



County of Roanoke

DEPARTMENT OF COMMUNITY DEVELOPMENT

BUILDING PERMITS
DEVELOPMENT REVIEW
ENGINEERING
INSPECTIONS
MAPPING/GIS
PLANNING
STORMWATER MANAGEMENT
TRANSPORTATION
ZONING

DIRECTOR, ARNOLD COVEY
DEPUTY DIRECTOR OF DEVELOPMENT SERVICES, TAREK MONEIR
DEPUTY DIRECTOR OF PLANNING, PHILIP THOMPSON
COUNTY ENGINEER, GEORGE W. SIMPSON, III, P.E.
BUILDING COMMISSIONER, JOEL S. BAKER, CBO

Friday, September 30, 2011

J. Douglas Fritz, MS4 Program Manager
Department of Conservation and Recreation
203 Governor Street
Richmond, VA 23219

Re: Roanoke County MS4 Permit # VAR040022 – Year Three Annual Report and Revised MS4 Program Plan

Mr. Fritz,

Roanoke County has included a hard copy of our Year Three Annual Report for our MS4 Permit # VAR040022. With this document, you will find a CD including all of the supporting documents and an excel document listing all of the new stormwater management facilities that have been brought online during this reporting period.

In addition to the Annual Report, the County has included the revised MS4 Program Plan. This document has been updated to include the description of the illicit discharge detection/outfall reconnaissance program as requested by Mason Harper during the MS4 Program Evaluation.

This information has also been sent to you digitally via email to StormBMP@dcr.virginia.gov and doug.fritz@dcr.virginia.gov. Please let us know if any additional information is needed to remain in compliance with our permit. Roanoke County is committed to maintaining a comprehensive MS4 Program that will provide Roanoke Valley citizens with the best water quality possible.

Sincerely,

George Simpson, III, P.E., County Engineer
Department of Community Development
5204 Bernard Drive
PO BOX 29800
Roanoke, VA 24018
(540) 772-2080
Gsimpson@roanokecountyva.gov



ROANOKE COUNTY, VIRGINIA

Municipal Separate Storm Sewer System (MS4) Annual Report Year Three

October 1, 2011

**Prepared By:
Department of Community Development
5204 Bernard Drive
PO BOX 29800
Roanoke, VA 24018**

Submitted to the Virginia Department of Conservation and Recreation
in compliance with Permit No. VAR040022.



Roanoke County Board of Supervisors

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Paul M. Mahoney

Roanoke County Attorney

Report prepared and compiled by:

The County of Roanoke Department of Community Development

Arnold Covey, Director of Community Development

Tarek Moneir, Deputy Director of Development Services

George W. Simpson, III, P.E., County Engineer

Butch W. Workman, Stormwater Operations Manager

Kafi Howard, Environmental/Civil Engineer

Megan Daily, Environmental/Civil Engineer

Contributing Agencies and Organizations:

Clean Valley Council

The City of Roanoke

The Town of Vinton

Virginia Save Our Streams Foundation

Roanoke Valley Television Station

Virginia Department of Transportation

Signed Certification in Accordance with 4 VAC 50-60-370:

"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."

Print Name: GEORGE W. SIMPSON, III

Title: COUNTY ENGINEER

Signature: 
PROGRAM ADMINISTRATOR

Date: 9-29-11

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Executive Summary

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. Overland or via stormwater systems, polluted runoff is discharged into local water bodies. When left uncontrolled, this water pollution can result in the destruction of fish, wildlife, and aquatic life habitats; a loss of aesthetic value; and threats to public health due to contaminated 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 to the maximum extent practicable (MEP). The focus of this program is to protect water quality, and to improve waters into which the regulated small MS4 discharges. This program is also designed to satisfy the appropriate water quality requirements of the Clean Water Act, Virginia Stormwater Management Act, and associated regulations.

The County of Roanoke developed and implemented a comprehensive plan to meet the conditions of the MS4 permit. The permit is outlined in six minimum control measures (MCMs): Public Education and Outreach on Stormwater Impacts, Public Involvement and Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post Construction Stormwater Management in New Development and Redevelopment, and 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 third annual report for this MS4 permit.

Strong regional cooperation has been pursued in the MCM areas of Public Education and Outreach, Public Participation and Involvement, and Pollution Prevention/Good Housekeeping. 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, Virginia Department of Transportation, and other regional environmentally responsible organizations such as the Upper Roanoke River Roundtable and the Clean Valley Council. Regional cooperation and discussion will not only be economically sound, but also instrumental in the consistent and continual education of the citizens of Roanoke County and beyond. This regional perspective is instrumental in the effective reduction of pollutants into our rivers and streams.

Roanoke County's commitment to establishing and sustaining a comprehensive program that protects the County's stormwater quality has been made and will continue over the permit term to provide the Roanoke Valley citizens with clean water now and into the future. The Minimum Control Measures and associated BMPs for this reporting period (July 1, 2010 – June 30, 2011) are described in the following document.

The header banner features a light green background with several icons: a dog's head, a trash can, and a water tap. Below the icons, the text "Clean Up After Your Pet!" is written in a light green, sans-serif font. The banner is flanked by images of trees and a path.

MCM 1: Public Education and Outreach on Stormwater Impacts

This minimum control measure is intended to implement a public education program to distribute educational materials to the community and conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies. These measures outline the steps that the public can take to reduce pollutants in stormwater runoff. The programs which the County has developed to meet these educational and outreach goals are listed below:

BMP 1-1: Educational Programs Review

BMP 1-2: Roanoke County Stormwater Informational Mailer

BMP 1-3: Stream Monitoring and Education

BMP 1-4: Stormwater Education Programs

BMP 1-5: Stormwater Public Awareness Program

BMP 1-6: Roanoke County Stormwater Webpage

BMP 1-7: Business Education Program

Included with this document is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDL's, 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: e. coli and fecal coliform (EC/FC) or sediment (SED).

BMP 1-1: Educational Programs Review

Goal:

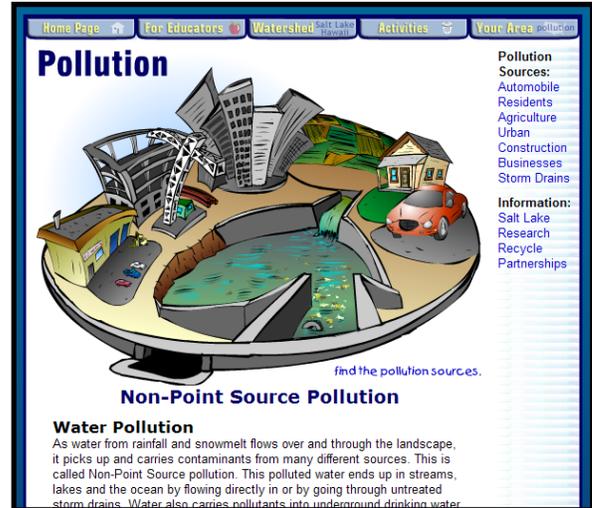
The goal of this BMP is to update and distribute a list of current publications, educational programs, websites, videos, maps, and training opportunities that directly address stormwater issues such as stormwater management, stormwater quality, floodplain management, pollution prevention, conservation 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/index.aspx?NID=332>

Based on the website statistics, it shows that the stormwater programs database has been viewed **302** times between July 1, 2010 and June 30, 2011. This is an increase from last year's statistics which show the database being viewed 160 times. A list of items in this



database can be found on the attached compact disk titled, **BMP1-1 Educational Programs Database.pdf**.

<http://protectingwater.com/index.html>

TMDL Consistency:

Many of the sources available on our webpage provide extensive educational material concerning the damage that livestock and pet waste can do to our 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 our webpage also provide extensive educational material concerning the damage that sediment can do to our 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 that while the website is an effective format to distribute the information concerning educational programs, the usage can fluctuate greatly. Modifications to this BMP for year four include the addition of new locations where this database is accessible, therefore increasing the amount and variety of information distributed.

Year	Viewing Statistics
2008 - 2009 (YEAR ONE)	793
2009 - 2010 (YEAR TWO)	160
2010-2011 (YEAR THREE)	302

BMP 1-2: Roanoke County Stormwater Informational Mailer

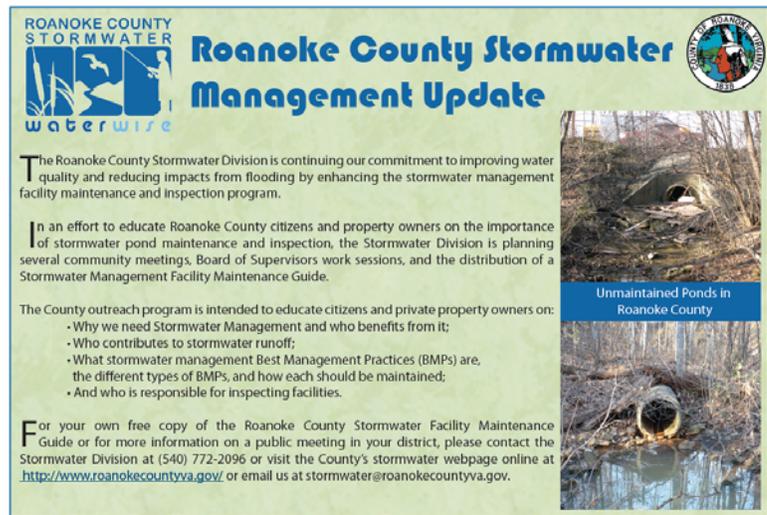
Goal:

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 about local stormwater issues. The mailer will be designed as a regional document and will touch on the County's Stormwater Program, general stormwater quality education, updates on local impaired water bodies, and TMDL's. The mailer will be based on the unique issues and concerns for the Roanoke River Watershed.

Measurable Goals:

For Year Three, Roanoke County developed a spring informational mailer that was sent out on February 28, 2011. This mailer discussed the stormwater pond maintenance and inspection program, some upcoming community meetings, and an informational guide that we have available upon request.

This informational mailer was sent to over **50,000** residences. The stormwater website listed in the mailer received **7,529** views. In addition, multiple phone calls to the County were generated by this mailer; unfortunately the County does not have the capability to track the number and source of incoming phone calls at this time. A copy of this informational mailer can be found on the attached compact disk titled, **BMP 1-2 Stormwater Informational Mailer.pdf**.



TMDL Consistency:

This mailer discusses the benefits of proper maintenance of stormwater facilities. Keeping these stormwater facilities maintained is critical for flood protection, erosion prevention, and water quality. (EC/FC)

Evaluation and Modification:

The number of emails, phone calls, and website hits shows that the mailer is an effective format to distribute stormwater information. Because the number of citizens impacted by this mailer is so large, no modifications are planned for this BMP. The County's goal is to continue to distribute the mailer to its residents and utilize it as an effective outreach method.

Year	Distribution Statistics
2008 - 2009 (YEAR ONE)	Aprox. 50,000
2009 - 2010 (YEAR TWO)	Aprox. 50,000
2010 - 2011 (YEAR THREE)	Aprox. 50,000

BMP 1-3: Stream Monitoring and Education

Goal:

In cooperation with the local Virginia Save Our Streams chapter, Roanoke County will provide stream monitoring and informational stream seminars 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 grass roots cooperation to promote the importance of stream monitoring within the County. These seminars and 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 Save Our Streams and Clean Valley Council, provided six informational stream seminars and **24** local stream monitoring sessions. The six stream school seminars targeted both adults and school age kids between 3rd and 10th grade and had a total of **667** in attendance. The stream monitoring sessions targeted adult citizens and a total of **28** stream segments were monitored with **68** citizens participating. A report showing each segment that was monitored and the score each reach received can be found on the attached compact disk titled, **BMP1-3 Stream Monitoring and Education Statistics.pdf**.

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 important impacts to water health (EC/FC) and (SED).

Evaluation and Modification:

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

Year	Streams Monitored	Attendance
2008 - 2009 (YEAR ONE)	52	491
2009 - 2010 (YEAR TWO)	24	775
2010 - 2011 (YEAR THREE)	28	735

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 correlated.

Measurable Goals:

For this annual period, Roanoke County in conjunction with Clean Valley Council has continued to provide the stormwater education program to school age children. The education programs were held in **34** different County schools and reached **8815** students between first grade and 12th grade. The Stormwater Education Program descriptions and program statistics for each educational event can be found on the attached compact disk titled,



BMP1-4 Stormwater Education Program Statistics.pdf.

TMDL Consistency:

Several of the educational programs that are presented to Roanoke County Schools target sources of bacteria such as, "Reeling in Runoff", "Plants Eat Bad Chemicals", and "The Water Game". (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 show 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 continue to target appropriate grade levels and be SOL applicable. The specific educational programs will continue to be evaluated and new programs may be incorporated into the group of programs to address new issues that impact the community.

Year	Schools Participating	Students Reached
2008 - 2009 (YEAR ONE)	20	4011
2009 - 2010 (YEAR TWO)	31	6871
2010 - 2011 (YEAR THREE)	34	8815

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 distributed book bag tags, bookmarks, books, erasers, lanyards, litter bags, pencils, rulers, stickers, handouts, water bottles and trash bags, all promoting the importance of water quality to the citizens of Roanoke County.

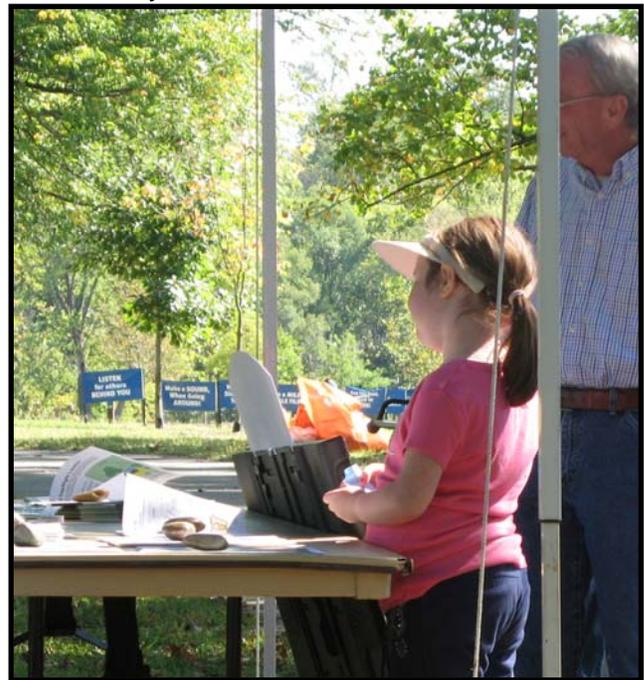
In total, Roanoke County gave out **5,081** pieces of merchandise to the citizens of the County. The types and amounts of merchandise provided by the County can be found on the attached compact disk titled, **BMP1-5 Stormwater Public Awareness Program Statistics.pdf**.

TMDL Consistency:

Roanoke County and our educational partners give out thousands of pieces of merchandise that have reminder slogans on them to be aware of day to day items such as picking up after their pets (EC/FC) and filling bare spots in their yards to prevent erosion (SED).

Evaluation and Modification:

In the third year, Roanoke County successfully distributed a variety of media bringing 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 through a variety of media sources to continue to meet the goals of this permit.



Year	Media Distributed	Media Sources
2008 - 2009 (YEAR ONE)	2,811	STUDENT MERCHANDISE, TELEVISION SPOTS,
2009 - 2010 (YEAR TWO)	5,244	STUDENT MERCHANDISE, PRESENTATIONS, WATERSHED MAPS
2010 - 2011 (YEAR THREE)	5,081	STUDENT MERCHANDISE, WATER BOTTLES, BMP MAINTENANCE GUIDES

BMP 1-6: Roanoke County Stormwater Webpage

Goal:

Roanoke County will maintain and monitor the Roanoke County Stormwater webpage, where citizens can continue to get information concerning the County's Stormwater Management Program, ordinances, design guidelines, general information, contact information, pollution prevention information, educational programs and links to other organizations and sites. The website will also inform the citizens about on-going community based projects such as: storm-drain stenciling, Save Our Streams monitoring, regional clean-ups, and other local water quality educational programs.

Measurable Goals:

In this annual period, Roanoke County redesigned the website for the entire County. During this process, the Stormwater page was examined and streamlined to give the citizen more ease in navigation. This 17 page website is still devoted to stormwater management, water quality, floodplain management and local water quality issues and information.



These web-pages continue to inform the citizens about the current issues of this region while giving phone, email, and web information to contact a stormwater professional for further information. There were a total of **7,529** views to the stormwater webpage between July 1, 2010 and June 30, 2011. The number of visitors to each webpage for the third year of this permit has been monitored and can be found on the attached compact disk titled, **BMP1-6 Stormwater Webpage Statistics.pdf**.

TMDL Consistency:

The website highlights a page discussing "Non-point Source Pollution". This page illustrates how agriculture and straight pipes can contribute to the overall pollution problem. (EC/FC) This page also illustrates how a citizen can prevent non-point source pollution through planting riparian buffers along creeks. (SED)

Evaluation and Modification:

For Year Four, the County plans on continuing to look at the pages that are least viewed and utilize this information to determine if the content of some of the pages needs to be changed. Roanoke County plans to also re-evaluate the most viewed web pages on the stormwater website to maximize on their popularity and get more information on those pages.

Year	Webpage Views	Most Popular (MP) and Least Popular Page (LP)
2008 - 2009 (YEAR ONE)	21,035	(MP): STORMWATER MANAGEMENT HOMEPAGE (LP) : STORMWATER PROGRAMS DATABASE
2009 - 2010 (YEAR TWO)	6,084	(MP): STORMWATER MANAGEMENT HOMEPAGE (LP) : STORMWATER PROGRAMS DATABASE
2010 - 2011 (YEAR THREE)	7,529	(MP): STORMWATER MANAGEMENT HOMEPAGE (LP) : STORMWATER PROGRAMS RESOURCES

BMP 1-7: Business Education Program

Goal:

The goal of this program 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 discharges into the County's storm sewer system. These education programs are directed toward groups of commercial, industrial, and institutional organizations that are most likely to have significant impacts to local stormwater quality. Target businesses will be chosen so that the awareness message can be specific and most effective.

Measurable Goals:

For Year Three, the businesses in our target group were local restaurants. These businesses can have a direct positive impact on local water quality through education on better waste oil management, food waste management and chemical handling. A pamphlet was sent to **78** restaurants detailing how they may be able to enhance our local water quality by recycling grease and oil, checking dumpsters for leaks and loose trash, and sweeping premises regularly to prevent litter from entering the storm drain system. A copy of this pamphlet and a list of the third year target businesses can be found on the attached compact disk titled, **BMP1-7 Business Education Flyer and Statistics.pdf**.



Restaurant in Roanoke County, Virginia

TMDL Consistency:

The program targets local restaurants by educating them on waste management, litter management, chemical handling and differentiating between the sanitary sewer and the storm sewer. Educating restaurant workers on the final destination of their respective sewer drains will prevent the inappropriate usage of the storm drain in the case of a chemical spill or sanitary overflow. (EC/FC)

Evaluation and Modification:

In this third annual reporting period, Roanoke County successfully distributed pamphlets to 78 commercial restaurants as an educational item. The County finds this BMP to be effective and intends to continue to provide information to local commercial businesses as an educational item. To make this BMP more effective, Roanoke County intends to expand the number and type of target businesses in which to educate as a way to meet the goals of this permit.

Annual Period	Type of Educational Material	Target Group	Number of Businesses
2008 - 2009 (YEAR ONE)	Stormwater Facility Information Brochure	Commercial Businesses Owning a Stormwater BMP	16
2009 - 2010 (YEAR TWO)	Improving Water Quality by Smart Landscaping Letter	Local Landscaping Companies	86
2010 - 2011 (YEAR THREE)	Stormwater Best Management Practices for Restaurants Pamphlet	Restaurants	78



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 the success of a stormwater management plan. To garner this support, the County has coordinated several programs to engage the citizen's interest in stormwater quality. The BMP's that have been established to complete this measure are listed below:

BMP 2-1: Storm Drain Stenciling Program

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

BMP 2-2: Stormwater Public Event

Conduct a public event 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 citizen's 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

Continue to post Roanoke County's Stormwater Discharge permit and annual report on the County's website for citizens to download and read.

Included with this document is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDL's, 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: e. coli and fecal coliform (EC/FC) or sediment (SED).

BMP 2-1: Storm Drain Stenciling Program

Goal:

The goal of this program is to coordinate a storm drain stenciling program with local schools, neighborhoods, businesses, and other groups, to stencil messages on storm drains that educate people about the consequences of dumping waste into the storm drain system.

Measurable Goals:

In the third year of this permit cycle, the County hosted one storm drain stenciling event on Cove Road in Roanoke County on September 20, 2010. This event was for the Boy Scouts Troup #410. Fourteen students attended this events where **34** storm drains where stenciled.

A second stenciling event was scheduled, but was canceled due to weather conditions.

TMDL Consistency:

The storm drain stenciling program is an outreach method to inform and remind citizens that what goes into the storm drain goes directly to local creeks and streams. Roanoke County believes that when citizens understand that the storm drains are not

treated by the sanitary sewer, they will be less likely to allow their pet waste or other non-stormwater waste to enter the storm drain through the road-side inlets. (EC/FC)



Evaluation and Modification:

The County finds this BMP to be an effective method of information distribution and outreach. This year student attendance and numbers of storm drains stenciled were down due to the canceled event. The County proposes to continue to coordinate a storm drain stenciling program that will stencil storm drains within the County while at the same time expanding the areas being stenciled so that the education and outreach value is enhanced.

Year	Storm Drains Stenciled	Attendance
2008 - 2009 (YEAR ONE)	-	26
2009 - 2010 (YEAR TWO)	+65	59
2010 - 2011 (YEAR THREE)	34	14

BMP 2-2: Stormwater Public Event

Goal:

At least once a year, Roanoke County will hold a public event to address stormwater issues, the County's progress towards stormwater quality improvements and to receive input from the public on the County's Stormwater management program.

Measurable Goals:

On October 2, 2010 Roanoke County sponsored the Fall Waterways Cleanup and Celebration and maintained a booth for the event. Roanoke County staff was available for questions and comments regarding our stormwater and water quality programs. Recent projects were listed at the booth, as well as tips for ways a resident can prevent negative water quality impacts in their home and property. Approximately **892** attended.

On December 3-4, 2010, the AECF Green Living and Energy Expo was held at the Roanoke Civic Center. Roanoke County sponsored the Clean Valley Council to present "Stormwater and You" at the Expo. This presentation described stormwater pollution prevention strategies for citizens, outlined how the stormwater system works and highlighted ways that citizens can reduce their contribution to stormwater runoff pollution. Approximately **2000** people attended this expo.



TMDL Consistency:

At least once a year, the County is involved in one or more public events that celebrate our commitment to regional water quality. Pet waste and erosion are common issues discussed at each of these events since they are such a regional water quality issues. (EC/FC) and (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 address issues and allowing the County to receive input from the public. No modifications are planned for this BMP.

Year	Public Event(s)	Attendance
2008 - 2009 (YEAR ONE)	Fall Waterways Cleanup 2008, Public Meeting, Volunteer Planting Day, Better Living Expo 2009, Garst Mill Park Celebration 2009	1,102
2009 - 2010 (YEAR TWO)	Earth Summit 2009, Fall Waterways Clean-up 2009, Better Living Expo 2010	687
2010 - 2011 (YEAR THREE)	Fall Waterways Clean-Up 2010, AECF Green Living and Energy Expo 2010	2892

BMP 2-3: Stormwater Management Citizens Advisory Committee

Goal:

The goal of this program is to establish a group of citizens that meet with local stormwater management officials to review ordinances, TMDL's, local projects, informational materials and educational components of the Stormwater Management program. 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 has held three citizens advisory committee meetings this year, on December 3, 2010, April 12, 2011 and June 15, 2011. The meetings discussed issues dealing with local water quality in this region.

The December 3rd meeting was held at the AECOP Green Living and Energy Expo. This event is held at the Roanoke Civic Center for two days. Over 70 exhibits, demonstrations, presentations and workshops were held at this event. "Stormwater and You" was presented to committee members and the expo audience. The presentation described stormwater pollution prevention strategies for citizens, background on stormwater issues and how the stormwater system works.

The April 12th meeting was held at the Vinton War Memorial. Roanoke County Staff presented "Stormwater Facility Inspection in Roanoke County". This presentation gave an overview of the stormwater facility inspection program, its successes and challenges, and the public education component that is helping them educate the citizens of Roanoke County.



The June 15th meeting was held at the Roanoke County Fleet Maintenance Center on Hollins Road. This meeting included a brief introduction and tour of all of the stormwater systems and energy management devices of this recently completed LEED certified site for the maintenance of Roanoke County's fleet of vehicles.

TMDL Consistency:

During each of these citizen advisory committee meetings, topics are chosen that target specific issues that educate our committee members on local issues such as excess bacteria in our waterways (EC/FC) and ways to prevent and minimize the sediment loss to our streams (SED).

Evaluation and Modification:

Roanoke County proposes to continue this citizen's advisory committee. Based on the attendance, the citizens find this committee to be an effective method of allowing them to address issues and speak to the County. The County will continue to meet with the committee. The meetings will be on a quarterly basis and will meet three to four times a year.

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

Goal:

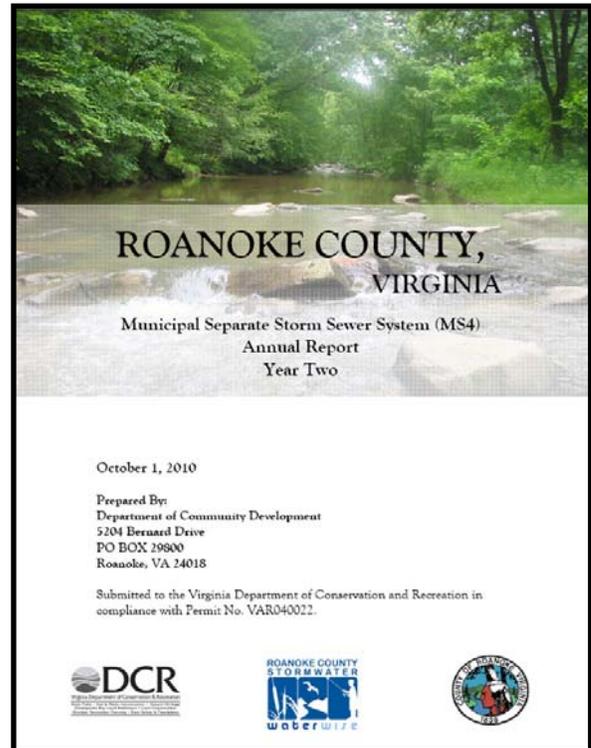
The goal of this program is to post the Roanoke County's Municipal Separate Storm Sewer Program on the website where citizens may view and comment on it. This form of public viewing will allow citizens of Roanoke County to become knowledgeable about the goals of the program and have information with which to comment on existing issues and influence changes in future programs. 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 general registration statement was posted to the Roanoke County Stormwater website on December 3, 2008. This will continue to be available on the website until the five year permit period is complete on June 30, 2013. The second year annual report was posted to the website on October 19, 2010. Roanoke County has also made the Stormwater Program Plan and Year One and Year Two annual reports available in hard copy at the Engineering front desk. No comments were received from the citizens regarding the Program Plan.

TMDL Consistency:

Access to our Stormwater Program Plan and Annual Reports gives Roanoke County Citizens a hefty education about all of the local streams and rivers, their impairments, and any approved TMDL's. In addition, the Program Plan and Annual Report detail the efforts that the County is taking to address these issues. This will inform citizens on ways to get involved with current outreach programs in addition to minimizing any impact that they may have on local water quality (EC/FC) & (SED).



Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that these locations for viewing are successful in allowing interested citizens to become more familiar with the stormwater program.

Year	Items Posted to Website	Posted Date
2008 - 2009 (YEAR ONE)	GENERAL REGSITRATION STATEMENT	12/3/2008
2009 - 2010 (YEAR TWO)	ROANOKE COUNTY ANNUAL REPORT (YEAR ONE)	11/1/2009
2009 - 2010 (YEAR THREE)	ROANOKE COUNTY ANNUAL REPORT (YEAR TWO)	11/19/2010

MCM 3: Illicit Discharge Detection and Elimination

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 BMP's that have been established to complete this measure are listed below:

BMP 3-1: Storm Drain Map

A County-wide Storm Sewer Map in the GIS database has been completed for all known locations of municipal storm sewer systems. The Roanoke County Storm Sewer Database will be maintained so that a map of all the public storm sewers in the County will be available to the public.

BMP 3-2: Illicit Discharge Ordinance

A Roanoke County Illicit Discharge Program will be established which will include policy, procedures, reporting, and enforcement measures for illicit discharges.

BMP 3-3: Illicit Discharge Program

Roanoke County will design and enforce an illicit discharge program to target and inspect areas of high risk potential for illicit connections.

Included with this document is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDL's, 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: e. coli and fecal coliform (EC/FC) or sediment (SED).

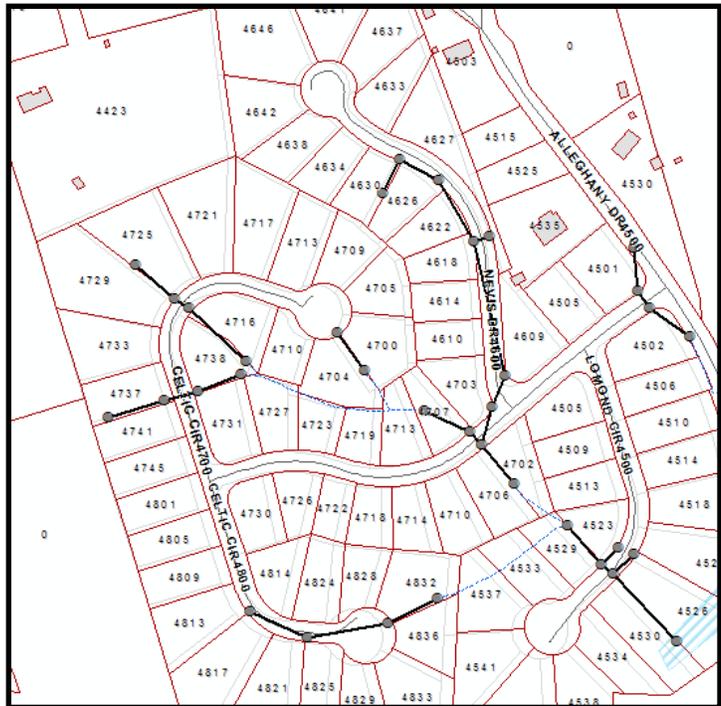
BMP 3-1: Storm Drain Map

Goal:

The goal of this program is to continue to develop a storm drain map which identifies all of the municipal separate storm sewers within the County of Roanoke which discharge to a natural drainage way.

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) of the waters that are being discharged to, 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. This has been completed for **47%** of the known outfalls within the County. Ninety-seven new structures have been located. Fifty-two (52) new outfalls have been analyzed for a total of 415. These have been analyzed for the corresponding HUC, impaired water, and drainage acreage. A list of all outfalls analyzed in Permit year three can be found on the attached compact disk titled, **BMP 3-1 Storm Drain Outfalls.pdf**.



TMDL Consistency:

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

Evaluation and Modification:

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

Year	New Mapped Structures	Stormwater Facilities	Outfalls Mapped	% of Outfalls Analyzed
2008 - 2009 (YEAR ONE)	21	461	235	25%
2009 - 2010 (YEAR TWO)	224	511	363	40%
2010 - 2011 (YEAR THREE)	97	595	415	47%

BMP 3-2: Illicit Discharge Ordinance

Goal:

The goal of this program is to detect and eliminate illicit discharges in to the Municipal Separate Storm Sewer System by developing and adopting regulations and an enforcement program to prevent illegal discharges into the storm drain system.

Measurable Goals:

Roanoke County has developed and evaluated the Illicit Discharge Ordinance and determined that it is in compliance with current state regulations of the Virginia Department of Conservation and Recreation. Suitable measures for effective enforcement are included in the Illicit Discharge Ordinance which can be found on the attached compact disk titled, **BMP 3-2 Illicit Discharge Ordinance.pdf**.

TMDL Consistency:

An Illicit Discharge Ordinance will greatly aid in the enforcement of illicit discharges to the MS4 system. This legal method can aid the County in discontinuing existing connections and discouraging future illicit discharges to the system. (EC/FC)

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that the creation and evaluation of the Illicit Discharge Ordinance is an appropriate method to aid in the enforcement, detection and elimination of illicit discharges to the storm sewer system. New Stormwater regulations have just recently been approved at the State level and have not gone into effect at this time. As the County incorporates the new Stormwater regulations into our local ordinances, our illicit discharge program will remain in compliance with the stipulations of the most current state regulations.



Year	Action	Modifications
2008 - 2009 (YEAR ONE)	Illicit Discharge Ordinance Reviewed.	None
2009 - 2010 (YEAR TWO)	Illicit Discharge Ordinance Reviewed.	None
2010 – 2011 (YEAR THREE)	Illicit Discharge Ordinance Reviewed.	None

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 address illicit discharges through the enforcement process. In year one, Roanoke County determined the screening factors for high illicit discharge potential and in year two, the desktop determination was completed. In year three, Roanoke County began field screening and monitoring for illicit discharges. A list of screened outfalls can be found on the attached compact disk titled, **BMP 3-3 Illicit Discharge Sheets.pdf**.

TMDL Consistency:

An Illicit Discharge Program will greatly aid in the location of illicit discharges to the MS4 system. This method can give staff the methodology needed to screen, target and monitor the storm drain system in the efforts to discover existing illegal connections to the municipal storm drain system. (EC/FC)

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that the Illicit Discharge Program is a critical component in the detection and elimination of illicit discharges to the storm sewer system.



Steps in Illicit Discharge Program	Schedule	Status
Determination of Screening Factors	YEAR 1	Complete
Desktop Determination of Illicit Discharge Potential	YEAR 2	Complete
Begin Field Screening and Indicator Monitoring	YEAR 3	19% Complete
Continue Field Screening and Indicator Monitoring	YEAR 4	



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 BMP's 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 control best management practices, 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 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 site inspection and enforcement procedures.

Included with this document is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDL's, 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: 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 Ordinance that will reduce pollutants in stormwater runoff to the storm sewer system from construction activities. These regulations, included in the Erosion and Sediment Control Ordinance, require erosion and sediment controls as well as sanctions to ensure compliance under local law. This ordinance requires E&S controls for all land disturbances of 2,500 square feet or more and an engineered Erosion and Sediment Control Plan for any land disturbance greater than 10,000 square feet. The E&S Plan will require construction site operators to implement appropriate erosion and control best management practices specific to the site. Site inspection and enforcement actions are also incorporated into the County's Erosion and Sediment Control Ordinance.

Measurable Goals:

Roanoke County has evaluated the Erosion and Sediment Control Ordinance to keep it in compliance with any changes to regulations being made at the State level. New stormwater management and construction site regulations have been passed but have not gone into effect. Roanoke County's current Erosion and Sediment Control Ordinance is still in compliance with the regulations set forth and enforced by the Virginia Department of Conservation and Recreation.



The County has had **221** regulated land-disturbing activities, and a total of **85.74** acres disturbed. The monthly counts of land disturbing activities, both residential and commercial, can be found on the attached compact disk titled, **BMP4-1 Erosion and Sediment Control Statistics.pdf**.

TMDL Consistency:

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

Evaluation and Modification:

No modifications are planned for this BMP. Roanoke County believes that the Erosion and Sediment Control Ordinance is a critical component in reducing pollutants in stormwater runoff to the regulated small municipal separate storm sewer system from construction activities. It is critical that it remain in compliance with the Virginia Erosion and Sediment Control Regulations.

Year	Action	Disturbances	Acres
2008 - 2009 (YEAR ONE)	E & S Ordinance Reviewed No changes or modifications.	103	140
2009 - 2010 (YEAR TWO)	E & S Ordinance Reviewed No changes or modifications.	313	252
2010 - 2011 (YEAR THREE)	E & S Ordinance Reviewed No changes or modifications.	221	86

BMP 4-2: Erosion and Sediment Control Certification

Goal:

The goal of this BMP is to identify current Erosion and Sediment Control certified employees and develop a program for additional certifications and cross-training.

Measurable Goals:

Two county departments, Community Development, and Parks and Recreation were identified as having positions whose job responsibilities necessitate erosion and sediment control training and certification. Currently the county utilizes training and certification through the Department of Conservation and Recreation's Virginia Erosion and Sediment Control training and certification program. Additional employees hired into positions whose job responsibilities have already been determined as needing training in erosion and sediment control will be certified using this program. A table of the positions within each department, the employee(s) in the positions, and their level of certification can be found on the attached compact disk titled, **BMP 4-2 E&S Certification Statistics.pdf**.

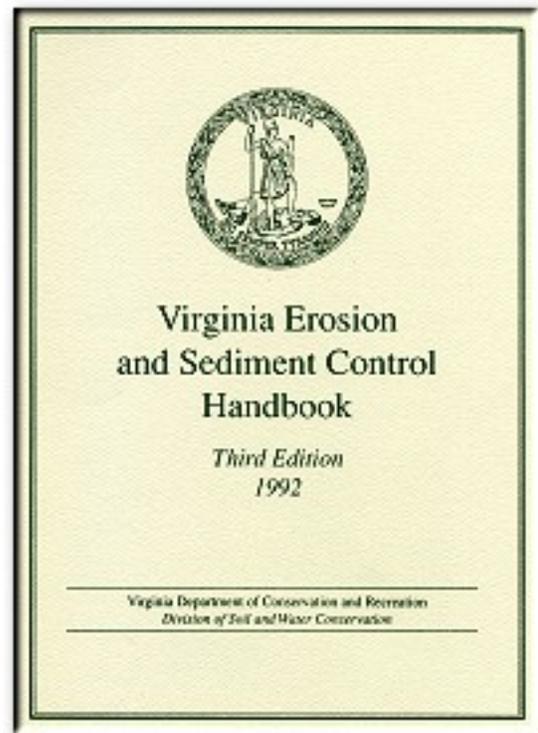
TMDL Consistency:

This program identifies County employees that need Erosion and Sediment Control training and tracks their certifications to determine if they have lapsed in their required training and certifications. This program minimizes County site erosion potential by educating our employees on correct E&S procedures and policy (SED).

Evaluation and Modification:

In examining the employee's job responsibilities and certifications, **one** position was identified as needing additional certification. This certification is scheduled to be completed in Year Four of the permit period.

No modifications are planned for this BMP. Roanoke County believes that the certification of all County employees that could significantly impact erosion through land disturbance 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 evaluated the Land Development Procedures to keep them in compliance with any changes to the Roanoke County Stormwater Ordinance and Manual or to regulations being made at the State level. New Stormwater regulations have just recently been approved at the State level and have not gone into effect at this time. The Roanoke County Land Development Procedures are still in compliance with the regulations set forth and enforced by the Virginia Department of Conservation and Recreation. These procedures can be found on the attached compact disk titled, **BMP 4-3 Land Development Procedures.pdf**.



TMDL Consistency:

The Land Development Procedures lists the steps needed for a site plan to meet the State and local Erosion and Sediment Control and Stormwater requirements. Keeping these procedures in compliance with any changes at the state level guarantees that new site plans are reviewed by the County with the most current regulations available. This program minimizes erosion and flooding potential due to the benefit of an educated engineering design team and construction crew on all Roanoke County public and private land development sites that require a site plan. (SED)

Evaluation and Modification:

No modifications are planned for this BMP. 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 is consistent with the most recent stormwater management regulations. As new state stormwater management regulations go into effect, the local ordinances must change, and keeping the Land Development Procedures up to date with our ordinances makes the procedures a useful tool to utilize when developing land.

Year	Action	Changes and Modifications
2008 - 2009 (YEAR ONE)	Land Development Procedures Reviewed	No changes or modifications.
2009 - 2010 (YEAR TWO)	Land Development Procedures Reviewed	No changes or modifications.
2010 - 2011 (YEAR THREE)	Land Development Procedures Reviewed	No changes or modifications.



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

Roanoke County recognizes that addressing water quality in post construction runoff is an important way to prevent the deposition of sediment and other pollutants into our streams and rivers. The BMP's 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 addresses stormwater runoff from new development and redevelopment. This manual includes regulations and design standards for the design, construction, and maintenance of water quantity and quality best management practices.

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 to the municipal storm sewer system.

BMP 5-3: Low Impact Development Utilization

The County will also encourage and track any developments to be designed utilizing low impact development principles.

Included with this document is a detailed description of the objective and measurable goals of each BMP, the strategies to ensure consistency with local TMDL's, 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: 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 an ordinance and design manual that requires stormwater runoff to be addressed. These documents ensure that controls are in place that would 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 Ordinance regulates new development and redevelopment projects of 5,000 square feet and larger. 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.

For year three, these documents have been evaluated to ensure continual compliance with the goals of this BMP and compliance with Federal and State Regulations. The Ordinance and Manual have been found to be consistent with State regulations and consistent with the prevention or minimization of water quality and quantity impacts. A copy of the Stormwater Management Ordinance and Manual can be found in two files on the attached compact disk titled, **BMP 5-1 Stormwater Management Ordinance.pdf** and **BMP 5-1 Stormwater Management Manual.pdf**.

TMDL Consistency:

This legal document and design manual targets reducing the quantity and improving the quality of stormwater runoff from new development, re-development, and existing developed areas. This manual and ordinance protects against erosion from stream banks, construction sites, developed areas, and re-developed areas in addition to regulating illicit discharges. (**SED & EC/FC**)

Evaluation and Modification:

No changes are planned for this BMP. New Stormwater regulations have just recently been approved at the State level and have not gone into effect at this time. It is vital that Roanoke County continues to keep its local Stormwater Management standards in compliance with these new regulations.

Year	Action	Changes and Modifications
2008 - 2009 (YEAR ONE)	Stormwater Ordinance and Manual Reviewed	No changes or modifications.
2009 - 2010 (YEAR TWO)	Stormwater Ordinance and Manual Reviewed	No changes or modifications.
2010 - 2010 (YEAR THREE)	Stormwater Ordinance and Manual Reviewed	No changes or modifications.

BMP 5-2: Stormwater Management Facility Inspection Program

Goal:

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

Measurable Goals:

In the first annual period, Roanoke County developed a Stormwater Management Facility Inspection Program and implemented the program. Background information, design plans, and contact information was gathered and the inspection program was begun. Currently Roanoke County has a total of 595 known permanent stormwater facilities.

In this third annual period, Roanoke County inspected **134** permanent stormwater facilities. For each inspected pond, the County determined the treated acreage, HUC, and downstream impaired water body. This information can be found on the attached compact disk titled, **BMP 5-2 Stormwater Management Facility Inspection Statistics.xls**.



TMDL Consistency:

This program ensures that all permanent stormwater facilities are adequately maintained and functioning properly. The proper function of these facilities is critical for flood protection and erosion prevention. (SED)

Evaluation and Modification:

Currently the County is on schedule with the Inspection Program and no changes are planned for this BMP. Continuing to track and inspect permanent stormwater facilities is vital for the long-term success of the facilities and the prevention of the transport of sediment and other pollutants into our streams and rivers.

Year	Stormwater Facilities Inspected	Total Number of Stormwater Facilities
2008 - 2009 (YEAR ONE)	56	461
2009 - 2010 (YEAR TWO)	62	511
2010 - 2011 (YEAR THREE)	134	595

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 strategies.

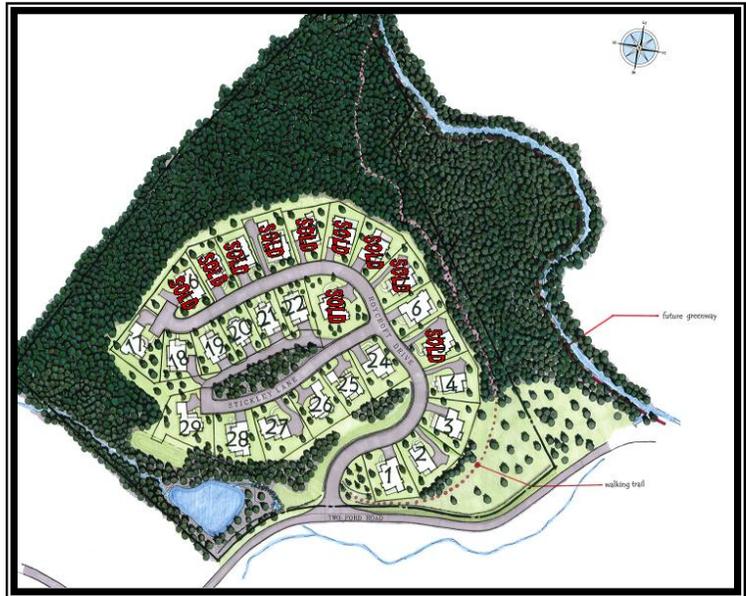
Measurable Goals:

In this annual period, Roanoke County has tracked the number of development projects and total acreage that has been developed using Low Impact Development principles for each HUC. No new development projects have been reviewed or approved that has utilized 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 our streams and rivers. (SED)



Evaluation and Modification:

No changes are planned for this BMP. Roanoke County will continue to encourage Low Impact Development in its region. The County will also continue to track the number, size, and HUC of Low Impact Developments in the region. The use of Low Impact Development will help to minimize the reliance on expensive structural practices which is an important way to prevent the deposition of sediment and other pollutants into our streams and rivers.

Year	LID DEVELOPMENTS	SIZE	HUC
2008 - 2009 (YEAR ONE)	0		
2009 - 2010 (YEAR TWO)	1. THE PRESERVE AT TWO FORD ROAD	16.64 Ac	RU14
2010 - 2011 (YEAR THREE)	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 our facilities and also provide education and programs that will educate the County employees about pollution prevention and hazardous waste. The BMP's that have been established to complete this goal are listed below:

BMP 6-1: Spill Prevention and Control Plans and Illicit Discharge Inspection Program

Roanoke County will inspect and develop Spill Prevention and Control 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 to be attained by County employees.

Included with this document 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: e. coli and fecal coliform (EC/FC) or sediment (SED).

BMP 6-1: Spill Prevention and Control Plans

Goal:

The goal of this BMP is to develop and update Spill Prevention and Control Plans for all of its municipal facilities. 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. These plans will be updated and annual training will be completed.

Measurable Goals

To meet this goal, Roanoke County will inspect all County facilities, review all existing Spill Prevention Plans, and continue to determine if additional Spill Prevention Plans are needed. A list showing the review and inspection schedule for all County facilities can be found in a file on the attached compact disk titled, **BMP 6-1 SPCC Schedule.pdf**.

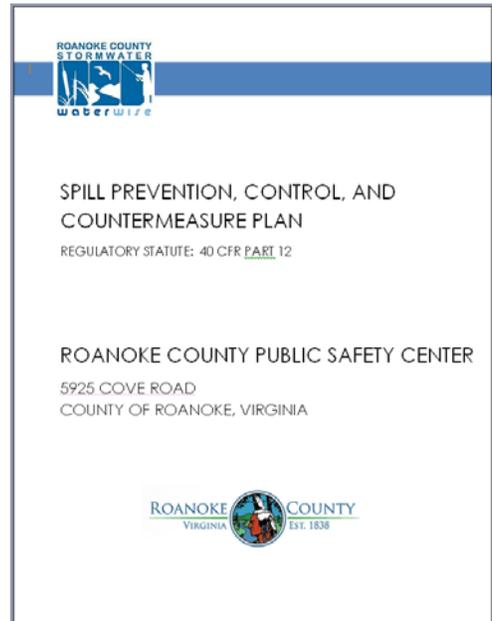
In year three, Roanoke County inspected **15** facilities. No new Spill Prevention Plans for the inspected facilities were needed. All existing Spill Prevention Plans are up to date and no modifications were needed. Roanoke County also completed the one new Spill Prevention Plan that was previously identified as being needed.

TMDL Consistency:

This program minimizes the potential for pollution spills to enter the municipal storm drain system. Having updated Spill Prevention 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) and (SED).

Evaluation and Modification:

No changes are planned for this BMP. Roanoke County will continue to update existing Spill Prevention and Control Plans and develop new plans according to the schedule. This BMP is considered to be an effective method of evaluating and eliminating potential illicit discharges from Municipal facilities, and preventing spills from entering the MS4 from a County facility.



Year	Inspected Facilities	New SPCC'S Completed	Updated SPCC'S
2008 – 2009 (YEAR ONE)	-	-	-
2009 - 2010 (YEAR TWO)	10	0	4
2008 - 2009 (YEAR THREE)	15	1	0

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

In year three, the County of Roanoke participated in twelve Household Hazardous Waste Collection events. A total of **504** people participated in the Household Hazardous Waste Collection days this year and **290** of the participants were residents of Roanoke County. 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 a file on the attached compact disk titled, **BMP 6-2 Household Hazardous Waste Statistics.pdf**.



TMDL Consistency:

Currently there is no known benefit that this BMP will have on any TMDL

waste load allocations approved prior to the issuance of this MS4 permit. Recently a TMDL waste load allocation has been approved for PCB's for the Roanoke River and the County expects this BMP to have a benefit in the reduction of that pollutant in future Program Plans.

Evaluation and Modification:

The participation for the Household Hazardous Waste events has increased from the previous permit year. Roanoke County understands that these events are an important way to keep these hazardous wastes from being disposed inappropriately into our streams and rivers.

Year	HHHW Events	Attendance
2008 - 2009 (YEAR ONE)	3	482
2009 - 2010 (YEAR TWO)	11	264
2010 – 2011 (YEAR THREE)	12	290

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 of discovering illicit connections and citing additional areas where pollutants may be entering the regulated storm sewer system.

Measureable Goals

The Stormwater Division of the Department of Community Development employs two stormwater construction and maintenance crews with a total of **7** men. 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 **56** projects were completed. A total of 14,420 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 **\$1,034,000**. The completed projects and associated values of these improvements can be found on the attached compact disk titled, **BMP 6-3 Storm Sewer Maintenance Program Statistics.pdf**.

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:

The total value of improvements has dropped by 64% from last year's value. This is primarily due to budget cuts during this past fiscal year. The program continues to maintain the County's stormwater system and has completed more projects than in the previous year. The program simply adjusted to the cuts by focusing on more less costly projects. For the third annual period, no changes are planned for this BMP. Roanoke County plans to continue to maintain the County's storm sewer system. This action of maintaining the storm drain system will keep it functioning properly and is an important opportunity to discover potential illicit connections to the storm drain system.

Year	Total Projects	Annual Period Improvement Value	Total in Improvements
2008 - 2009 (YEAR ONE)	24	\$661,800	\$661,800
2009 - 2010 (YEAR TWO)	54	\$241,600	\$903,400
2010 - 2011 (YEAR THREE)	56	\$1,034,000	\$1,937,400

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

The County of Roanoke currently maintains basic hazardous waste training for employees in Fire and Rescue. The County's Environmental Assessment Team (EAT) is a team responsible for establishing and maintaining the environmental management system and ensures its conformance with state laws. The County's EAT is also involved in specifying hazardous waste training for applicable positions within the County.

All County employees receive environmental awareness and management training. Human Resources ensure this training is delivered to all County full and part-time employees. The training includes: the County's environmental policy and system to manage environmental resources, identification of potentially significant environmental impacts, environmental objectives and targets, and employee roles and environmental responsibilities. In this past year, **sixty** new employees received this training.

TMDL Consistency:

This program makes sure that all Fire and Rescue staff maintains basic hazardous waste training to prevent any mishandling of hazardous materials in ways that could be detrimental to the environment. This program is also responsible for educating County Employees on environmental awareness and management training. This effort targets every employee, whether they are in a high risk field or not, about some good housekeeping practices. This program trains every County employee to be the eyes and ears of pollution prevention. This will increase the likelihood that any potentially hazardous situation will be brought to the attention of a supervisor and adequately addressed. (SED)

Evaluation and Modification:

Due to the economic recession in the State of Virginia, Roanoke County has hired fewer employees in the most recent years. Even with this decrease in new hires, Roanoke County still considers this BMP to be successful and proposes to continue this program. Roanoke County will continue the pollution prevention and environmental awareness training for all County employees and encourage additional pollution prevention training to be attained by County employees in grounds maintenance and landscaping areas.

Annual Period	Number of New Employees Trained	Total Employees Trained
2007 - 2008	141	
2008 - 2009 (YR1)	95	819
2009 - 2010 (YR2)	80	899
2010 - 2011 (YR3)	60	959

Stormwater Volume and Pollutant Load Estimation for any Waterbody with a Waste Load Allocation Identified

As part of Roanoke County's Third Annual Report, the volume of stormwater discharged and the quantity of pollutants is estimated for all water-bodies with a Waste Load Allocation.

In this section we will describe the methods and results of the calculations for the following:

1. Estimated Percent Impervious (across total MS4)
2. Annual Precipitation
3. Estimation of Volume of Stormwater Discharged
4. Estimation of Colony Forming Units of E. Coli
5. Estimation of Total Suspended Solids Discharged Annually

Percent Impervious for Roanoke County Urbanized Areas

The Percent Impervious across the MS4 was derived from the Report on Roanoke County's Existing and Possible Urban Tree Canopy. This report was carried out by the Virginia Department of Forestry in collaboration with Roanoke County and the Roanoke Valley-Alleghany Regional Commission. The data analysis utilized high resolution (1 meter) aerial imagery acquired in the Summer of 2008 and incorporated parcel specific data zoning and land use data provided by Roanoke County.

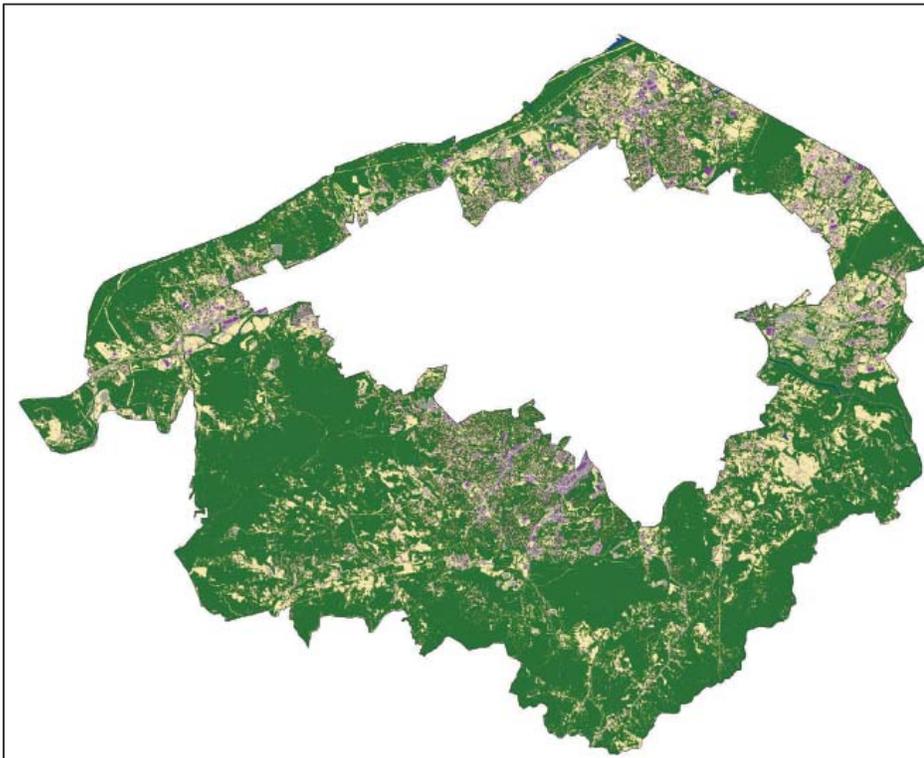


Figure 1: Land Cover for Roanoke County Urbanized Areas

This report provided Roanoke County with an estimate of total percent impervious cover for all of the County's urbanized areas. The total impervious percentage was **11.2%**. This calculation does not include the non-urbanized areas of Roanoke County. These areas are primarily agricultural districts with little impervious cover. Roanoke County feels that once these rural agriculture districts are included into the dataset, the impervious percentage will decrease for the total county. Therefore, if the County uses the impervious percentage from its urban areas the runoff and pollution estimates will be a conservative estimate of the overall loading for the county.

Annual Precipitation

Roanoke County gathers its annual precipitation from the Local Climatological Data from 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, 2010 to June 30, 2011 and compiled for this report. The total precipitation for the July 1, 2010 to June 30, 2011 period was **44.68 inches**.

Estimation of Volume of Stormwater Discharged

Using the county-wide percent impervious estimate 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 wasteload allocation. 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 (across total MS4)
 - y.yy = Annual precipitation of reporting period 2009 - 2010 (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)	Volume (ft ³)
Roanoke River	142,079	2.58E+09
Tinker Creek	2,657	4.83E+07
Carvin Creek	7,983	1.45E+08
Glade Creek	3,542	6.43E+07
Lick Run	407	7.39E+06
Ore Branch	906	1.65E+07

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 is 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 has converted Fecal Coliform to E. coli using the regression model developed by the Virginia Department of Environmental Quality. These methods and results are detailed below.

The Simple Method:

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

Where:

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

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

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

Watershed with WLA	Drainage Area of MS4 (ac)	E Coli (cfu/yr)
Roanoke River	142,079	1.15E+11
Tinker Creek	2,657	2.97E+09
Carvin Creek	7,983	8.16E+09
Glade Creek	3,542	3.87E+09
Lick Run	407	5.29E+08
Ore Branch	906	1.10E+09

Estimation of Total Suspended Solids Discharged Annually

Roanoke County has 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 (ac)	Total Suspended Solids (tons/yr)
Roanoke River	142,079	4.38E+03