



ROANOKE COUNTY VIRGINIA

Municipal Separate Storm Sewer System (MS4) Annual Report Permit Year One - July 1, 2013 – June 30, 2014

October 1, 2014

(Revised March 20, 2015 pursuant to DEQ Review Comments dated February 23, 2015)

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



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The City of Roanoke
The Town of Vinton
Roanoke Valley Resource Authority
Western Virginia Water Authority
Virginia Save Our Streams Foundation
Roanoke Valley Television Station
Virginia Department of Transportation

**CERTIFICATION STATEMENT AND SIGNATORY REQUIREMENTS
FOR MS4 PERMIT APPLICATIONS AND REPORTS**

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.*

A person is a duly authorized representative only if:

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

CERTIFICATION

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

Responsible Official Signature	Date
Mr. Dan O' Donnell, Interim County Administrator	

VAR040022	Roanoke County
Permit Number	MS4 Name

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Executive Summary

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

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

The County of Roanoke developed and implemented a comprehensive plan to meet the conditions of the MS4 permit. The plan is outlined in six Minimum Control Measures (MCMs), as follows: (1) Public Education and Outreach on Stormwater Impacts, (2) Public Involvement and Participation, (3) Illicit Discharge Detection and Elimination, (4) Construction Site Stormwater Runoff Control, (5) Post-Construction Stormwater Management in New Development and Redevelopment, and (6) Pollution Prevention and Good Housekeeping for Municipal Operations. Within each MCM, there are numerous best management practices (BMPs) being implemented by the County of Roanoke. This report is the first annual report for the County's reissued MS4 permit, having an effective date of July 1, 2013 and an expiration date of June 30, 2018.

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

The Minimum Control Measures and associated BMPs used by the County for this reporting period (July 1, 2013 – June 30, 2014) 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, revised July 1, 2014 that is being submitted with this Annual Report. Both of these documents are posted on the County's website at <http://www.roanokecountyva.gov/index.aspx?NID=331>



MCM 1: Public Education and Outreach on Stormwater Impacts

Clean Up After Your Pet!

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: Business Education Program

Develop and maintain a stormwater quality education program for specific commercial businesses 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 and fecal coliform (EC/FC)), 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, educational 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.

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. The address of the webpage where the educational programs list can be found is:

<http://www.roanokecountyva.gov/DocumentCenter/Home/View/226>

Several of the stormwater-related pages on the Roanoke County Website are not currently able to be tracked for how many times they are accessed, so the viewing statistics for this permit year for this BMP is unknown. A list of items in this database can be found on the attached compact disk under folder titled **BMP 1-1**.

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

Table 1-1. CVC Handouts and Web Resources

Title of Resource:	Date Added/Updated	Comment
Available Materials: FY 2013-2014		
http://www.cleanvalley.org/storm-water	2014	Web resources targeted at residents: includes general BMP's, raingardens, rain barrels
http://www.cleanvalley.org/stormwater-businesses	2014	Web resources targeted at businesses: subsections on <u>carwash, restaurant, autoshops</u>
Cigarette Butts and the Environment	2014	Handout on impacts of cigarette butts in the environment
Program: Citizen Science Monitoring for the Upper Roanoke River Watershed	2013	Initiation of new program to engage citizens in monitoring local waterways. Program development underway, interested volunteer names collected, program targeted to begin Fall 2013
Brochure: Native Plants for Conservation, Restoration and Landscaping (DCR publication)	2013	Gardening Information for reducing SW impacts and improving water quality
Brochure: A Virginian's Guide to Year-Round Yard Care (DCR/Chesapeake Bay Program)	2013	Gardening Information for reducing SW impacts and improving water quality
Teaching Manual: Project Wet: Curriculum and Activity Guide 2.0	2013	Teaching Curriculum for water related programs, includes SW programs and activities
Brochure: Pick it Up....It's your "Doodie" (Town of Vinton and County of Roanoke)	2013	Pet Waste solutions for SW BMP's and water quality
Web Pages: Stormwater Information for Citizens and businesses	2012	Stormwater pages added to CVC's website, updates made, ready for municipality review and publication
Brochure - Rain Gardens: A Landscape Tool to Improve Water Quality (VDOF Publication)	2012	Gardening Information for reducing SW impacts and improving water quality
Book: Best Management Practices: Integrated Pest Management by P. Eric Wiseman	2012	Gardening Information for reducing SW impacts and improving water quality
Brochure: Non-Point Source Pollution and You (DCR publication)	2012	Non-point source pollution information
Brochure: After the Storm: A Citizens Guide to Understanding Stormwater	2012	Citizen information various BMPS for reducing SW impacts and improving water quality
Video: After the Storm	2012	Dan Rather video on stormwater pollution problems
Book: Clean and Green: The complete Guide to Nontoxic and Environmentally Safe Housekeeping	2012	Household Information for reducing SW impacts and improving water quality
Documentary: Bag It!	2011	Documentary about plastics in the environment that covers plastic waste as litter in rivers/oceans and harm to wildlife

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/FC)

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

Evaluation and Modification:

The number of times that the database has been viewed illustrates whether the website is an effective format to distribute the information concerning educational programs. At this time, the County cannot track specific number of views of this material; however, the website statistics that are available are contained in BMP 1-6. These statistics indicate that the site is being visited.

Year	Viewing Statistics
2013 - 2014 (YEAR ONE)	716 (Stormwater webpage)

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 1 of the reissued permit, the County was unable to complete this BMP due to a loss of key personnel at the time when the mailer is normally prepared for printing. However, other efforts were undertaken to educate residents, and in some cases, these efforts greatly exceeded the County's permit requirements. See BMPs 1-4, 1-5, and 1-7.

TMDL Consistency:

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

Evaluation and Modification:

Based on the emails, phone calls, and website hits the County has received in the past, it appears that mailers are an effective format to distribute stormwater information. With the new Permit requirements, the County will be reviewing this BMP for possible expansion. The County's goal continues to be to perform effective outreach to its citizens.

Year	Distribution Statistics
2013 - 2014 (YEAR ONE)	-

BMP 1-3: Stream Monitoring and Education

Goal:

In cooperation with the Clean Valley Council, stream monitoring and informational stream seminars will be provided for Roanoke County residents. The goal of this BMP is to educate citizens on the field procedures that have been established to determine water quality, in addition to motivating citizens to monitor waterways in their neighborhood and enhance grassroots cooperation to promote the importance of stream monitoring within the County. These seminars/monitoring sessions will 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, Roanoke County, in cooperation with Clean Valley Council, provided **two** indoor informational stream seminars and **eleven** local stream monitoring sessions. The indoor events targeted adults and both first and second graders. The outdoor stream monitoring sessions targeted both adults and school-age children between 6th and 10th grade. The two venues combined had a total of **907** in attendance. 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/FC and SED)

Evaluation and Modification:

The number of seminars, monitoring events, and participating citizens show that this Stream Monitoring and Education BMP is an effective method to educate citizens and enhance the 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

BMP 1-4: Stormwater Education Program

Goal:

Roanoke County will develop a stormwater educational program for Roanoke County school-age children. Educators will develop and provide programs addressing stormwater and related water quality issues. Different programs will target appropriate grade levels and will be SOL appropriate.

Measurable Goals:

For this annual period, Roanoke County, in conjunction with Clean Valley Council, continued to provide stormwater education to school-age children. The following education programs were held in County and private schools across the Roanoke Valley region. Some **98** presentations were made to Roanoke County schools and another **37** were held for private schools. These programs reached **3,410** students between pre-kindergarten through the 12th grade:



1. Bag IT
2. Brandon Oaks: Overview of Recycling, Litter, and Stormwater
3. Cigarette Butt campaign
4. CVC and Stormwater
5. Drains to Rivers
6. Groundwater
7. Indoor Stream School
8. Land Use
9. Oceans of Trash
10. Recycled Regatta & Watershed Awareness Day
11. Recycling, Litter, and Stormwater
12. Reeling the Runoff
13. Soil: Who Needs It?
14. Storm Drain Stenciling
15. Stormwater and Watershed Health
16. Stream School
17. Trash to Treasure
18. Travelin' Trash
19. Water Game
20. Watershed Day
21. Watersheds to Oceans
22. Watersheds/Oceans of Trash
23. Who Polluted the River

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

TMDL Consistency:

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

Evaluation and Modification:

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

Year	Programs Given	Students Reached
2013 - 2014 (YEAR ONE)	135 (County + Private Schools)	3,410

BMP 1-5: Stormwater Public Awareness Program

Goal:

Roanoke County will maintain a Stormwater Public Awareness Program that includes the distribution of stormwater merchandise, public service announcements, and other high visibility educational media to utilize social mass marketing methods to bring stormwater quality issues to the attention of the citizens of Roanoke County.

Measurable Goals:

In this annual period, Roanoke County, through Clean Valley Council (CVC), distributed Chip Clips, Recycled Pencils, Portable Cigarette Ashtrays, Stormwater Book Bag Tags, Highlighters, Water Bottles, Watershed Maps, Soil Posters, Litter Bags, Lanyards, “Doody” bags, T-shirts, Brochures, and Stickers, among other things, all with stormwater pollution prevention messages promoting the importance of water quality to the citizens of Roanoke County and beyond. In addition, CVC completed **seven segments** on local news stations, **two** articles in the local papers, and an interview on local radio regarding stormwater runoff and associated pollutants on behalf of Roanoke County and the surrounding localities.



Roanoke County issued **two** Public Service Announcements (PSA) and conducted **two** interviews on local television (RVTV – Roanoke County Today Show) to share information with the public about the MS4 permit, state stormwater management requirements, anti-littering, and its stormwater public awareness/education program.

Additionally, Roanoke County organized a citizen stormwater advisory committee to evaluate the County’s existing water programs, evaluate regulatory requirements, and develop recommendations for the County Board of Supervisors. The committee was composed of 23 members representing a broad spectrum of stake-holders. They met 9 times, over a 6 month period for professionally facilitated meetings. All meetings were open to the public and all educational presentations and committee generated documents are posted on the County stormwater website. The workings of the committee were widely publicized by the local written and television media. Draft committee recommendations were shared with the citizens in 5 public meetings. Citizen comments were shared with the committee prior to their finalizing recommendations. The final recommendations were presented to the Board of Supervisors.

In total, Roanoke County gave out **4,719** pieces of merchandise to citizens in Roanoke County and beyond. The types and amounts of merchandise provided by the County, a sample of the interview questions, a copy of the banner/bumper sticker used for “The World is not Your Ashtray” ad campaign, and information on the stormwater advisory committee membership and meeting topics can be found on the attached compact disk under the folder titled **BMP 1-5**.

TMDL Consistency:

Roanoke County and our 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 their pets, and filling in bare spots in their yards 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/FC & SED)

In addition, 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/FC & 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.

However, to better align with the MS4 permit requirements, future efforts for this BMP will focus on 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.

The developed materials may include public service announcements, printed brochures and newsletters, billboard and mass transit advertisements, signage at select locations, radio advertisements, television advertisements, and use of websites and social media. The County will track the number and types of materials that are distributed and posted on websites/social media and the size of audiences exposed to such materials, as appropriate.

In addition, the County has purchased a set of video programs that were designed for educating the general public on Illicit Discharge Detection and Elimination (IDDE) to the storm drainage system; such discharges include the selected three high-priority water quality issues: excess bacteria, sediment, and nutrients. The kit includes five videos of varying run times, which are designed to be used in specific medium/media or to reach a specific audience. The County will track the size of audiences exposed to the various videos and evaluate the response it receives from the public.

Year	Materials Distributed	Media Sources Used
2013 - 2014 (YEAR ONE)	4,719 (across entire Roanoke Valley region)	• 3 Radio Segments on 2 stations (CVC) • 8 TV Segments on 3 stations (CVC) • 2 Newspaper Articles (1 newspaper) (CVC) • 2 Public Service Announcements (RoCo)

CVC = Clean Valley Council; RoCo = Roanoke County

BMP 1-6: Roanoke County Stormwater Webpage

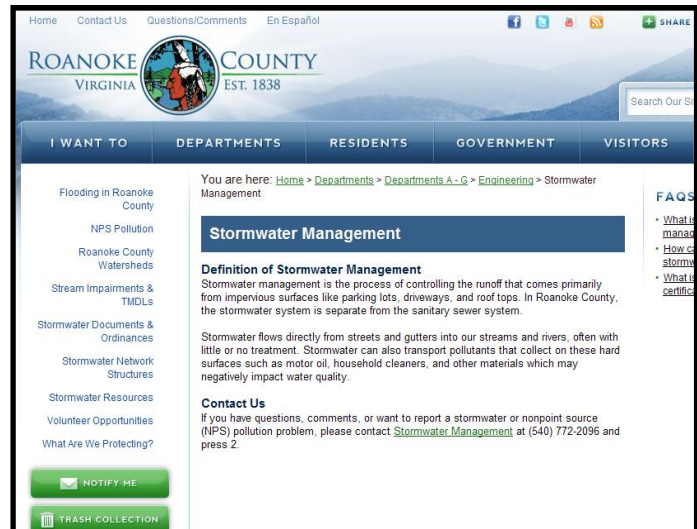
Goal:

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

Measurable Goals:

This website is devoted to stormwater management, water quality, floodplain management, and local water quality issues and information.

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



For this reporting year, there were a total of **3,949 visits**, with **5,692 page** views to the stormwater website between July 1, 2013 and June 30, 2014. The number of visitors to each webpage for this first year of the reissued permit is shown below and is also on the attached compact disk (CD) under the folder titled **BMP 1-6**.

Roanoke County Stormwater Webpage Statistics

Period: 7/1/2013 - 6/30/2014

Page Name	Visits	Pageviews	%
Roanoke County, VA - Official Website - Stormwater Management	716	1205	21%
Roanoke County, VA - Official Website - Stormwater Advisory Committee	631	1193	21%
Roanoke County, VA - Official Website - NPS Pollution	514	611	11%
Roanoke County, VA - Official Website - Flooding in Roanoke County	503	610	11%
Roanoke County, VA - Official Website - Stormwater Documents & Ordinances	415	542	10%
Roanoke County, VA - Official Website - Floodplain Management	317	497	9%
Roanoke County, VA - Official Website - Roanoke County Watersheds	241	312	5%
Roanoke County, VA - Official Website - Local Projects	202	224	4%
Roanoke County, VA - Official Website - Stream Impairments & TMDLs	173	209	4%
Roanoke County, VA - Official Website - Flood Warning System	146	179	3%
Roanoke County, VA - Official Website - Flood Insurance	91	110	2%
Total	3,949	5,692	100%

TMDL Consistency:

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

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

Evaluation and Modification:

For this permit cycle, the County intends to evaluate the web pages that are least-viewed and utilize this information to determine if their content needs to be changed. In addition, the County will add the appropriate videos from its new IDDE Public Outreach kit to the website in an effort to inform the public about the hazards and legal ramifications of illicit discharges. These pages will also be monitored to see how often they are accessed.

Year	Webpage Views	Most Popular (MP) and Least Popular Page (LP)
2013 - 2014 (YEAR ONE)	5,692	MP: Stormwater Management page LP: Flood Insurance page

BMP 1-7: Business Education Program

Goal:

The goal of this BMP is to develop a stormwater quality education program for specific commercial businesses within the County of Roanoke. This BMP will provide information to these businesses in an effort to increase business owner awareness of the impact of illicit discharges from their operations into the County's storm sewer system. The program will be directed toward certain groups of commercial, industrial, and institutional organizations that are most likely to have significant impacts to local stormwater quality.

Measurable Goals:

For Year 1 of the re-issued permit, Roanoke County partnered with the Clean Valley Council, Roanoke City, and Town of Vinton to develop and distribute 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 wash waters; restaurants often rinse greasy range hoods and kitchen mats into the drainage system. A list of County businesses that received the postcards can be found on the attached compact disk under the folder titled **BMP 1-7**.



These educational postcards, shown below, listed several best management practices related to the business type, and were sent to all such facilities in the three jurisdictions; leftover cards were distributed at various local environmental events. Here is a summary of how the cards were distributed:

Locality	Restaurants	Car Washes/Auto Shops
City of Roanoke	504	37
County of Roanoke	115	107
Vinton	53	45
Total Mailed	672	189
Total Printed (Extras distributed between all municipalities and the CVC)	1300	600

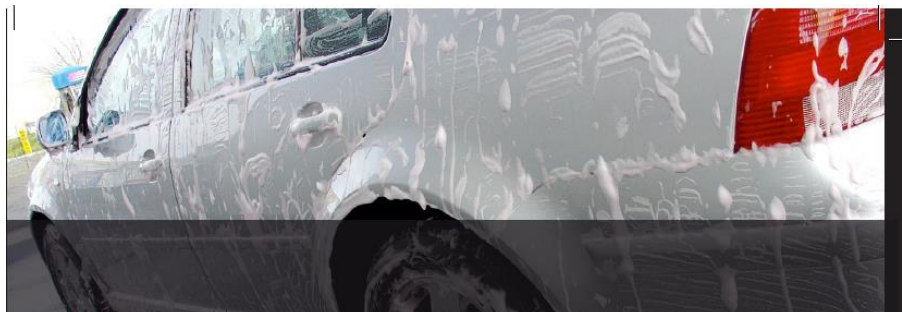


ONLY RAIN MAY GO DOWN THE STORM DRAIN



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

All Storm Drains Flow to the Roanoke River



ONLY RAIN MAY GO DOWN THE STORM DRAIN



1. Use biodegradable and non-phosphorus soaps.
2. Use high pressure, low-flow nozzles with an automatic shut-off valve.
3. Collect all trash and debris to prevent it from getting into storm drains.
4. Recycle rinse water and collect and discharge all wash water to the sanitary sewer system.
5. Do not discharge any car wash water to storm drains, ditches, or streams.

All Storm Drains Flow to the Roanoke River

The back of both postcards followed this general format:

THANK YOU FOR KEEPING OUR WATERWAYS CLEAN!

By following these five easy steps, your car wash can help the Roanoke Valley keep the Roanoke River and its streams clean, ensuring a healthier, safer environment for everyone. To learn more, contact the Clean Valley Council at 540-345-5523 or visit www.cleanvalley.org. You can also contact your locality for more information.

Together, we can make a difference.

City of Roanoke:

www.roanokeva.gov

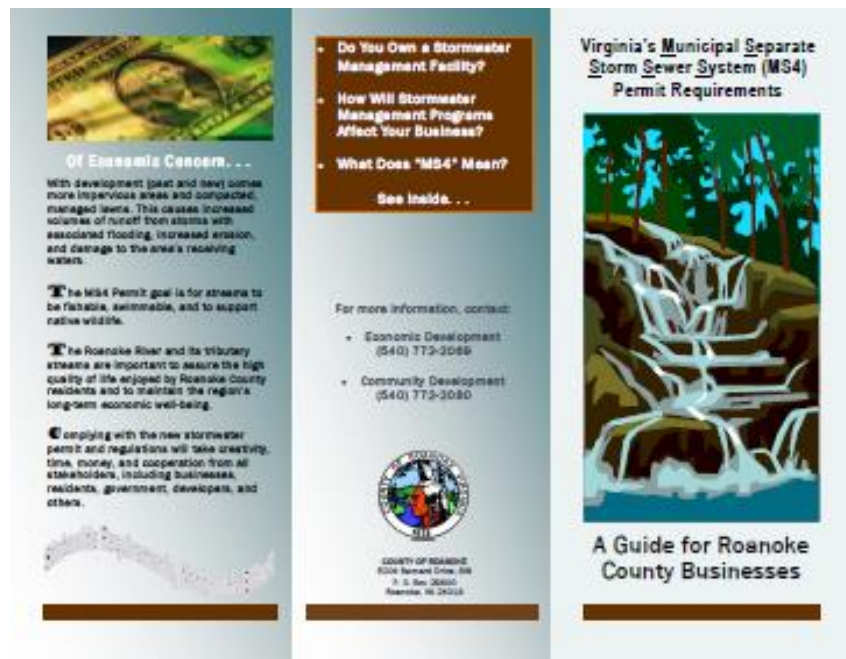
Roanoke County:

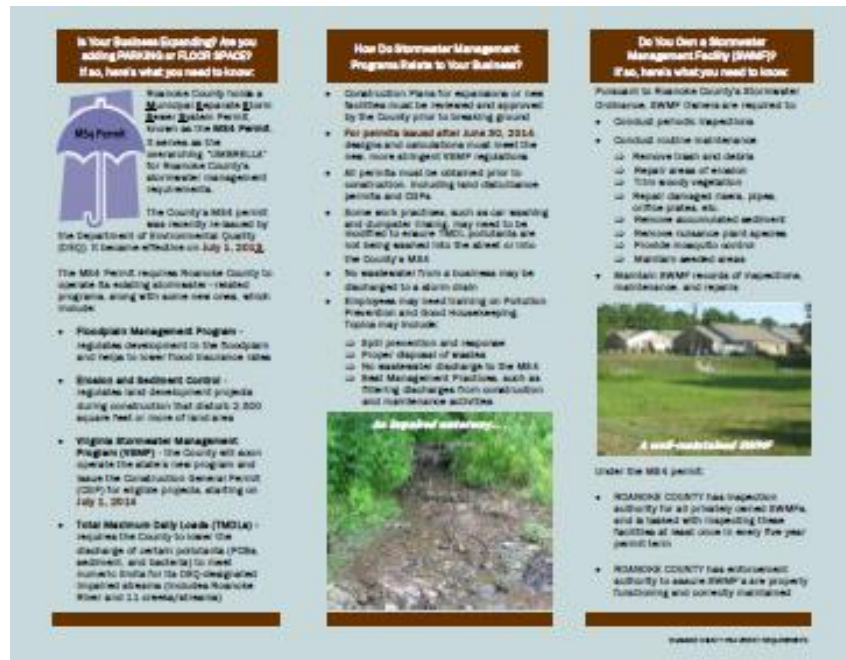
www.roanokecountyva.gov

Town of Vinton:

www.vintonva.gov

In addition to the postcards, the County also developed and mailed out **1,208** brochures, reaching each business in Roanoke County and all 'gatekeeper' groups, such as the Chamber of Commerce. A copy of the brochure is shown below:





This brochure addressed three topics: (1) MS4 Permit requirements, (2) how MS4 permit requirements may affect local businesses, and (3) maintenance requirements for businesses having stormwater management facilities.

In addition, the County's Economic Development Department highlighted stormwater management in its March 2014 newsletter, which is emailed to local businesses and posted on the County's website at <http://www.yesroanoke.com/ArchiveCenter/ViewFile/Item/113>.

Subsequent to the various mailings, County staff in Community Development and Economic Development received a variety of phone calls, emails, and website hits from various businesses and interested citizens inquiring about the materials; unfortunately, the County has yet to develop a reliable method for tracking the number and source of phone calls, in particular, but it is encouraged that the various mailers produced interest from the community.

TMDL Consistency:

The Car Wash postcard targets local businesses that may have uncontrolled discharges from vehicle washing operations, which could increase sediment discharges into local receiving waters. Therefore, these postcards would address the TMDL for sediment (SED). Similarly, the Restaurant postcard addresses rinsing of kitchen equipment and accessories, which may contribute bacteria to receiving waters. Thus, the restaurant postcard helps address the County's TMDL for bacteria (EC/FC). The brochures mailed to businesses help to address the TMDL for sediment.

Evaluation and Modification:

Following the mail-out of postcards and brochures, the County received numerous inquiries from business owners as to how to properly address their car wash operations, kitchen cleaning, or BMP maintenance. Thus, it is believed that this program is an effective means to educate businesses.

Due to the changes made to the Stormwater Public Awareness Program, in response to new MS4 General Permit requirements, this BMP will be renamed, effective July 1, 2014, from Business

Education Program to **Targeted Education Program**. The purpose of this name change is to better reflect that this program will be directed at targeted audiences, and not necessarily only businesses.

Annual Period	Type of Educational Material	Target Group	Number of Businesses
2013 - 2014 (YEAR ONE)	• Car Wash Postcard • Restaurant Postcard • MS4 Permit Brochure for Businesses	• Businesses with Car Washes • Restaurants • All County Businesses	107 115 1,208



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 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 Management Citizens Advisory Committee

Conduct a Stormwater Management Program Citizens' Advisory Committee to provide an approachable environment where ideas and concerns regarding the County's Stormwater Program may be shared and discussed. A member of the County's stormwater management team must be present.

BMP 2-4: Annual Report Posted on Stormwater Website for Citizens to View

Post the Roanoke County Stormwater Discharge Permit and Annual Report 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 and fecal coliform (EC/FC)) 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 first year of the new permit cycle, the County hosted four storm drain stenciling events. A total of 63 people participated, with 106 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/FC)



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 ONE)	106	63

BMP 2-2: Stormwater Public Event

Goal:

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

Measurable Goals:

Roanoke County was active in **14** regional events throughout the year that involved **23,490** people:

1. 1st Annual Recycled Regatta and Watershed Awareness Day
2. Blue Ridge Marathon
3. Cigarette Butt Campaign (by CVC)
4. Clean Valley Day
5. Earth Day
6. ECO E-Waste Collection
7. Fall Waterways Cleanup
8. Festival in the Park
9. Green Living and Energy Expo
10. Radical Reels
11. Roanoke River Conference
12. Salem Home Show
13. Tons of Fun
14. The World is Not Your Ashtray Campaign (by Roanoke County)



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

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

TMDL Consistency:

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

Evaluation and Modification:

Based upon the attendance at these public events, Roanoke County finds this BMP to be an effective method of allowing the citizens to inquire about issues and allowing the County an opportunity to receive public input. Modifications to this BMP may be considered in light of the new permit requirements.

Year	Public Event(s)	Attendance
2013 – 2014 (YEAR ONE)	14 (See listing above)	23,490

BMP 2-3: Stormwater Management Citizens Advisory Committee

Goal:

The goal of this BMP is to establish a regional group of citizens that meet with local stormwater management officials to review ordinances, TMDLs, local projects, informational materials, and educational components of each locality's Stormwater Management program (Roanoke County, Roanoke City, and the Town of Vinton). This group will also provide an approachable environment where ideas and concerns regarding the County's stormwater program may be shared and discussed.

Measurable Goals:

Roanoke County held three Citizens Advisory Committee meetings this year, as follows:

October 11, 2013



The **October 11th meeting** was held at Ferrum College. The meeting topic was Stormwater Utilities: Development Strategies to Implementation – case studies from 3 localities (Roanoke City, Blacksburg, and Lynchburg). The meeting agenda is available at the following website: <http://www.cleanvalley.org/roanoke-river-currents-watershed-conference>

March 26, 2014

The **March 26th** meeting was held at the Jefferson Center in Roanoke, VA. There was a review of all ongoing stormwater meetings and activities, DEQ TMDLs, and Roanoke County and other municipal reviews.

March/April 2014 - DEQ TMDL Workshops

For the **March/April** DEQ TMDL Workshops, committee members were asked to attend one of the workshops being held throughout the valley, as a means to understand DEQ's process and intentions regarding the Watershed Implementation Plan, which the agency is currently developing.

These events are also summarized on the attached compact disk under the folder titled **BMP 2-3**.

TMDL Consistency:

During each of these citizens' advisory committee meetings, chosen topics target specific issues that help to educate committee members on local issues, such as excess bacteria in the region's waterways and ways to prevent and minimize sediment loss to prevent it from entering area waters. (EC/FC & SED)

Evaluation and Modification:

There has been inadequate public participation for this BMP, which renders it ineffective. As such, Roanoke County, along with the other participating municipalities, has decided to disband the committee and find other means/methods to adequately involve and inform citizens. **Effective July 1, 2014, this BMP is discontinued.**

BMP 2-4: Annual Report Posted on Stormwater Website for Citizens to View

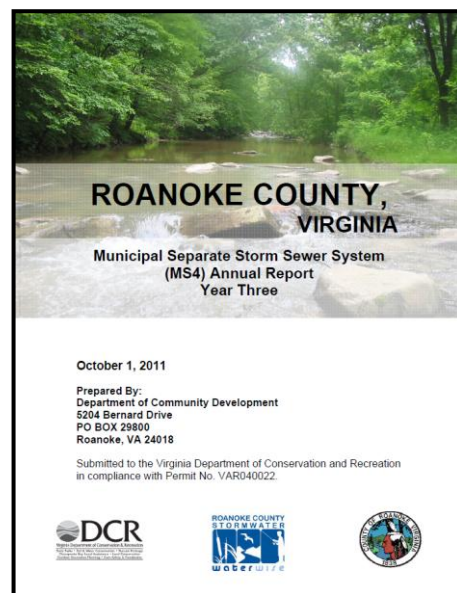
Goal:

The goal of this BMP is to post the Roanoke County's Municipal Separate Storm Sewer System (MS4) Program documents on the website for citizen review and comment. This form of public viewing allows Roanoke County citizens to become knowledgeable about the goals of the program and to obtain information so as 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 current on annual evaluations of program effectiveness and proposed changes.

Measurable Goals:

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

- Previous Years One through Year Five Annual Reports
- Evidence of MS4 Permit Coverage letter from DEQ, dated July 1, 2013. This was posted, along with the MS4 permit, on the County's website on July 3, 2014
- 2013 VSMP General Registration Statement for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems, dated March 25, 2013
- MS4 Program Plan, revised 3-21-13



Roanoke County has also made the Stormwater Program Plan and previous Year One through Year Five annual reports and this year's annual report available in hard copy, found in the Department of Community Development's office. No comments were received from the citizens regarding the revised Program Plan, dated 3-21-13.

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/FC & SED)

Evaluation and Modification:

Roanoke County believes that posting the MS4 program-related documents on its Stormwater Website is a good venue for allowing interested citizens to become more familiar with the County's stormwater program and local water quality issues. Because this BMP consists of posting more than just the Annual Report, this BMP is 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: Illicit Discharge 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 and fecal coliform (EC/FC)) or sediment (SED).

BMP 3-1: Storm Drain Map

Goal:

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

Measurable Goals:

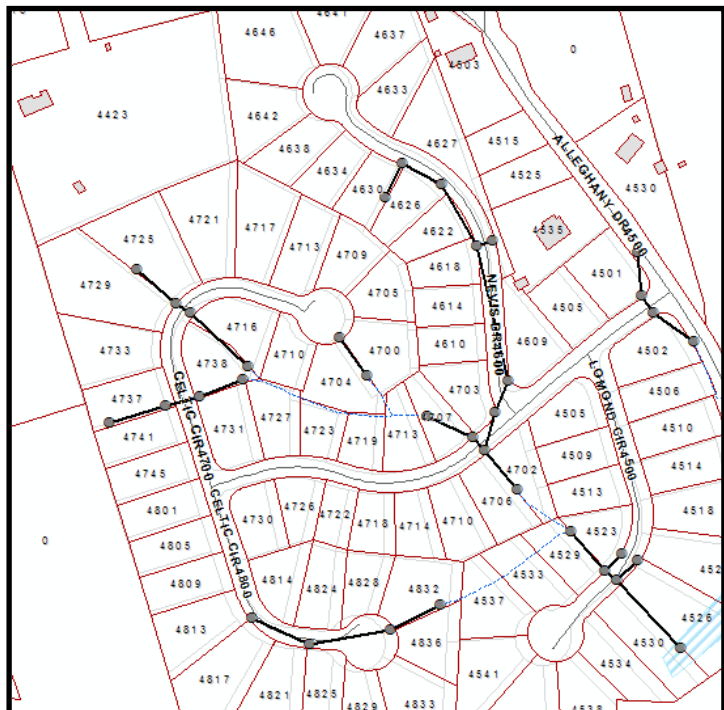
Roanoke County has continued this program by expanding and updating the storm sewer map of Roanoke County. In addition to locating any new storm sewer outfalls, the map has been updated to show the current outfalls and their associated Hydrologic Unit Code (HUC) for the watershed in which they discharge, the names and locations of all the impaired surface waters that receive discharges from these systems, and the estimated acreage draining to the storm sewer outfall. Note that for Year 1, there were no new outfalls added.

TMDL Consistency:

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

Evaluation and Modification:

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



BMP 3-2: Illicit Discharge Ordinance

Goal:

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

Measurable Goals:

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

TMDL Consistency:

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

Evaluation and Modification:

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



Year	Action	Modifications
2013 - 2014 (YEAR ONE)	New Illicit Discharge Ordinance Developed and Adopted	n/a

BMP 3-3: Illicit Discharge Program

Goal:

The goal of this program is to develop, implement, and enforce a program to detect and eliminate illicit discharges, as defined in 4VAC50-60-10, into the regulated municipal separate storm sewer system. The Illicit Discharge Program will include the following components:

1. Procedures for locating priority areas likely to have illicit discharges.
2. Procedures for tracing the source of an illicit discharge.
3. Procedures for removing the source of the discharge.
4. Procedures for program evaluation and assessment.
5. Procedures for reporting discharges to the MS4.



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 the previous permit Year One, Roanoke County determined the screening factors for high illicit discharge potential and completed the desktop determination in Year Two. In Year Three, Roanoke County began field screening and monitoring for illicit discharges. Due to several eliminated staff positions, no new field screening was completed in Year Four. In Year Five, Roanoke County completed the outfall field reconnaissance. Of the 258 outfalls originally identified for field reconnaissance, it was determined that 43 of them were not true outfalls, and 215 were observed in the field (47 in Year 3, and 168 in Year 5).

In this first year of the reissued permit, **96** outfalls were inspected, with no illicit discharges identified. The selection process 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

In addition, the County responded to **11** illicit discharge complaints received from citizens. All were resolved or found to not be valid complaints. The results from these inspections and the results from the outfall inspections conducted this permit year are included on the attached compact disk under the folder titled **BMP 3-3**.

TMDL Consistency:

An Illicit Discharge Program aids in the location 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 connections to the municipal storm drain system. (EC/FC)

Evaluation and Modification:

Roanoke County believes that the Illicit Discharge Program is a critical component in the detection and elimination of illicit discharges to its storm sewer system. Roanoke County will continue its field reconnaissance of outfalls and will also follow up on illicit discharge complaints received from citizens. In order to simplify program understanding, this BMP will be split into 2 BMPs effective July 1, 2014; **BMP 3-3 MS4 Outfall Inspections** and **BMP 3-4 Illicit Discharge Detection and Elimination Program**. These replacement BMPs are described in the MS4 Program Plan, revised July 1, 2014.



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: Land Development Procedures Review and Evaluation

Develop and maintain procedures for site plan review which incorporate consideration of potential water quality impacts, flooding and erosion and sediment control, and site inspection and enforcement procedures.

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 and fecal coliform (EC/FC)) or sediment (SED).

BMP 4-1: Erosion and Sediment Control Ordinance

Goal:

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

Measurable Goals:

Roanoke County's current Erosion and Sediment Control Ordinance is in compliance with the regulations previously set forth and enforced by the Virginia Department of Conservation and Recreation (DCR). DCR reviewed the County E&S Program during July 2012. As a result of the DCR review, Roanoke County developed, and DCR approved, an alternative inspection program. However, with the recent adoption of the new state



stormwater regulations, the Virginia Department of Environmental Quality (DEQ) has indicated that it will issue a guidance document to assist localities in updating their Erosion and Sediment Control Ordinances. Once this guidance document becomes available from DEQ, the County will proceed with the necessary updates to its ordinance. During the first year of the reissued permit, the County had **168** regulated land-disturbing activities, and a total of **102.4** acres disturbed. The monthly counts of land disturbing activities, both residential and commercial, can be found on the attached compact disk under the folder titled **BMP 4-1**.

TMDL Consistency:

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

Evaluation and Modification:

No modifications are planned for this BMP, at this time. However, as noted above, the E&S Ordinance will be revised to align with the new state regulations, once DEQ issues its guidance document. Roanoke County believes that the Erosion and Sediment Control Ordinance is a critical component in reducing pollutants in stormwater runoff to its MS4 from construction activities. It is critical that it remain in compliance with the Virginia Erosion and Sediment Control Regulations.

Year	Action
2013-2014 (YEAR ONE)	E & S Ordinance Not Reviewed No changes or modifications

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 can be found on the attached compact disk under the folder titled **BMP 4-2**.

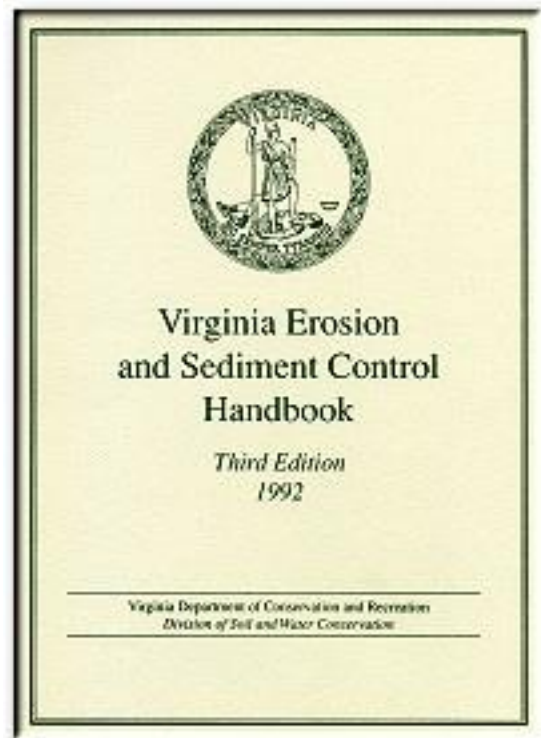
In addition, the Departments of Community Development and Parks, Recreation and Tourism have personnel state-certified as Responsible Land Disturbers.

TMDL Consistency:

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

Evaluation and Modification:

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



BMP 4-3: Land Development Procedures Review and Evaluation

Goal:

The goal of this BMP is to ensure that the procedures for site plan review incorporate considerations for water quality impacts by addressing the most current local stormwater management regulations, which are outlined in the Roanoke County Stormwater Management Ordinance.

Measurable Goals:

Roanoke County has revised its Land Development Procedures to ensure compliance with the new Roanoke County Stormwater Ordinance and Manual and the new State Stormwater Regulations. These procedures can be found on the attached compact disk under the folder titled **BMP 4-3**.



TMDL Consistency:

The Land Development Procedures list the steps needed for a site plan to meet the State and local Erosion and Sediment Control and Stormwater Management requirements. Keeping these procedures in compliance with the related state programs ensure that the County reviews new site plans against the most current regulations available. This BMP minimizes erosion and flooding potential through its education of the County's engineering design team and construction crew for all public and private land development sites that require a site plan. (SED)

Evaluation and Modification:

This BMP was modified to reflect Roanoke County becoming the local VSMP authority, effective July 1, 2014. Roanoke County believes that continuing the process of updating the Land Development Procedures is important to make sure that Roanoke County's site plan review process is consistent with the most recent stormwater management and erosion control regulations. As the new state stormwater management regulations have become effective, the County's local Stormwater Management and Land Development Procedures were accordingly changed.

In order to better reflect the regulatory requirements, this BMP is being split into 3 BMPs effective July 1, 2014; **BMP 4-3 Erosion and Sediment Control Plan Review**, **BMP 4-4 Erosion and Sediment Control Inspections**, and **BMP 4-5 Erosion and Sediment Control Compliance and Enforcement**. These replacement BMPs are described in the MS4 Program Plan, revised July 1, 2014.

Year	Action	Changes and Modifications
2013-2014 (YEAR ONE)	Revised the County's Land Development Procedures	Updated to Coordinate with State Regulations



MCM 5: Post-Construction Stormwater Management in New Development and Redevelopment

Roanoke County recognizes that addressing water quality in post-construction stormwater runoff is an important way 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 developed a Stormwater Management Ordinance and Design Manual, which address stormwater runoff from new development and redevelopment. The manual includes regulations and standards for the design, construction, and maintenance of water quantity and water quality Best Management Practices (BMPs).

BMP 5-2: Stormwater Management Facility Inspection Program

The County has developed a program to identify, track, and inspect all known permanent stormwater management facilities that discharge into the Municipal Separate Storm Sewer System (MS4).

BMP 5-3: Low Impact Development Utilization

The County will encourage and track any developments to be designed utilizing Low Impact Development (LID) principles.

In addition, all County employees who review, approve, and inspect the implementation of stormwater management plans will be required to obtain DEQ-certification.

Included in this report is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDLs, the status of the County's compliance with each BMP,), a list of certified plan reviewer and inspection personnel, and an evaluation of the BMP and any proposed modifications needed to better achieve the goals of the program. The TMDL compliance is broken down by impairment type: bacteria (E. coli and fecal coliform (EC/FC)) 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 this 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. A copy of the Stormwater Management Ordinance and Design Manual can be found on the attached compact disk in the folder titled **BMP 5-1**.

TMDL Consistency:

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

Evaluation and Modification:

The materials associated with this BMP were revised to align with the new Virginia Stormwater Management Law and Regulations. The new Stormwater Management Ordinance was adopted by the County Board of Supervisors on April 22, 2014.

Year	Action	Changes and Modifications
2013 - 2014 (YEAR ONE)	New Stormwater Ordinance and Manual Adopted	New Documents, effective July 1, 2014

BMP 5-2: Stormwater Management Facility Inspection Program

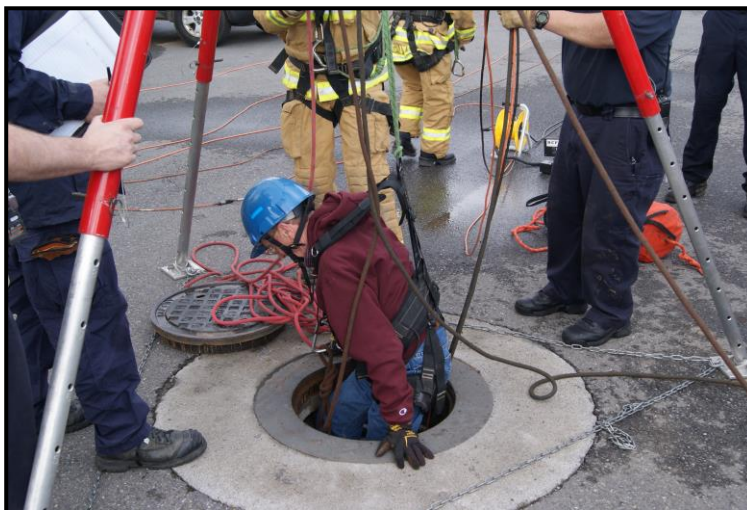
Goal:

The goal of this BMP is to enforce procedures for the Stormwater Management Facility Best Management Practice (BMP) Inspection Program.

Measurable Goals:

In the first annual period, Roanoke County developed a Stormwater Management Facility (SWMF) Inspection Program and implemented the program. Data such as background information, design plans, and contact information was gathered and the inspection program commenced. Currently, Roanoke County has a total of **732** known permanent stormwater facilities, 71 of which are public (state, federal, and local).

In this first year of the reissued permit, the County of Roanoke inspected **184** permanent privately-owned stormwater management facilities and **23** public facilities. A list of these facilities can be found on the attached compact disk under the folder titled **BMP 5-2**.



TMDL Consistency:

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

Evaluation and Modification:

Based on the permit requirement to annually inspect all County-owned stormwater management facilities and to inspect other stormwater management facilities at least once every 5 years, this BMP was modified to reflect the required inspection frequency.

In order to better reflect the regulatory requirements, this BMP is being split into 4 BMPs effective July 1, 2014; **BMP 5-2 Stormwater Management Plan Review**, **BMP 5-3 Stormwater Management Facility Construction Inspections**, **BMP 5-4 Stormwater Management Facility Post-Construction Inspections**, and **BMP 5-5 Stormwater Management Facility Tracking**. These replacement BMPs are described in the MS4 Program Plan, revised July 1, 2014.

Year	Stormwater Facilities Inspected	Total Number of Stormwater Facilities	BMP Maintenance Guides Given Out
2013 - 2014 (YEAR ONE)	23 - Public 184 - Private	71 - Public 661 - Private	120

BMP 5-3: Low Impact Development Utilization

Goal:

The goal of this BMP is to encourage and identify development projects that utilize Low Impact Development (LID) strategies.

Measurable Goals:

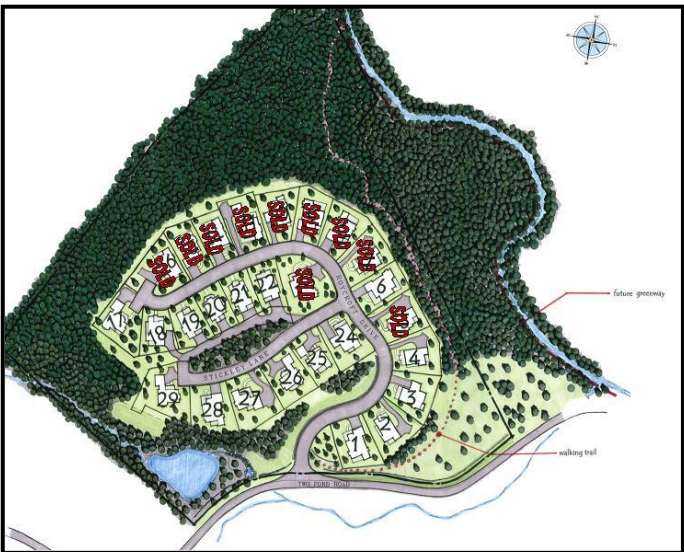
In this annual period, there were no new development projects, either reviewed or approved, that used LID development practices in the last permit year.

Roanoke County continues to encourage Low Impact Development practices to be used in conjunction with or in place of structural measures for the reduction of stormwater runoff. The County understands that Low Impact Development strategies will help to minimize the reliance on expensive structural practices that require ongoing maintenance to remain effective.

TMDL Consistency:

This program encourages development projects that utilize Low Impact Development strategies, which is an important way to prevent the deposition of sediment and other pollutants into area streams and rivers. (SED)

Evaluation and Modification:



With the new stormwater management regulations effective on July 1, 2014, this BMP is no longer relevant. **Effective July 1, 2014, this BMP is discontinued.** The MS4 Program Plan has been revised to remove this BMP.

Year	LID DEVELOPMENTS	SIZE	HUC
2013 - 2014 (YEAR ONE)	0		



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 pollutant runoff from Roanoke County Municipal operations. To perform this measure, the County needs to continue to evaluate its facilities and to also provide education and programs that will educate the County employees about pollution prevention and hazardous waste. The BMPs that have been established to complete this goal are listed below:

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

Roanoke County will inspect and develop Spill Prevention, Control, and Countermeasure Plans for all of its municipal facilities that require a plan. Existing plans will be updated and annual training will be completed.

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 a program for the maintenance and upgrade of the regulated municipal storm sewer system.

BMP 6-4: Pollution Prevention and Hazardous Waste Training

Roanoke County will continue the pollution prevention and hazardous waste training for County employees, maintenance workers, and landscaping crews, and encourage additional pollution prevention training for County employees.

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 and fecal coliform (EC/FC)) 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. These plans will be updated and annual training will be completed. In addition, each facility will be inspected and evaluated for the potential for illicit discharges from storage yards, outdoor storage areas, waste transfer stations, fleet or maintenance shops and other municipal facilities. The disposal method for waste materials will be evaluated. Soluble or erodible materials will be analyzed and protected from exposure to precipitation. The application of fertilizers will be examined to meet manufacturer's recommendations. Any operation that has potential to discharge material into the municipal separate storm sewer system will be examined for potential for unwanted discharge.

Measurable Goals

To meet this goal, Roanoke County will inspect all County owned properties, review all existing SPCC Plans, and continue to determine if additional SPCC plans are needed.

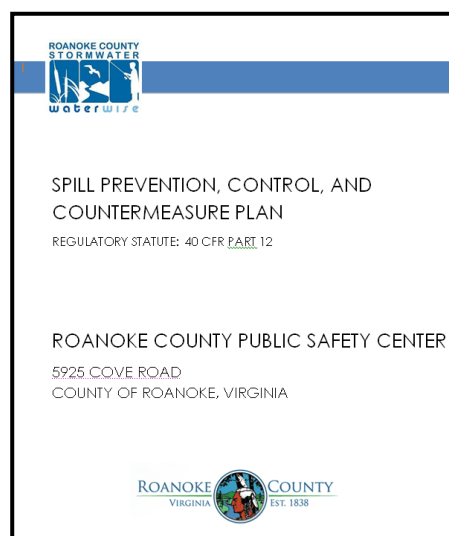
- County facilities that currently have a SPCC Plan include: Cave Spring Fire Station Revised 2011
- Clearbrook Fire Station, Revised 2011
- Fort Lewis Fire Station, Revised 2011
- Hollins Fire Station, Revised 2011
- Public Safety Center (currently under development)

TMDL Consistency:

This program minimizes the potential for pollution 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 pollution spills. This program also expands to evaluate any new County facilities, so that all working municipal facilities are protected. (EC/FC & SED).

Evaluation and Modification:

Due to changes in the MS4 General Permit Requirements, this BMP is split into 2 BMPs effective July 1, 2014; **BMP 6-1 Spill Prevention, Control, and Countermeasure Plans** and **BMP 6-6 Stormwater Pollution Prevention Plans for Municipal Facilities**. These replacement BMPs are described in the MS4 Program Plan, revised July 1, 2014.



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:

Roanoke County participated in **12** Household Hazardous Waste (HHW) Collection events, with 346 people from Roanoke County participating in them. The waste that was collected consisted of oil, antifreeze, paint, aerosols, pesticides, gasoline, kerosene, hydrochloric acid, phosphoric acid, ammonia, batteries, strippers, cleaners, fluorescent bulbs, and mineral spirits. Statistics for the HHW Events can be found in files on the attached compact under the folder titled **BMP 6-2**. Additionally, the County participates in drug take back events with Western Virginia Water Authority. The flyer is included on the attached compact disk in a folder titled **BMP 6-2**. This year, three drug take back events were held in the County of Roanoke, as follows, with pounds of medication collected in the County and also in Roanoke City, City of Salem, Botetourt County, Craig County, and Town of Vinton.

- **April 27, 2013**
Roanoke County: 272 pounds
Total: 3868.2 pounds
- **October 29, 2013**
Roanoke County: 519 pounds
Total: 1331 pounds
- **April 26, 2014**
Roanoke County: 667 pounds
Total: 2005 pounds



Since this program was started in 2010, 12,263.2 pounds of medication have been collected in Roanoke Valley locations.

TMDL Consistency:

Currently there is no known benefit that this BMP will have on any TMDL wasteload allocations. However, it should have a beneficial effect on stream water quality.

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.

Year	HHW Events	Attendance
2013 - 2014 (YEAR ONE)	12	346

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 storm sewer system.

Measureable Goals

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



This year **51** maintenance and improvement projects were completed, resulting in the following: 2 joints of pipe were replaced, 1783 feet of ditches repaired, 1 BMP maintained, 2 storm drain inlets repaired, and 297 tons of sediment removed. A total of **5,068** labor hours were committed towards storm sewer system maintenance and improvements to the municipal storm sewer system. The value of these improvements was estimated to be **\$950,250**.

TMDL Consistency:

This program is responsible for maintaining the regulated storm sewer system. This includes the improvement of eroding stream banks and channels. This program directly remediates existing areas where sediment is eroding and stabilizes the system, removing the input of sediment to the streams and channels. (SED) This program also increases the potential for discovering illicit connections to the storm drain system. (EC/FC)

Evaluation and Modification:

No changes are planned for this BMP. Roanoke County will continue to maintain the County's storm sewer system. Maintaining the storm drain system keeps it functioning properly and is an opportunity to discover potential illicit connections to the storm drain system.

Year	Total Projects	Annual Period Improvement Value	Total in Improvements
2013 - 2014 (YEAR ONE)	51	\$950,250	\$950,250

BMP 6-4: Pollution Prevention and Hazardous Waste Training

Goal:

The goal of this BMP is to develop and maintain pollution prevention and hazardous waste training for County employees, grounds maintenance workers, and landscaping crews.

Measureable Goals

Pollution Prevention

The County conducted initial pollution prevention training in several sessions. The first one involved a presentation to the Executive Team (i.e., all department heads and County Administrator), followed by one-on-one meetings with upper managers and high level staff from each department. In addition, a presentation was given to all of the employees from the Department of Social Services at one of its monthly staff meetings. The focus of these initial meetings was to familiarize the employees with the requirements of the state's new stormwater management regulations, the County's MS4 permit, and the need for illicit discharge detection and elimination. A more structured program will begin in this current year. All employees across the County and within the School Board will receive generalized pollution prevention training. Certain groups of employees will receive more targeted training to cover pollution prevention, illicit discharge detection and elimination (IDDE), and municipal good housekeeping (such as Parks and Recreation crews and General Services' garage maintenance staff).

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 150 uniformed employees. The number of volunteers is always in flux, but the County estimates that there are also 100 volunteers that currently have HAZ-MAT Operations training. HAZ-MAT certification does not expire from the Virginia Department of Fire Programs; however all career personnel receive annual, internal training on this topic as part of their career development training. In this first year of the re-issued permit, 12 volunteers (2-19-14) and 9 career (7-10-14) personnel completed the HAZ-MAT training. See the attached CD for training certificates, in the folder titled **BMP 6-4**.

TMDL Consistency:

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

Evaluation and Modification:

Roanoke County has expanded its training program to reflect the additional training requirements contained in the MS4 General Permit. Effective July 1, 2014, this BMP is named **Employee Training**. The revised training is described in the MS4 Program Plan, revised July 1, 2014.

Annual Period	Number of Fire & Rescue Employees Trained this Year	Total Employees Trained
2013-2014 (YEAR ONE)	12 volunteers 9 career	100 volunteers 150 career



Stormwater Volume and Pollutant Load Estimation for Year 1 of Reissued Permit (2013 – 2018)

As part of Roanoke County's First Annual Report under the reissued permit, the volume of stormwater discharged and the quantity of pollutants is estimated for all water bodies with a Wasteload Allocation (WLA). These calculations are the same as those used in Year 5 of the previous permit as no significant changes have occurred.

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

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

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

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

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

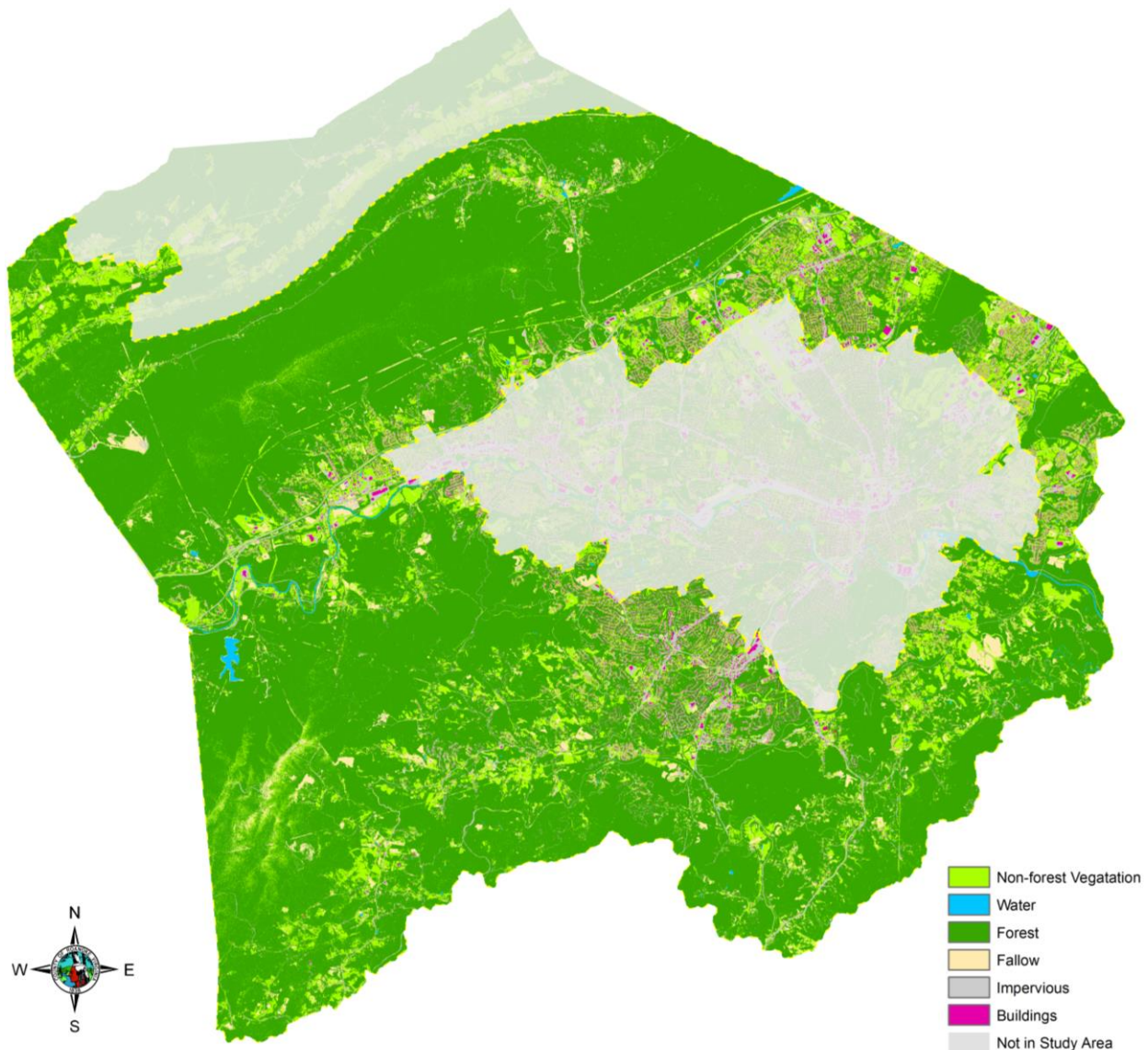
For Year Five of the previous permit, the drainage area and percent impervious for each impaired stream were adjusted to reflect changes in the urbanized areas based on the 2010 U.S. Census. All drainage areas were also re-delineated to ensure that only areas that were within the urbanized areas, based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

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

(1) For purpose of E. coli TMDL

(2) For purpose of Sediment TMDL,

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



Annual Precipitation

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

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

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

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

Where:

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

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

(1) For Purpose of E. coli TMDL

(2) For Purpose of Sediment TMDL

Estimation of Colony Forming Units of E. coli

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

The Simple Method:

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

Where:

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

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

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

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

Estimation of Total Suspended Solids Discharged Annually

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

The Simple Method:

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

Where:

L = Annual load (lbs/yr)

R = (x.xx * y.yy")

= Annual Runoff Estimate, inches

C = Pollutant Concentration (mg/L)

= 54.51 mg/L (factor for TSS)

A = (z.zz mi² * 640.09)

= Area (ac)

0.226 is the Conversion Factor for TSS

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

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

Sediment and E. coli TMDL Studies and Wasteload Allocations

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

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

Tinker Creek Watershed E. coli TMDL Study

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

The study states that an approximate 75% reduction in bacteria from existing developed lands is needed to meet these WLAs. Addressing this TMDL is a part of the Implementation Plan that is currently being prepared by DEQ.

Roanoke River and Ore Branch E. coli TMDL

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

* Current discharge based on TMDL study

The study states that approximately 99% reduction in bacteria from stormwater runoff from developed lands is needed to meet these WLAs. Addressing this TMDL is a part of the Implementation Plan that is currently being prepared by DEQ.

Roanoke River Benthic (Sediment) TMDL

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

The study states that excessive sediment is the most probable stressor identified that is adversely affecting benthic organisms (macroinvertebrates 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.

Addressing this TMDL is a part of the Implementation Plan that is currently being prepared by DEQ.

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

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

Benthic (Sediment)

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

PCBs TMDL Studies and Wasteload Allocations

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

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

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

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

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

Addressing this TMDL is not part of the Implementation Plan that is currently being prepared by DEQ. DEQ intends to address PCBs through a different process. PCBs cleanup will most probably consist of testing suspected contaminated sites and performing site-specific clean ups.

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

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

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

Issues for further Study and Clarification

Through its reissued MS4 Permit, effective July 1, 2013, Roanoke County is required to develop TMDL Action Plans for sediment and E. coli by July 1, 2015; and PCBs by July 1, 2016. These Action Plans must include the steps that Roanoke County intends to take to meet its wasteload allocations. Therefore, a clear understanding of the TMDL studies that developed the wasteload allocations and the County's current yearly pollutant discharges are critical to ensure that the County develops effective Action Plans that meet the regulatory requirements and are cost-effective for its citizens. Roanoke County has requested assistance from DEQ for the following issues in last year's Annual Report, and through several e-mails. To-date, we have not received any responses. Following are issues that Roanoke County desires to clarify with the assistance of DEQ.

1. Roanoke County understands that the MS4 area that is 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 change.
2. The Tinker Creek TMDL Study and Roanoke River and Ore Branch TMDL Study indicate, respectively, that a 75% and 99% reduction in E. coli would be required to meet the wasteload allocations. However, Roanoke County's calculations using the Simple Method, and information gathered from its GIS system, indicate that all of the County's streams with wasteload allocations for E. coli are **in compliance**, except for Ore Branch. Roanoke County's calculations indicate that Ore Branch requires a 50% reduction in E. coli, rather than the 99% reduction that is identified in the TMDL study. Roanoke County desires to work with DEQ to better understand the differing results from the TMDL studies and Roanoke County's calculations.
3. The Roanoke River Benthic TMDL Study indicates that an approximate 69.5% reduction in sediment from developed lands and from in-stream erosion is necessary to meet the wasteload allocations. However, Roanoke County's calculations using the Simple Method, and information gathered from its GIS system, indicate that the Roanoke River is **in compliance** with its wasteload allocation. Roanoke County desires to work with DEQ to better understand the differing results from the TMDL study and Roanoke County's calculations.
4. The Roanoke River PCBs TMDL Study needs to be revised to give the Town of Vinton a share of the wasteload allocation.
5. Roanoke County is unaware of any good empirical method to calculate the yearly discharge of PCBs from a watershed.
6. The calculated E. coli and Sediment discharges are based solely on land use and precipitation values. Impacts from existing BMPs are not reflected in these calculations.

As the County's GIS system is improved to better locate and quantify the beneficial effects of BMPs, such BMPs will be integrated into future water quality calculations.