Discharge Ordinance on April 22, 2014; it is compliant with current state regulations of the Virginia Department of Environmental Quality. Enforcement measures and penalties are included in the Illicit Discharge Ordinance. The document may be found on the attached compact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

TMDL Consistency:

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

Evaluation and Modification:

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



Year	Action	Modifications
2013 - 2014 (Year 1)	New Illicit Discharge Ordinance Developed and Adopted	n/a
2014 - 2015 (Year 2)	None	None
2015 - 2016 (Year 3)	None	None
2016 - 2017 (Year 4)	None	None

BMP 3-3: MS4 Outfall Inspections

Goal:

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

Measurable Goals:

In the first year of the reissued permit, 96 outfalls were inspected, with no illicit discharges identified. In the second year of the reissued permit, 85 outfalls were inspected with no identified illicit discharges. In this third year, 50 outfalls were inspected, again with no illicit discharges found. In the fourth year, **58** outfalls were inspected with no illicit discharges found. The selection process in each year for the chosen outfalls followed these criteria, in descending order:

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

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

TMDL Consistency:

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

Evaluation and Modification:

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

Year	# Outfalls Inspected	# of Illicit Discharges Found
2013 - 2014 (Year 1)	96	None
2014 - 2015 (Year 2)	85	None
2015 - 2016 (Year 3)	50	None
2016 - 2017 (Year 4)	58	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 into the regulated municipal separate storm sewer system (MS4), as defined in 4VAC50-60-10. 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 4 of the reissued permit, Roanoke County responded to **18** 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 4 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 4 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, SED, & PCBs)

Evaluation and Modification:

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

Year	# of Illicit Discharge Complaints Received	# Resolved and Closed
2013 - 2014 (Year 1)	11	11
2014 - 2015 (Year 2)	15	15
2015 - 2016 (Year 3)	25	25
2016 - 2017 (Year 4)	18	18



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 address construction site stormwater runoff.

BMP 4-4: Erosion and Sediment Control Inspection

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

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

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

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

BMP 4-1: Erosion and Sediment Control Ordinance

Goal:

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

Measurable Goals:

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



During this fourth year of the reissued permit, the County had **44 commercial** regulated land-disturbing activities, with a total of **121.273** acres disturbed. The County also had **156 residential** regulated land-disturbing activities, with a total of **33.61** acres disturbed. The monthly counts of land disturbing activities, both residential and commercial, can be found on the attached compact disk under the folder titled **BMP 4-1**. [Note that there are two spreadsheets to look at because the report is set up to calculate calendar year instead of fiscal year.]

TMDL Consistency:

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

Evaluation and Modification:

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

Year	Total Acres Disturbed (acres)	Total # of Regulated Land-Disturbing Activities
2013 - 2014 (YEAR 1)	102.4	168
2014 - 2015 (YEAR 2)	66.31	189
2015 - 2016 (YEAR 3)	68.067	159
2016 - 2017 (YEAR 4)	121.273 commercial <u>33.61 residential</u> 154.88 TOTAL In TOV - 0.09 SFR and 1.59 commercial	44 commercial <u>156 residential</u> 200 TAL In TOV - 1 SFR and 4 commercial

TOV = Town of Vinton

RoCo = Roanoke County

Year	Action
2013 - 2014 (YEAR 1)	E & S Ordinance not reviewed; no proposed changes or modifications
2014 - 2015 (YEAR 2)	Proposed revisions to E & S Ordinance to meet state regulations, currently under Board of Supervisors consideration
2015 - 2016 (YEAR 3)	Adopted the Revised Ordinance
2016 - 2017 (YEAR 4)	None

BMP 4-2: Erosion and Sediment Control Certification

Goal:

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

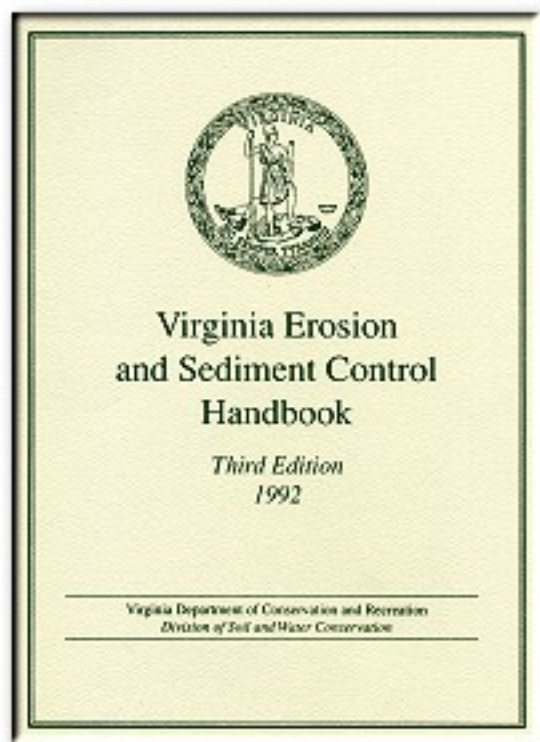
Measurable Goals:

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

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

TMDL Consistency:

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

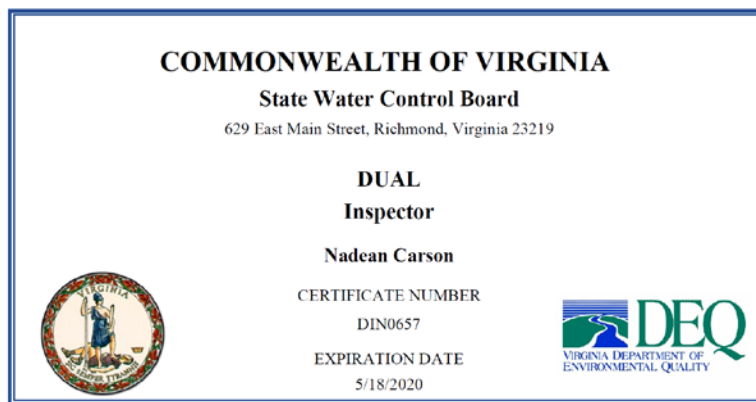


Evaluation and Modification:

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

ESC & STORMWATER MANAGEMENT CERTIFICATIONS				
	NAME	CERTIFICATION	CERTIFICATE #	EXPIRATION DATE
Atkinson	Bob	Professional Engineer	0402 041822	01/31/19
Henderson	David	Professional Engineer	0402 022296	05/31/19
Yates	Morgan	Plan Reviewer	458	05/31/20
Younger	Carter	Plan Reviewer	Provisional	Provisional
Linkenhoker	Cindy	ESC Combined Administrator	363	11/30/18
Thompson	Philip	ESC Combined Administrator	698	12/09/19
Atkinson	Bob	SWM Combined Administrator	SWCA0283	12/08/18
Fuller	RG	SWM Combined Administrator	SWCA0325	03/15/19
Gwynn	Angie	SWM Combined Administrator	SWCA0288	12/29/18
Henderson	David	Dual SWM Combined Administrator	DCA0259	10/17/17
Covey	Arnold	Dual Program Administrator	DPA0108	06/30/19
Sowder	Denise	Dual Program Administrator	DPA0107	02/05/19
Carroll	Curtis	ESC Inspector	1966	11/30/19
Forry	Shane	ESC Inspector	Provisional	Provisional
Fowler	Bill	ESC Inspector	3740	11/30/19
Fuller	RG	ESC Inspector	3848	11/30/19
Holland	Dale	ESC Inspector	1945	05/31/19
Peters	Bruce	ESC Inspector	3469	05/31/18
Prillaman	Rhonda	ESC Inspector	ESIN0250	09/04/18
Waldron	Larry	ESC Inspector	3930	05/31/20
Yates	Morgan	ESC Inspector	1929	05/31/19
Prillaman	Prillaman	SWM Inspector	SWIN0364	10/16/18
Shrewsbury	Nick	Dual Inspector	DIN0239	10/28/18
Altice	Jeff	Responsible Land Disturber	39411	04/04/19

In addition to the above-named staff, the County's 3rd party contractor also holds the following certification:



BMP 4-3: Erosion and Sediment Control Plan Review

Goal:

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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

Year	Total # of E&S Plan Reviews
2013 - 2014 (YEAR 1)	Not reported
2014 - 2015 (YEAR 2)	196
2015 - 2016 (YEAR 3)	130 SFR (14 in TOV; 116 in RoCo) 49 Commercial (incl. subdivisions) – all in RoCo
2016 - 2017 (YEAR 4)	131 SFR (3 in TOV; 128 in RoCo) 41 Commercial (incl. subdivisions) (2 in TOV; 39 in RoCo)

TOV = Town of Vinton

RoCo = Roanoke County

BMP 4-4: Erosion and Sediment Control Inspection

Goal:

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

Supporting Documents:

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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



Year	# of Inspections Conducted (Commercial and SFR Projects)
2013 - 2014 (YEAR 1)	18,694
2014 - 2015 (YEAR 2)	14,131
2015 - 2016 (YEAR 3)	11,889* [SFR=9,679; COM = 2,210] 137 SFR: 0 COM in TOV 542 SFR, 2210 COM in RoCo
2016 - 2017 (YEAR 4)	9,443* [SFR=6,723; COM = 2,720] 24 SFR: 42 COM in TOV 1,085 SFR, 2,678 COM in RoCo

SFR = Single Family Residential; COM = Commercial; TOV = Town of Vinton; RoCo = Roanoke County

*Residential inspections occur with every building inspection

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

Goal:

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

Measurable Goals:

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



TMDL Consistency:

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

Evaluation and Modification:

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

Year	# of Enforcement Actions NTC = Notice to Comply SWO = Stop Work Order
2013-2014 (YEAR 1)	12 - NTC 2- Civil Penalties [Summons]
2014 - 2015 (Year 2)	19 - NTC 1 - SWO
2015 - 2016 (YEAR 3)	20 - NTC 4 - SWO 1 - Civil Penalty [Summons]
2016 - 2017 (YEAR 4)	7- NTC 9 - SWO 1 - Civil Penalty [Summons]



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

Develop and 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.

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 5-1: Stormwater Management Ordinance and Manual

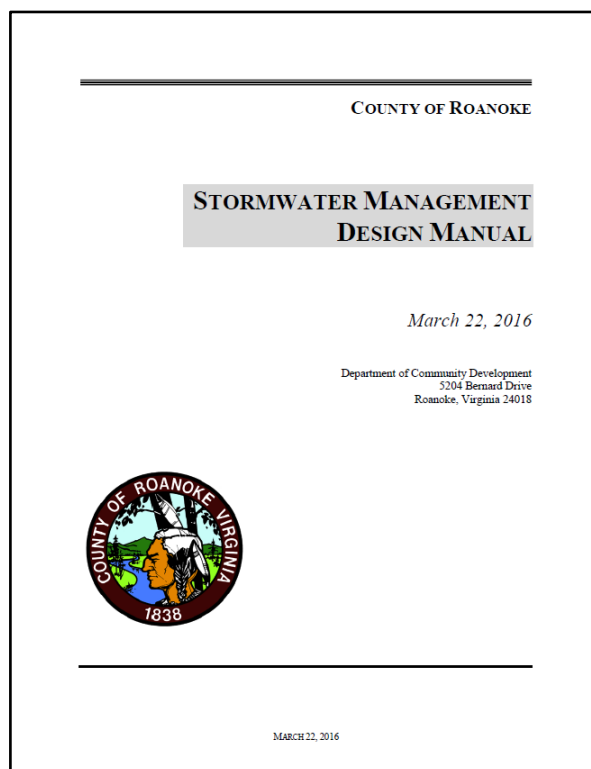
Goal:

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

Measurable Goals:

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

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



TMDL Consistency:

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

Evaluation and Modification:

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

Year	Action	Changes and Modifications
2013 - 2014 (YEAR 1)	New Stormwater Ordinance and Design Manual Adopted	New Documents, effective July 1, 2014
2014 - 2015 (YEAR 2)	Revise SWM Ordinance and Design Manual	Revisions are under Board of Supervisor consideration.
2015 - 2016 (YEAR 3)	Revised SWM Ordinance and Design Manual	Revised SWM Ordinance, eff. 2-23-16 Revised SWM Design Manual, eff. 3-22-16
2016 - 2017 (YEAR 4)	none	none

BMP 5-2: Stormwater Management Plan Review

Goal:

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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

Year	# of SWM Plans Reviewed	# of Agreement in Lieu of SWM Plans issued
2013 - 2014 (YEAR 1)	37	-
2014 - 2015 (YEAR 2)	185	33
2015 - 2016 (YEAR 3)	162 28 - Commercial; 134 - SFR	32
2016 - 2017 (YEAR 4)	44 - Commercial; 161 - SFR	41

SFR = Single Family Residential

NOTE:

VSMP Permits Issued for SFR = 41

VSMP Permits Issued for Commercial = 19

BMP 5-3: Stormwater Management Facility Construction Inspection

Goal:

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

Measurable Goals:

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

TMDL Consistency:

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



Evaluation and Modification:

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

Year	# of SWM Facilities Inspected Under Construction
2013 - 2014 (YEAR 1)	111
2014 - 2015 (YEAR 2)	73
2015 - 2016 (YEAR 3)	53
2016 - 2017 (YEAR 4)	51

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

Goal:

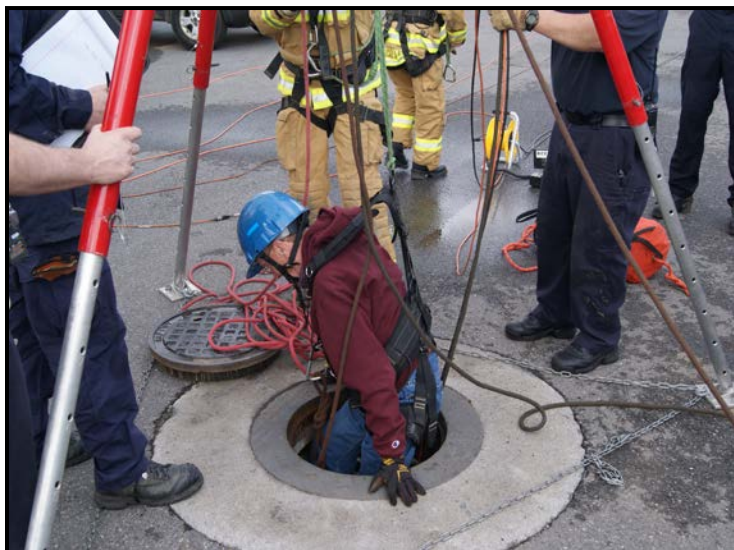
The goal of this BMP is to develop and maintain written procedures for post-construction inspections to confirm that adequate maintenance is occurring.

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 4, Roanoke County inspected all of its publicly-owned SWMFs, including those owned by Roanoke County Schools. The repair/maintenance needs were categorized into four major groups, summarized on spreadsheets, in preparation for procuring contractors to conduct the work in the fall / winter of 2018. These spreadsheets are included on the attached compact disk in the folder titled **BMP 5-4**. Due to the loss of several key personnel and additional work taken on by the County's ESC inspectors, the County has hired a 3rd party contractor (Parker Design Group) to assist with BMP inspections for privately-owned facilities.

Year	Post-Construction Stormwater Facilities Inspected	Total Number of Stormwater Facilities*	BMP Maintenance Guides Given Out
2013 - 2014 (YEAR 1)	23 - Public 184 - Private	71 - Public 661 - Private	120
2014 - 2015 (YEAR 2)	49 Public 97 Private	71 - Public 700 - Private	0
2015 - 2016 (YEAR 3)	67- Public 95 - Private	67- Public 681- Private	30
2016 - 2017 (YEAR 4)	66- Public 254 - Private	66- Public 678- Private	8

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

BMP 5-5: Stormwater Management Facility Tracking

Goal:

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

Measurable Goals:

Success for this BMP will be measured by the annual evaluation of any additions or modifications to the GIS stormwater database. In this Permit Year 4, there were 11 new Stormwater Management Facilities brought online in the MS4 area, serving 16.81 acres. For a complete listing of these facilities with other pertinent data, see the enclosed compact disk in the folder titled **BMP 5-5**. Click on the “BMPs” tab in the spreadsheet.

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:

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

New Stormwater Facilities Brought Online

HUC	#	Acres Treated
30101010301	1	2.00
30101010402	2	3.47
30101010403	1	4.44
30101010404	7	6.90
Total	11	16.81

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

Goal:

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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

Permit Year 2 was the first year to not require maintenance agreements for individual residential lots. In this Permit Year 4, there were no new residential lots that used individual stormwater control measures without maintenance agreements. Practices that have been used in the past include: roof leaders directed to grass swales and underground detention, among others.

100% of the total number of individual SFRs was reached with homeowner education and outreach materials using direct mail. For this Permit Year 4, the newsletter entitled *A Stormwater Guide for Homeowners*, dated April 2017, was used for this purpose, as it included a relevant article entitled "Top 10 ways to Reduce Stormwater Pollution at Home." This newsletter can be found on the attached compact disk under the folder titled **BMP 1-2**.

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

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



MCM 6: Pollution Prevention and Good Housekeeping for Municipal Operations

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

BMP 6-1: Spill Prevention Control and Countermeasures Plans

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

BMP 6-2: Household Hazardous Waste Event

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

BMP 6-3: Storm Sewer Maintenance Program

Roanoke County will continue to provide storm sewer system maintenance.

BMP 6-4: Employee Training

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

BMP 6-5: Standard Operating Procedures

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

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

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

BMP 6-7: Nutrient Management Plans

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

BMP 6-8: Pesticide Applicator Certification

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

BMP 6-9: Responsible Land Disturber

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

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

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

Goal:

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

Measurable Goals:

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

County facilities that have a current SPCC Plan include:

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

These SPCC plans were either prepared or revised last year and submitted with last year's Annual Report. They may be viewed on the County's website at the following site:

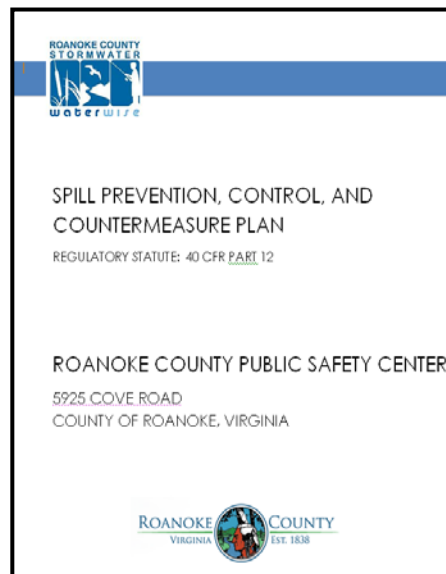
<http://roanokecountyva.gov/DocumentCenter/Index/639>

TMDL Consistency:

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

Evaluation and Modification:

SPCC plans are required for facilities per 40 CFR Part 112. The County finds this to be an effective BMP to assure the proper storage of oil.



BMP 6-2: Household Hazardous Waste Event

Goal:

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

Measurable Goal:

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

Roanoke County participated in **11** Household Hazardous Waste (HHW) Collection events with the Roanoke Valley Resource Authority; **371** people from Roanoke County participated in them. The waste that was collected included a wide array of products such as flammable liquids, light bulbs, paints, pesticides, and aerosols. Statistics for the HHW Events can be found in files on the attached compact disk under the folder titled **BMP 6-2**.



The Western Virginia Water Authority held two Rx Take-Back events in the Roanoke Valley region during this permit year, collecting a total of **7,832 pounds** of medication. (2,966 pounds were collected in October 2016, and 2,433 pounds were collected in April 2017). Participating localities included: Roanoke County, City of Roanoke, Franklin County, Craig County, Botetourt County, City of Salem, and Town of Vinton. The fliers are included on the attached compact disk in a folder titled **BMP 6-2**. Roanoke County's collection totals are provided below:

- **Saturday October 22, 2016**

Roanoke County:

- Kroger at Tanglewood: 225.5 pounds
- Kroger at Valley Gateway: 151.9 pounds
- Kroger at Brambleton: 296.9 pounds
- Roanoke County Fire Station #1: 495 pounds

Total: 1,169.3 pounds

- **Saturday April 29, 2017**

Roanoke County:

- Kroger at Tanglewood: 556 pounds
- Kroger at Valley Gateway: 208 pounds
- Kroger at Brambleton: 467 pounds
- Roanoke County Fire Station #1: 263 pounds

Total: 1,494 pounds

Since this program was started in 2010, a hefty **26,965 pounds** of medication have been collected in Roanoke Valley locations.

TMDL Consistency:

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

Evaluation and Modification:

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

Year	HHW Events	Attendance
2013 - 2014 (YEAR 1)	12	346
2014 - 2015 (YEAR 2)	12	339
2015 - 2016 (YEAR 3)	11	405
2016 - 2017 (YEAR 4)	11	371

Got Drugs?

Turn in your unused or expired medications for safe disposal.

Saturday, October 22, 2016
10 am - 2 pm

Convenient Parking Lot Locations in:

Roanoke - Towers Mall - CVS
Botetourt County - Daleville Kroger
Salem - Super Shoes on Main Street
Vinton - Hardy Road Kroger
Craig County - Market Street Pharmacy

Roanoke County - Tanglewood Mall Kroger,
Kroger on Valley Gateway Blvd., Kroger at
Colonial & Brambleton and the Hershberger
Road Fire and Rescue Station #1

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

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

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



BMP 6-3: Storm Sewer Maintenance Program

Goal:

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

Measurable Goals:

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

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



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

This year **51** maintenance and improvement projects were completed, resulting in the following:

- Feet of pipe installed = **225**
- Total properties improved = **66**
- Total feet of open/riprap channel = **480**
- Total restoration area = **28,259** square feet
- Tons of sediment removed = **540** cubic yards
- Number of Board-approved projects = **2**
- Number of small projects = **16**
- Number of routine/repetitive projects = **6**
- Number of emergency / high priority projects = **26**
- Inter-departmental projects = **2**

A total of **16,416 labor** hours were committed towards storm sewer system maintenance and improvements to the municipal storm sewer system. The value of these improvements that were performed in-house was estimated to be **\$1,202,003**; additionally, the County contracted for **\$57,159** in additional drainage improvements. Therefore, the total County investment in storm drainage maintenance and improvements was **\$1,259,162**.

TMDL Consistency:

This program is responsible for maintaining the regulated storm sewer system. This includes the improvement of eroding stream banks and channels. This program directly remediates existing areas where sediment is eroding and stabilizes the system, removing the input of sediment to the streams and channels. For example, at the Hidden Valley High School, some 540 cubic yards of silt was removed from the forebay and dam area. (SED) This program also increases the potential for discovering illicit connections to the storm drain system. (EC)

Evaluation and Modification:

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

Year	Total Projects	Annual Period Improvement Value
2013 - 2014 (YEAR 1)	51	\$950,250
2014 - 2015 (YEAR 2)	50	\$1,567,757
2015 - 2016 (YEAR 3)	63	\$1,227,429
2016-2017 (YEAR 4)	?	?



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

BMP 6-4: Employee Training

Goal:

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

Measurable Goals:

This BMP is measured by the number of County employees that receive the training. In this permit year, employees in eleven departments received training on several of the topics listed above. The training dates, name and number of employees attending, by department, and a generic copy of the letter sent to all department heads explaining the purpose of said can be found on the attached compact disk under 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 168 uniformed, career employees. The number of volunteers is always in flux, but the County estimates that there are also 246 volunteers that currently have HAZ-MAT Operations training. HAZ-MAT certification does not expire from the Virginia Department of Fire Programs;

however all career personnel receive annual, internal training on this topic as part of their career development training.

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

New for this year, the County's Community Development Department conducted an in-house training for local land-disturbing contractors. The effort was a partnership with the Roanoke Regional Home Builders Association (RRHBA) and Fields Construction. The training was entitled "Erosion Control Basics: Complying with the Minimum Standards" and was designed to help contractors understand the 19 minimum standards in Virginia's Erosion and Sediment Control Regulations. The ultimate goal: "to keep dirt on the projects and out of the receiving streams."

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. The contractor-specific training conducted by the County was focused on reducing sediment from construction sites. (SED/EC)

Evaluation and Modification:

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

BMP 6-5: Standard Operating Procedures

Goal:

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

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

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

Measurable Goals:

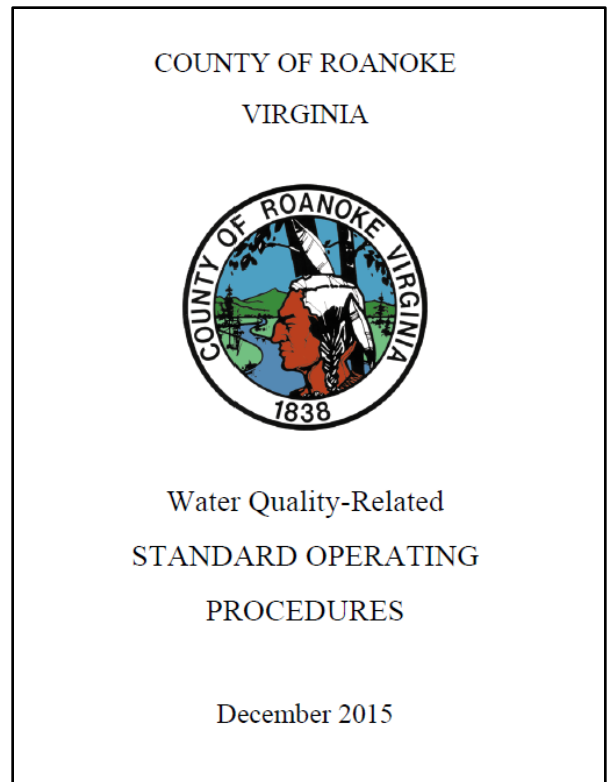
The measurable goal is the development and training on appropriate SOPs. The SOPs are provided on the enclosed compact disk in the folder titled **BMP 6-5**. Training using the SOPs was described in the previous **BMP 6-4**.

TMDL Consistency:

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

Evaluation and Modification:

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



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

Goal:

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

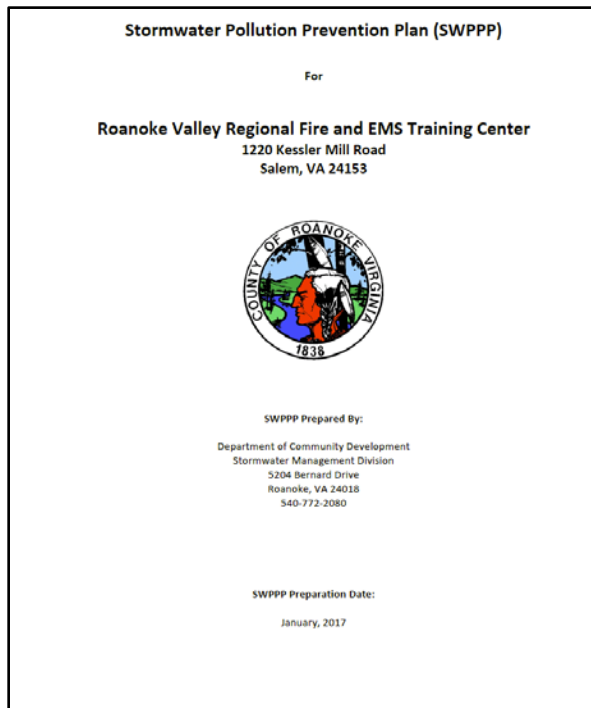
High-priority facilities include composting facilities, equipment storage and maintenance facilities, materials storage yards, pesticide storage facilities, public works yards, recycling facilities, salt storage facilities, solid waste handling and transfer facilities, and vehicle storage and maintenance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

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

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

Measurable Goals:

Success for this BMP will be measured by the development, implementation, and maintenance of the required SWPPPs. In this Permit Year 4, the following SWPPPs were completed and are enclosed on the attached compact disk in a folder titled **BMP 6-6**.



Roanoke County Public Safety Buildings

- Public Safety Buildings #1, #3, #5 #6, #9 (revision)
- Fire & EMS Training Center

Roanoke County Public Schools (RCPS)

- RCPS Bus Lots (Glenvar High School, Northside High School, and Former William Byrd High School (in Vinton, VA)

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 implement and update the completed SWPPPs, as identified and reported on the attached compact disk in the folder titled **BMP 6-6**.

BMP 6-7: Nutrient Management Plans

Goal:

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

Measurable Goals:

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

Property owned by Roanoke County – In Permit Year 2, the County's Department of Parks, Recreation, and Tourism (PRT) completed a Nutrient Management Plan (NMP) that covers all of the sites that are fertilized by the Parks Department. Some of the fields maintained by PRT are on school properties, so those sites are also included on the NMP. However, Roanoke County Schools is responsible for most of their fields and grounds and those areas have been covered under the Schools' Nutrient Management plans, as previously reported. PRT added a couple of fields to their list, so their acreage increased; PRT currently fertilizes roughly **107.55 acres on 31 sites**.

Sites covered by Phase 1 grouping in the Parks NMP plan, as reported Permit Year 2

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

Sites covered by Phase 2 grouping in the Parks NMP plan, as implemented permit Year 3

• Hollins Park	5688 Hollins Rd. Roanoke, VA 24019
• Ingersoll Rand Park	Old Mountain Rd Roanoke, VA 24019
• Roanoke County Fleet Center	5235 Hollins Rd. Roanoke, VA 24019
• Bonsack Elementary 5437	Crumpacker Dr. Roanoke, VA 24019
• OLD Central Middle School (RCCC)	100 Highland Rd. Vinton, VA 24179
• Herman Horne Elementary	1002 Ruddell Rd. Vinton, VA 24179
• Vinyard Park East	151 Berkley Rd. Roanoke, VA 24012
• Vinyard Park West	150 Berkley Rd. Roanoke, VA 24012
• Goode Park	5904 Goode Park Rd. Vinton, VA 24179
• Mount Pleasant Park	3071 Pitzer Rd. Roanoke, VA 24014
• Craig Recreation Center	900 Chestnut St. Vinton, VA 24179

Sites covered by Phase 3 grouping in the Parks NMP plan, as implemented permit Year 4

- | | |
|-------------------------------|--|
| • Brookside Park | 20 Verndale Dr, Roanoke, VA 24019 |
| • Burlington Elem Fields | 6533 Peters Creek Rd, Roanoke, VA 24019 |
| • Green Hill Park | 2501 Parkside Dr, Salem, VA 24153 |
| • Green Ridge Rec Center | 7415 Wood Haven Rd, Roanoke, VA 24019 |
| • Mason Cove Elem Fields | 3370 Bradshaw Rd. Salem, VA 24153 |
| • Northside Complex Fields | 6758 Northside High School Rd. Roanoke, VA 24019 |
| • Public Safety building | 5925 Cove Rd. Roanoke, VA 24019 |
| • School Admin building Field | 5937 Cove Rd. Roanoke, VA 24019 |
| • Walrond Park | 6824 Walrond Dr. Roanoke, VA 24019 |
| • Whispering Pines Park | 3551 Absalom Smith Rd. Salem, VA 24153 |

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

Glenvar High School

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

Northside High School

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

Northside Middle School

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

Hidden Valley Middle School

- Football - 56,000 sq. ft.

Hidden Valley High School

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

Cave Spring Middle School

- Practice - 87,000 sq. ft.

Cave Spring High School

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

William Byrd High School

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

TMDL Consistency:

This BMP ensures that all County owned lands where nutrients are applied to a contiguous area of 1 acre or more. While there is no known benefit towards satisfying the TMDL requirements for E. coli or sediment, there is a water quality benefit associated with proper application of nutrients, which are one of the County's high priority water quality issues, 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 implement all of its NMPs, as listed on the attached compact disk in the folder titled **BMP 6-7**.

BMP 6-8: Pesticide Applicator Certification

Goal:

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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

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

EMPLOYEE	CERTIFICATION TYPE	CERTIFICATION #	EXPIRATION DATE
Eric C. Vest	Pesticide Applicator	72792-G	6/30/2019
Mick Brizendine	Pesticide Applicator	73382-G	6/30/2019
Jerad Ray	Pesticide Applicator	127518-G	6/30/2019
Eric C. Vest	Fertilizer Applicator	CFA-13407-57329	6/4/2021

BMP 6-9: Responsible Land Disturber (RLD)

Goal:

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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

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

RLD = Responsible Land Disturber

SECTION II

Total Maximum Daily Loads (TMDLs)



Total Maximum Daily Loads (TMDLs)

A. TMDL ACTIVITIES

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

B. TMDL ACTION PLANS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

T-7: Dog Waste Stations (EC)

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

T-8: Dog Waste Ordinance (EC)

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

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

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

T-10: Stream Buffers (EC and SED)

Evaluate the possibility of enacting stream buffer requirements.

Capital Improvements (EC and SED)

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

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

Goal:

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

Measurable Goals:

In Permit Year 2 (2014 - 2015), the County hired a consultant to perform this task. The initial stream assessment was completed by the consultant and documented in a report, dated January 2016. This report was provided with last year's annual report.

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

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

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

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

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

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

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

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

The results also included 14 potential additional outfalls that were not on the County's GIS mapping at the time. These potential outfalls were investigated and 11 of them were added to the County's mapping. (The remaining three were not outfall pipes but rather inflow pipes to stormwater facilities.) The associated acreage for the 11 new outfalls is included in **BMP 3-1**.

TMDL Consistency:

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

Evaluation and Modification:

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

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

Goal:

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

Measurable Goals:

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

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

TMDL Consistency:

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

Evaluation and Modification:

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



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

High-Priority Water Quality Issue	Target Audiences	Means to Determine Audience Size	Estimated Audience Size	Overall Messages	Means to Deliver Messages	Rationale
#1 SEDIMENT	Car Washing/Detail Facilities	Business Licenses/Yellow Pages	14 all in RoCo	<ul style="list-style-type: none"> • All wash water to sanitary sewer. • Potential damage caused to streams by wash water. 	<ul style="list-style-type: none"> • Mailer, annually • PSAs on local cable station 	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 17 in RoCo; 3 in TOV	<ul style="list-style-type: none"> • All wash water to sanitary sewer. • Potential damage caused to streams by wash water. 	<ul style="list-style-type: none"> • Mailer, annually • PSAs on local cable station 	Vehicle washing/detailing can contribute significant sediment if wash water is discharged into the County's MS4, which drains, untreated, to local streams. Residential car washing is specifically allowed; but, it still may contribute significant sediment if wash water is not properly handled.
	Auto Body Shops	Business Licenses/Yellow Pages	44 28 in RoCo; 16 in TOV	<ul style="list-style-type: none"> • All wash water to sanitary sewer. • Potential damage caused to streams by wash water. 	<ul style="list-style-type: none"> • Mailer, annually • PSAs on local cable station 	
	Homeowners	Tax Records	34,963 31,390 in RoCo;	<ul style="list-style-type: none"> • Potential damage caused to streams by wash water. • Direct wash water to grass area for filtration and infiltration. • Never allow wash water to flow into street or storm drains. 	<ul style="list-style-type: none"> • County Publication sent annually to homeowners • PSAs on local cable station • Handouts at local environmental events, 4 per year minimum 	
	Contractors Involved in Land-Disturbing Activities	Community Development Permit Records	187	<ul style="list-style-type: none"> • Damage caused to streams by sediments. • Healthy fish populations require clear stream bottoms. • Silt fence is not enough. • Limit disturbed areas. • Stabilize as quickly as possible. 	<ul style="list-style-type: none"> • Brochure given to land-disturbance permittee when permit is issued. • Brochure given with enforcement actions 	Erosion and sediment control is required by regulations; however, more effective implementation may occur with additional education.

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

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	77 59 in RoCo; 17 in TOV	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage and contributes to algae overgrowth, which hurts aquatic life. All wastewater to sanitary sewers. Keep exterior trash receptacles and dumpsters covered and do not wash out into storm drain. Clean kitchen hoods and floor mats; properly dispose of wastewater. 	<ul style="list-style-type: none"> Mailer, annually PSAs on local cable station 	Uncovered dumpsters containing garbage and dumpsters and greasy floor mats that are rinsed out onto the pavement can contribute bacteria to our MS4, which discharges directly to our streams.
	Pet Owners (dogs/cats)	Pet Licenses	4,211 dogs 319 cats	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> County Publication sent annually to Homeowners PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Veterinarian Offices	Business Licenses/ Yellow Pages	11 9 in RoCo; 2 in TOV	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in Veterinarian offices, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	Pet Stores/Pet Boarding/ Grooming	Business Licenses/ Yellow Pages	37 All in RoCo	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> Brochures placed in pet stores, annually PSAs on local cable station 	Dog waste is a major source of bacteria in our streams.
	County Police and Firemen; Animal Control Officer	County Records	2 RoCo	<ul style="list-style-type: none"> Excessive bacteria hinders stream usage. Dog waste ends up in streams. Pick up after your pet and properly dispose of waste. 	<ul style="list-style-type: none"> In-house training 	Dog waste is a major source of bacteria in our streams; these County employees own or handle dogs as part of their work.

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

Goal:

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

Measurable Goals:

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

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

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

As discussed in **BMP 6-4**, the County's Community Development Department conducted an in-house training for local land-disturbing contractors. The effort was a partnership with the Roanoke Regional Home Builders Association (RRHBA) and Fields Construction. The training was entitled "Erosion Control Basics: Complying with the Minimum Standards" and was designed to help contractors understand the 19 minimum standards in Virginia's Erosion and Sediment Control Regulations. The ultimate goal of this training was to make sure that contractors know to "keep their dirt on their projects and out of the receiving streams."

TMDL Consistency:

The Enhanced Employee Training was specifically tailored to address Sediment and E-coli water quality issues. (EC & SED) The contractor-specific training conducted by the County was focused on reducing sediment from construction sites. (SED)

Evaluation and Modification:

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

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

Goal:

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

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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

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

Goal:

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

Measurable Goals:

Beginning in the 5th permit year (2017 - 2018), a minimum of 15 businesses will be visited to perform site surveys to observe conditions.

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

TMDL Consistency:

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

Evaluation and Modification:

This activity will begin in Permit Year 5 (2017 - 2018). Evaluation and modification are not appropriate at this time.



ONLY RAIN MAY GO DOWN THE STORM DRAIN



Clean Valley Council

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

All Storm Drains Flow to the Roanoke River

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

Goal:

Reduce offsite discharge of silt and sediment from construction sites.

Measurable Goals:

In this 4th year of the permit (2016- 2017), the County evaluated its current enforcement procedures and policies to determine if there was a need to revise them in order to obtain shortened corrective action times and, ultimately, decrease discharge of sediment from construction sites. The County concluded that its existing program offers sufficient flexibility to impose stricter corrective action times and/or increase the use of fines. In fact, compliance schedules are generally set by staff based on the seriousness of potential offsite impacts and the reasonable time required to perform work.

In lieu of applying a more rigorous enforcement program, the County opted to develop a unique Contractor reward system that recognizes land-disturbing contractors who conduct exemplary work through the proper use of erosion and sediment controls and stormwater management best practices. The new Contractor Appreciation Program is outlined on the County's website at <http://roanokecountyva.gov/ContractorAppreciation>. Contractors and their projects are selected for recognition and a prominent sign is posted on the construction site for the duration of the project, as long as it remains in compliance with the program.

The County believes the new program will raise awareness and encourage compliance from a positive standpoint, while leaving the enforcement mechanism as a backstop. This will give staff an opportunity to work with Contractors in a positive way and also provide positive and free publicity for the selected contractors/developers.

In June, 2017, the LewisGale Emergency Center project being constructed at the corner of Ogden and Electric Roads became the first recipient of the County's Stormwater Clean Award.



Cindy Linkenhoker of Roanoke County, and Contractor Jeff Nordstrom of Charles Perry Partners, Inc. (CPPI)
Photo courtesy: RVTV-3

TMDL Consistency:

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

Evaluation and Modification:

This is a new activity that started in June 2017. The County finds it to be effective 'right out of the gate' and looks forward to its future success in helping contractors 'do the right thing' by keeping their dirt on their projects and out of the local receiving waters.



Graveled lot at LewisGale Emergency Center project



Concrete washout facility at LewisGale Emergency Center project

T-7: Dog Waste Stations (EC)

Goal:

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

Measurable Goals:

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

Three new Mutt Mitt pet waste stations were ordered in the spring of 2016 and installed by the Parks, Recreation, and Tourism Department. Similarly, five more were ordered and installed in this Permit Year 4.

In addition, over the next 4 years, 13 additional dog waste stations will be installed (20%/ year), per the Dog Waste Station Phasing Schedule, provided on the compact disk included with the MS4 Annual Report in the folder titled **TMDLs**, sub-folder **T-7**. An edited version follows:

TMDL Consistency:

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

Evaluation and Modification:

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

Dog Waste Stations - Phasing Schedule for Installation
TMDL Action Plan Requirements
(BMP T-7 Bacteria)

Fiscal Year	Park/Greenway/Trail	Location	Existing Watercourse	Impairment	Quantity	Status
FY 16-17	Vinyard Park 1	Between parking lot and creek	Glade Creek	Bacteria	1	Installed
FY 16-17	Walrond Park	Between Restroom and Parking Lot	Existing pond and wetland; karst area	Bacteria	1	Installed
FY 16-17	Starkey Park/Crystal Creek Road Fields 1-4	Parking Lot	Back Creek	Bacteria	1	Installed
FY 16-17	Hollins Park	Parking Lot			1	Installed
FY 16-17	Read Mountain Preserve	Parking Lot			1	Installed
					\$ 1,000.00	
FY 17-18	Arnold Burton	Parking Lot/Concession Stand	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1	
FY 17-18	Merriman Soccer Complex/Starkey Park	Parking Lot	Back Creek	Bacteria	1	
FY 17-18	Jae Valley Park	Proposed Parking Lot	Back Creek	Bacteria	1	
FY 17-18	Mayflower Hills Park	Proposed Parking Lot			1	
					\$ 800.00	
FY 18-19	Vinyard Park 2	Between parking lot and creek	Glade Creek	Bacteria	1	
FY 18-19	Mount Pleasant Park	Parking Lot			1	
FY 18-19	Wayside Park	Parking lot	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1	
FY 18-19	Brookside Park	Parking Lot	Carvin Creek		1	
					\$ 800.00	
FY 19-20	Vinyard Park 1 (2nd unit)	Smaller Parking Lot	Glade Creek	Bacteria	1	
FY 19-20	Whispering Pines	Parking Lot			1	
FY 19-20	Oak Grove Park	Parking Lot			1	
FY 19-20	Green Hill Park (3rd unit)	Picnic Shelter	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1	
					\$ 800.00	
FY 20-21	Hanging Rock Battlefield Trail (2nd unit)	Dutch Oven Road Parking Lot	Mason Creek	Bacteria, Sediment	1	
FY 20-21	Explore Park (4th unit)	TBD	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1	
FY 20-21	Explore Park (South Ops)	Future Greenway Trailhead	Roanoke River	Dissolved Oxygen, PCBs, Sediment	1	
					\$ 600.00	
TOTAL PROPOSED UNITS					20	
Set-up Cost (\$200/unit)					\$ 4,000.00	
Annual Maintenance Estimate (\$75/unit)					\$ 1,500.00	

T-8: Dog Waste Ordinance (EC)

Goal:

Reduce discharge of E. coli from dog waste.

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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

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

No further actions will be taken on this BMP.

Stormwater Best Management Practices for Proper Pet Waste Disposal



A Guide for Roanoke County Pet Owners

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

Goal:

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

Measurable Goals:

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

In this permit year 2016 - 2017, staff gained County Administration's approval to prepare a draft ordinance for consideration by the Board of Supervisors (BOS). Staff plans to present this draft ordinance to the BOS in May/June 2018.

TMDL Consistency:

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

Evaluation and Modification:

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

Staff will move forward with preparation of a Draft ordinance. As this activity is still under development, evaluation and modification are not appropriate at this time.

Existing onsite septic systems in Roanoke County

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

	Located* within 100 feet of a stream	Located* between 100 feet and 200 feet of a stream	Located* beyond 200 feet from a stream	Total Number of Onsite Disposal Systems
Within MS4 Area	1530	1382	2332	5244
Outside MS4 Area	2541	1980	2291	6812
Total	4071	3362	4623	12056

T-10: Stream Buffers (EC and SED)

Goal:

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

Measurable Goals:

In this 4th permit year 2016 - 2017, County staff researched similar ordinances in Virginia, identified properties that border waterways in the County. Staff presented their finding to County Administration and obtained approval to develop possible stream buffer criteria for new development.

In permit year 2017 - 2018, County staff will move forward with the following activities:

Action	Proposed Schedule
Staff develops outline Overlay District Criteria	Remainder of 2017
Brief Board of Supervisors (BOS) and Planning Commission to educate the BOS and Planning Commission and obtain their general concurrence.	Early 2018
Develop Overlay District Ordinance Language	Spring 2018
Hold Public Meetings and outreach to affected stakeholders	Summer 2018
Present Ordinance to Planning Commission and BOS for Consideration	Summer/Fall 2018

TMDL Consistency:

Actions that decrease discharges of Sediment and E. coli are consistent with the TMDLs. (EC & SED) Implementing a stream buffer ordinance will help protect streams and water quality, while also promoting good land stewardship.

Evaluation and Modification:

This activity began in permit year 2016 - 2017 and is still under development. Evaluation and modification are not appropriate at this time.

Capital Improvements (EC and SED)

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

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

As previously reported, Murray Run was experiencing excessive erosion where it passed through an existing apartment complex. In some areas there were near vertical banks approximately 8 feet high. The erosion was threatening to wash out an adjacent sanitary sewer, and it was beginning to threaten one of the nearby apartment buildings.

Under a unique agreement, as allowed by the Public Private Education Act (PPEA), the County and the private property owner, HHHunt Corporation, partnered to restore approximately 1,460 feet of stream using natural stream concepts. The County agreed to obtain and administer a Stormwater Local

Assistance Fund (SLAF) grant from DEQ to pay for 50% of the project cost and to be responsible for long term maintenance of the stream. HHHunt agreed to pay for the 50% local grant match to design and construct the restoration and to perform normal day-to-day maintenance activities.



Post-Construction: Naturally-restored Shoreline, Murray Run at Ogden Rd.

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

2. Restoration of Glade Creek at Vinyard Park, Phase I – Completed December 2016

As previously reported, Glade Creek was experiencing excessive erosion where it passed through Vinyard Park. In some areas, there were near vertical banks almost 10 feet in height. The County obtained a Stormwater Local Assistance Fund (SLAF) grant from the Virginia Department of Environmental Quality (DEQ) and procured a Design-Build Contractor. Permitting for the project was complicated by the need to obtain a U.S. Fish and Wildlife biological opinion, as Glade Creek is habitat for an endangered freshwater fish, known as the Roanoke Logperch, which is depicted below:



Photo Credit: USGS - Noel Burkhead

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



Prior to Construction: Steep & Eroding Banks at Glade Creek



Post-Construction: Naturally-restored Banks at Glade Creek

3. Restoration of Glade Creek at Vinyard Park, Phase 2 - Design and Permitting is underway

SLAF support was obtained in 2017. Preliminary design has been completed and the joint permit application was submitted in September 2017. Construction is anticipated to occur in the fall of 2018. This project extends stream restoration through the lower portion of Vinyard Park. It consists of more localized natural stream features for a distance of approximately 2,500 feet. This project is anticipated to lower sediment discharge by 784 tons per year and to also protect existing public athletic fields.

Future Capital Improvement Projects

Roanoke County is evaluating potential projects to submit for future SLAF funding after the construction of the Restoration of Glade Creek at Vinyard Park, Phase 2 in late 2018. The following projects are being considered:

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

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

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

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

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

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

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

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

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

D. STRATEGIES TO ADDRESS PCBs TMDL

The specific TMDL Action Plan for PCBs was completed July 1, 2016 and submitted with last year's Annual Report. It is available on the County's website. Initial implementation of the plan, which relies heavily on enhancement of some of the existing BMPs discussed in Section 1 of this report, is discussed below.

BMP 1-2 Roanoke County Stormwater Informational Mailer

Roanoke County promotes general public awareness of PCBs and their potential sources by publishing an article regarding PCBs in its Stormwater Informational Mailer. This article, entitled *What About PCBs*, is on page 3 of the County's newsletter "A Stormwater Guide for Homeowners" dated April 2017. The newsletter can be found on the attached compact disk, in folder entitled **BMP 1-2**. The newsletter is also available on the County's website, which can be accessed here: <http://www.roanokecountyva.gov/DocumentCenter/View/9252>

BMP 1-5 Stormwater Public Awareness Program

Roanoke County promotes public awareness information regarding PCBs and their potential sources specifically to the development community by incorporating the PCBs Awareness Fact Sheet into the informational materials provided by the Department of Community Development's permitting office. This sheet is also posted on the County's website at <http://roanokecountyva.gov/index.aspx?nid=1648h>

The Department of Community Development provides those applying for demolition permits with the PCBs Awareness Fact Sheet by including it with the stormwater informational materials provided by the County permit technicians. In this 4th year of the permit, the County issued 21 residential demolition permits and 6 commercial demolition permits.

Year	# of Demolition Permits Issued
2016 - 2017 (YEAR 4)	21- residential 6-commercial

BMP 1-6 Roanoke County Stormwater Webpage

Roanoke County promotes general public awareness of PCBs and their potential sources by placing the PCBs Awareness Fact Sheet on its existing stormwater webpage. The PCBs Fact Sheet can be found here: <http://roanokecountyva.gov/index.aspx?nid=1648h>

BMP 3-2 Illicit Discharge Ordinance

Roanoke County continues to identify and eliminate illicit discharges in accordance with Chapter 24 of the County Code. None of this year's complaints involved the discharge of materials that could possibly contain PCBs.

BMP 4-4 Erosion and Sediment Control Inspections

Roanoke County implements a local Erosion and Sediment Control program. Through implementation of this program, the discharge of sediments, which may potentially have PCBs adhered to them as a result of atmospheric deposition, will be minimized.

BMP 5-4 Stormwater Management Facility Post-Construction Inspection

As part of its Stormwater Management Post-Construction Inspections program, the County conducts annual visual site inspections of County owned stormwater facilities and visual site inspections of privately owned stormwater facilities once every 5-years. During these inspections, County staff looks for evidence that the stormwater facility is working properly, specifically that adequate vegetation exists for facility stability and that water is not ponding in the facility for periods longer than designed.

Stormwater BMPs provide both water quality and water quantity controls. As such, pollutants settle out and are retained in the BMP. By ensuring that the BMPs are functioning as designed and are being properly maintained, the BMPs will continue to interrupt the pathway of any potential PCBs from entering into the downstream impaired waters. By properly disposing of the sediments during maintenance, as described in the Standard Operating Procedure (SOP) manual, potential PCBs-laden sediments will be eliminated as a potential source.

BMP 6-4 Employee Training

Roanoke County has incorporated its PCBs PowerPoint presentation into its Employee Training Program. Note that this presentation was formally submitted with last year's annual report and is included for reference on the attached compact disk, in folder entitled **BMP 6-4**.

It is anticipated that through good housekeeping practices, such as the proper collection and disposal of materials from drainage structure cleaning and facility maintenance, sources of potential PCBs will be minimized and the pathway for their entry into the MS4 will be interrupted.

BMP 6-5 Standard Operating Procedures

Roanoke County incorporated the PCBs Awareness Fact Sheet and PowerPoint presentation into the County's Water-Quality Related SOP Manual. It is anticipated that through good housekeeping practices, such as the proper collection and disposal of materials from drainage structure cleaning and facility maintenance, sources of potential PCBs will be minimized and the pathway for their entry into the MS4 will be interrupted. The updated SOP Manual can be found on the attached compact disk, in folder entitled **BMP 6-5**.

Emergency Spill Response and Containment

In response to spills and accidental releases, Fire and Rescue first responders are the first line of attack on spills and accidental releases. These individuals are trained to contain materials and coordinate with properly licensed and trained private clean-up companies for controlling releases. Entry into the environment of PCBs from potential sources such as leaking transformers will be minimized.

Regulation of Open Burning

Roanoke County regulates open burning under Chapter 9 of the County Code. Under Chapter 9, the County has placed restrictions on the burning of construction and demolition waste and debris. The release of PCBs contained in construction wastes and debris into the environment from local airborne deposition is minimized with the implementation of Chapter 9.

Regulation of Illegal Dumping and Littering

Roanoke County regulates illegal dumping and littering under Chapter 13 of the County Code. Chapter 13 provides the County the legal authority necessary to minimize the amount of debris and wastes that may have incidental PCBs.

Contract Language

Roanoke County uses general contract language in its contracts to ensure that demolition and construction wastes are properly disposed in landfills. The proper disposal of demolition and construction waste minimizes the amount of PCBs that are available for entry into receiving waters by interrupting their pathway.

DEQ Coordination

Roanoke County will continue to coordinate with the DEQ through its Blue Ridge Regional Office. Through combined state and local efforts, it is anticipated that the quantity of PCBs being discharged from current sources into the waters in and around Roanoke County will diminish. In addition, DEQ will continue to strategize on how best to remove the legacy pollutants that currently exist in these impaired waterways. Roanoke County will notify DEQ within 30-days of any potential PCBs discharges that it identifies for DEQ coordination and follow-up.

E. STORMWATER VOLUME AND POLLUTANT LOAD ESTIMATION FOR YEAR 4

1. Introduction

The volume of stormwater discharged (untreated) and the quantity of pollutants is estimated for all water bodies with a Wasteload Allocation (WLA).

This year, for the first time, stormwater volume and pollutant loads were estimated using the Watershed Treatment Model developed by the Center for Watershed Protection instead of the Simple Method. See the appendix for screen shots of the various computation runs and for summaries of the data sources.

Watershed Treatment Model under the Conditions when the TMDL was Created

Description	File Name
Carvins Creek, E. Coli	TMDL_Carvin_Creek_Run
Glade Creek, E. Coli	TMDL_Glade_Creek_Run
Lick Run, E. Coli	TMDL_Lick Run_Run
Ore Branch, E. Coli	TMDL_Ore_Branch_Run
Roanoke River, Benthic (Sediment)	TMDL_Roanoke_River_Benthic_Run
Roanoke River, E. Coli	TMDL_Roanoke_River_Run
Tinker Creek, E. Coli	TMDL_Tinker_Creek_Run

Watershed Treatment Model under 2016 Conditions

Description	File Name
Carvins Creek, E. Coli	Current_Carvin_Creek_Run
Glade Creek, E. Coli	Current_Glade_Creek_Run
Lick Run, E. Coli	Current_Lick Run_Run
Ore Branch, E. Coli	Current_Ore_Branch_Run
Roanoke River, Benthic (Sediment)	Current_Roanoke_River_Benthic_Run
Roanoke River, E. Coli	Current_Roanoke_River_Run
Tinker Creek, E. Coli	Current_Tinker_Creek_Run

Use of the Watershed Treatment Model allowed the consideration of factors other than percent impervious surface in determining pollutant loadings, and also included factors for pollutant reductions from various Best Management Practices (BMPs).

It must be recognized that while the Watershed Treatment Model is better than the Simple Method, the results of the Watershed Treatment Model are still only qualitative and very imprecise. The numeric results from the model should not be used to directly compare against the numeric results of the TMDL study due to differences in modeling methodologies and differences in data sources.

2. Brief Discussion of Data Sources

The Watershed Treatment Model was run twice; once for conditions in early 2000's, when the original TMDL studies were performed; and once for current (2016) conditions. The results are provided along with the original TMDL Wasteload Allocations.

Roanoke County used the best information available to it for these analyses. The sources are documented in the appendix. Over time, the available data sources change. As an example, the

land use and land cover designations used in the Watershed Treatment Model do not directly correspond with any land use or cover data set that the County possesses. Therefore, the County took multiple sets of data and, using GIS, performed an analysis that created one complete land use fabric. This process is even more evident when looking at land use classification in the County model run that mimics the original TMDL conditions.

In addition, land uses for the TMDL conditions model were drawn from a land use layer that used different categories than the County uses today. Land use categories for current conditions are drawn solely from parcels, since the County's parcel dataset now has a usage field. Because of this and other differences in data sources between the two model runs, great care must be used in developing conclusions.

3. Annual Precipitation

The model pollutant loading results are very sensitive to changes in rainfall amounts. A drought year would show a great decrease in pollutant loads, while a wet year would show a similar increase in pollutant loads.

In order to more properly provide an estimate of pollutant trends, all modeling was performed using the average rainfall for Roanoke County of 42 inches per year.

4. Adjustments to Watershed Treatment Model Results

Although the Watershed Treatment Model is more flexible than the Simple Method, some adjustments to the model results were needed.

a. Need to Ignore Irrelevant Data

The model results include nitrogen, phosphorus, fecal coliform, and suspended solids (sediment). Only the results desired for each model run should be considered. For example, the nitrogen and phosphorus results should be ignored in all of the model runs since no nutrient inputs were provided to the model.

b. Convert fecal coliform to E. coli

The Watershed Treatment Model provides a quantity for fecal coliform; this result must be converted to E. coli, which is the TMDL pollutant. The Virginia Department of Environmental Quality Conversion from Fecal Coliform to E. coli was used:

$$E\ coli = 2^{[-0.0172 + 0.91905 * \log_2(fecal\ coliform)]}$$

c. Manually add results of BMP reductions that are not included in the Model

Roanoke County has completed two stream restoration projects (Restoration of Murray Run at Ogden Road, and Restoration of Glade Creek at Vinyard Park, Phase 1) for the purpose of decreasing stream bank erosion and resultant sediment discharges to the Roanoke River. The Watershed Treatment Model does not have the ability to directly input this reduction; therefore, the reduction will be made manually.

5. Uncontrolled Stormwater Runoff Volumes

Uncontrolled stormwater runoff volume refers to the annual volume of untreated stormwater runoff that is generated by the annual rainfall. Stormwater that is treated through BMPs are subtracted from the total stormwater runoff volume to generate the uncontrolled stormwater runoff volume. The results from the Watershed Treatment Models are summarized below:

TMDL	Stormwater Runoff Annual Volume (Acre-Feet/Year)		Difference %
	TMDL Conditions	Current Conditions	
Carvins Creek, E. coli	4525.5	4875.5	7%
Glade Creek, E. coli	2394.6	2244.2	-7%
Lick Run, E. coli	748.4	775.8	4%
Ore Branch, E. coli	936.5	992.4	6%
Roanoke River, sediment	19778.3	26921.7	27%
Roanoke River, E. coli	13919.2	21011.4	34%
Tinker Creek, E. coli	2275.9	1912.6	-19%

Note that these volumes are overwhelmingly determined by drainage area land use categorization. Due to changes in data sources, it may be misleading to compare the TMDL conditions to current conditions. More data, over time, is needed to develop a more meaningful relationship.

6. Sediment and E. coli TMDL Studies and Wasteload Allocations

In Roanoke County, there have been three sediment and E. coli TMDL Studies performed by DEQ, 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.

7. PCBs TMDL Study and Wasteload Allocations

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

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

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

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

**Based on DEQ TMDL study*

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

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

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

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

8. Comparison of Sediment and Bacteria Modeling Results to TMDL Wasteload Allocations

E. coli results

Watershed with WLA	Calculated E.coli (cfu/yr), TMDL Conditions	Calculated E. coli (cfu/yr), 2016	Wasteload Allocation (cfu/yr)	Apparent Compliance Status
Carvins Creek	6.78E+05	8.36E+05	4.07E+12	Compliant
Glade Creek	3.42E+05	3.93E+05	8.02E+10	Compliant
Lick Run	2.81E+05	1.27E+05	3.29E+09	Compliant
Ore Branch	1.54E+05	1.88E+05	1.07E+09	Compliant
Tinker Creek	3.37E+05	3.22E+05	5.36E+11	Compliant
Roanoke River	2.22E+06	3.02E+06	2.84E+11	Compliant

According to the results above, the amount of E. coli in the system has gone up since the TMDL was produced. This is the result of the modeling changes in land use. Since the different models use different land use data sources, the results may be misleading.

The model indicates that the County is in compliance with all E.coli TMDLs. Again due to modeling imprecisions and differing methodology and data sources, this conclusion may not be correct.

Sediment results

Watershed with WLA	Calculated Total Suspended Solids (tons/yr) TMDL Conditions	Calculated Total Suspended Solids (tons/yr), 2016	Wasteload Allocation (tons/yr)	Apparent Compliance Status
Roanoke River	4170	5053*	1680	Non-Compliant

*Includes manual reduction of 1057 tons/year due to stream restoration projects

Restoration of Murray Run at Ogden Road 226 tons/year reduction

Restoration of Glade Creek at Vinyard Park, Phase 1 831 tons/year reduction

According to the results above, the amount of sediment has increased since the TMDL was originally developed due to changes in land use characterization. Note that the stream restoration projects completed by Roanoke County has cut the increase by over 1,000 tons of sediment/year. This indicates that the County's current program of performing natural stream restoration of badly eroding streams is making a difference.

9. Closing Remarks

- a. 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.
- b. 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 Watershed Treatment Model, indicate that all of the County's streams with wasteload allocations for E. coli are **in compliance**. It is understood that Roanoke County's methodology and data sources are different from those used to develop the TMDL.
- c. The Roanoke River PCBs TMDL Study needs to be revised to give the Town of Vinton a share of the wasteload allocation.
- d. Roanoke County is unaware of any good method to calculate the yearly discharge of PCBs from a watershed.

SECTION III

**Supporting Documents
(See attached CD)**