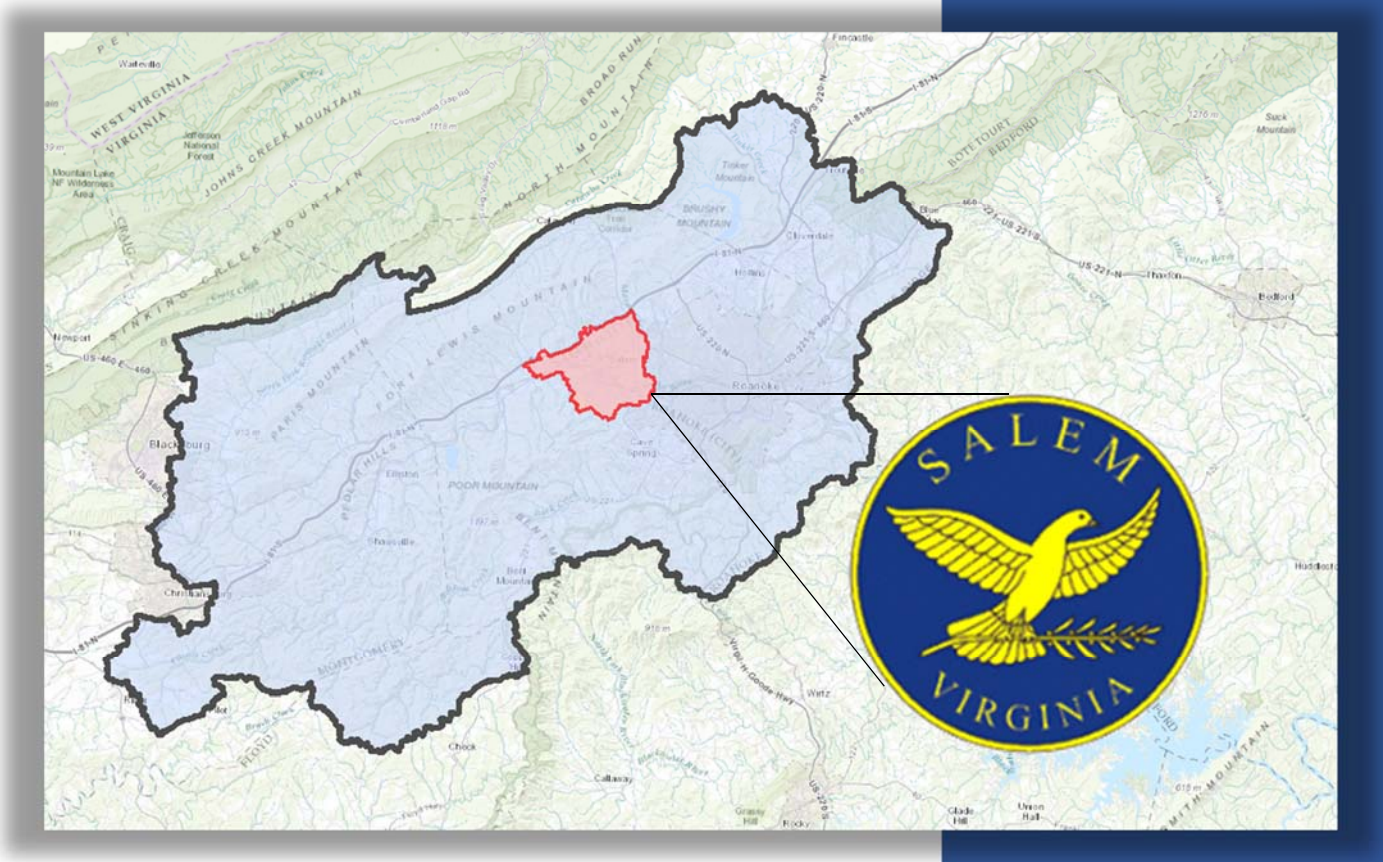
ROANOKE RIVER BACTERIA TMDL ACTION PLAN

City of Salem

A Plan to Address the City's Assigned Waste Load Allocation for the Roanoke River TMDL



June 30, 2015

This document addresses Section 1, Part B of the General Virginia Pollution Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4). This document serves as a City-specific Total Maximum Daily Load (TMDL) Action Plan to identify the best management practices and other interim milestone activities to be implemented to address the bacteria waste load allocation (WLA) assigned to the City's regulated MS4 area in the *"Bacteria TMDLs for Wilson Creek, Ore Branch and Roanoke River Watersheds, Virginia"* approved by the State Water Control Board on June 27, 2007.

EEE Consulting, Inc.

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EXECUTIVE SUMMARY

The City of Salem is authorized to discharge stormwater from its municipal separate storm sewer system (MS4) under the Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Discharge of Stormwater from Small MS4s (MS4 General Permit). To maintain permit compliance, the City implements an MS4 Program Plan that includes best management practices (BMPs) to address six minimum control measures (MCMs) and special conditions for the Total Maximum Daily Loads (TMDL) in which the City has been assigned a wasteload allocation (WLA). The Environmental Protection Agency (EPA) describes a TMDL as a "pollution diet" that identifies the maximum amount of a pollutant the waterway can receive and still meet water quality standards. A WLA determines the required reduction in pollutant of concern loadings from the MS4s to meet water quality standards. The MS4 General Permit serves as the regulatory mechanism for addressing the load reductions described in the TMDL, predominantly through the requirement of a TMDL Action Plan.

The purpose of this Action Plan is to address the WLA assigned to the City within the "Bacteria TMDLs for Wilson Creek, Ore Branch and Roanoke River Watersheds," approved June 27, 2007. The TMDL assigns the City a WLA for Escherichia coli (E.coli) equivalent to a 98.8% reduction in the existing conditions to meet water quality standards. The expectation of the TMDL is for MS4 permittees, such as the City, to address the TMDL WLAs through the iterative implementation of programmatic BMPs. The City's stormwater program BMPs are described in this TMDL Action Plan, specifically to their application to reductions in *E. coli* discharges to the MS4. The Action Plan addresses *E.coli* in accordance with the special conditions of the MS4 General Permit and expectations of the TMDL by demonstrating that the iterative implementation of programmatic BMPs to reduce or eliminate *E.coli* to the maximum extent practicable. Compliance to the special conditions is demonstrated through:

- ✓ Implementation of BMPs and associated policies and procedures;
- ✓ BMPs beyond those required by the MS4 General Permit;
- ✓ Enhancement of the City's MS4 Public Education and Outreach Plan;
- ✓ An assessment of City-owned and operated properties;
- ✓ Consideration of a septic system inspection program based on a study to identify existing systems; and
- ✓ A methodology to measure Action Plan effectiveness through MS4 annual reporting.

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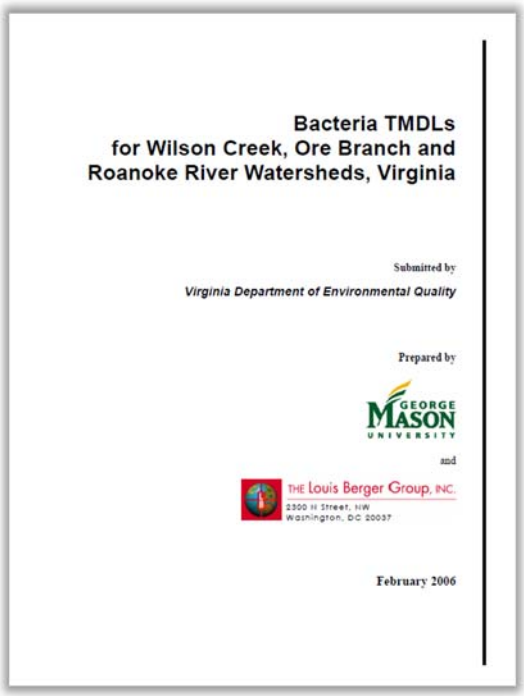
Acronyms

BMP	Best Management Practice
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
City	City of Salem
MCM	Minimum Control Measure
MS4	Municipal Separate Stormwater Sewer System
MSDS	Material Safety Data Sheets
NPDES	National Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program

1.0 Introduction and Purpose


Bacteria TMDLs
for Wilson Creek, Ore Branch and
Roanoke River Watersheds, Virginia

Submitted by
Virginia Department of Environmental Quality

Prepared by
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February 2006

Mandated by Congress under the Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES) storm water program includes the Municipal Separate Storm Sewer System (MS4), Construction, and Industrial General Permits. In Virginia the NPDES Program is administered by the Virginia Department of Environmental Quality (DEQ) through the Virginia Stormwater Management Program (VSMP) and the Virginia Pollutant Discharge Elimination System (VPDES). The City of Salem (City) is authorized to discharge stormwater from its MS4 under the VPDES General Permit for Discharge of Stormwater from Small MS4s (MS4 General Permit). As part of the MS4 General Permit authorization, the City developed and implements a MS4 Program Plan with best management practices (BMPs) to address the six minimum control measures (MCMs) and the special conditions for applicable total maximum daily loads (TMDLs), as outlined in the MS4 General Permit. Implementation of these BMPs is consistent with the provisions of an iterative MS4 Program constituting compliance with the standard of reducing pollutants to the "maximum extent practicable."

In 1998, the Virginia Department of Environmental Quality (DEQ) listed segments of the Wilson Creek, Ore Branch, and the Upper Roanoke River on their biennial 303(d) Total Maximum Daily Load (TMDL) Priority List and Report due to violations of the state's water quality standard for fecal coliform bacteria, now expressed as *E. coli*. As a consequence, the "Bacteria TMDLs for Wilson Creek, Ore Branch and Roanoke River Watersheds," were developed and approved by the State Water Control Board (SWCB).

The TMDL assigned the City a waste load allocation (WLA) for *E. coli* of 2.29E+11 colony forming units per year (cfu/yr), representing a 98.8% reduction in the existing loads. The WLA represent the allowable bacteria load from the City's MS4 to prevent instances of exceedance of bacteria discharge water quality standards. The expectation from the Commonwealth for Salem to address the WLA is through iterative implementation of programmatic BMPs. The City's programmatic BMPs applicable to the pollutant of concern are described herein and only failing to implement the BMPs would be considered a violation of the MS4 General Permit.

1.1 Total Maximum Daily Loads

A TMDL is the total maximum daily load, or the amount of pollutant a water body can assimilate and still meet water quality standards for its designated use. Typically, TMDLs are represented numerically in three main components:

- Wasteload Allocations (WLA) for point source contributions and MS4 Permit operators
- Load Allocations (LA) for non-point source contributions and natural background sources
- Margin of Safety (MOS)

Point source pollution is any single identifiable source from which pollutants are discharged. If point source discharges, including a permitted MS4, are present in the TMDL watershed, then any allocations assigned to that permittee must be in the form of a WLA. The City's MS4 outfalls are defined as point source discharges and therefore fall under this category in the TMDL. Pollution that is not from an identifiable source, such as a pipe or a ditch, but rather originates from multiple sources over a relatively large area, are considered to be non-point source pollution. These sources are typically categorized into agricultural, livestock, and wildlife, with Load Allocations (LAs) assigned for each. The Margin of Safety (MOS) is a required component that accounts for the modeling uncertainty in the response of the waterbody to loading reductions and is implicitly incorporated into a TMDL computation. The TMDL is expressed in the following equation:

$$TMDL = \sum WLA + \sum LA + MOS$$

The TMDL represents the sum of calculable sources plus a margin of safety that is required to not exceed the state water quality standard for recreation of a 30-day geometric mean of 126 cfu/100 ml and an instantaneous water quality standard of 235 cfu/100 ml. The cfu/ml unit represents a volumetric concentration of viable bacteria cells that can multiply under controlled conditions.

1.2 MS4 General Permit TMDL Special Conditions

The City operates its regulated MS4 that lies entirely within the Roanoke River bacteria TMDL watersheds and is therefore subject to the TMDL WLAs assigned in the TMDL. The special conditions for the TMDL listed in the MS4 General Permit require the City to develop a TMDL Action Plan that identifies the BMPs and other interim milestone activities to be implemented during the remaining terms of this state permit that specifically includes:

- A list of legal authorities applicable to reducing discharge of *E.coli* from the MS4
- A list of management practices and controls, beyond those required within the six minimum control measures of the MS4 General Permit, that are implemented as part of Salem's MS4 Program and applicable to reductions in *E.coli* discharge from the MS4;

- Enhancement of the Salem Public Education and Outreach Plan (PEOP) and employee training program to promote methods to eliminate and reduce discharges of *E.coli* into the Salem's MS4;
- An identification and assessment of facilities that are owned and operated by the MS4, not covered under a separate VPDES permit, with the potential (greater than the average expected loading) to be significant sources of *E.coli* discharge to the MS4;
- A methodology to assess the effectiveness of the City's Action Plan in reducing the discharge of *E.coli* from the City's MS4.

1.3 Salem's Bacteria Action Plan

The purpose of Salem's Action Plan for the Roanoke River bacteria TMDL is to address each of the MS4 General Permit special conditions listed in Section 1.2. As an adaptive and iterative approach to meet surface water quality goals, the Action Plan may be revised from time to time to reduce *E.coli* discharges from the City's MS4 to the maximum extent practicable (MEP). The Action Plan is incorporated, by reference, into Salem's MS4 Program Plan, which outlines the BMPs that address the entirety of the conditions set forth in the MS4 General Permit.

2.0 The Roanoke River Bacteria TMDL

The impaired segment of the Roanoke River begins in Salem and flows through Roanoke City and Roanoke County. The TMDL study area also includes the Wilson Creek and Ore Branch tributaries, making up the overall Upper Roanoke River Basin (USGS Cataloging Unit 03010101) that drains 580 square miles. The City of Salem accounts for 2% of the overall watershed with the Roanoke River serving as the impaired receiving surface water for the entire City. The bacterial impairment is due to bacterial violations to water quality standards for *E. coli*. This particular bacteria is typically found in the lower intestines of warm-blooded organisms. Certain strains of the bacteria can be harmful and can survive for a limited amount of time outside of a host. Fecal contamination from these organisms, if ingested by another host, can cause serious poisoning.

2.1 Wasteload Allocation

The "*Bacteria TMDLs for Wilson Creek, Ore Branch and Roanoke River Watersheds*" assign a WLA for *E. coli* to existing point sources, including permitted MS4s. The TMDL was established based on scenarios where no violations of either the *E. coli* geometric mean standard or the instantaneous *E. coli* standard would occur. The selected TMDL scenario for establishing WLAs included reductions from sources as shown in Table 1. A review of the reduction allocations demonstrates the potential difficulty to achieve water quality standards with the necessity to remove 68% of direct wildlife contributions and nearly all of the remaining sources.

Table 1. Selected Scenario for Roanoke River Load Reductions to achieve no violations in either *E. coli* standard.

Failed Septic & Pipes	Direct Livestock	Non-point Source (Agricultural)	Non-point Source (Urban)	Direct Wildlife
100%	100%	98.8%	98.8%	68%

Sources identified in Table 1 can be summarized as:

- Failed Septic Systems and Pipe – This category includes failed septic systems and "straight pipes" that directly discharge sewage to surface waters.
- Direct Livestock – Livestock inventory within the TMDL watershed consists of cows, hogs & pigs, sheep & lambs, and horses & ponies. Whereas indirect wildlife sources are those that are carried to the stream from the surrounding land via rain and runoff events, direct sources are those that are directly deposited into the stream.
- Non-point Source (Agricultural) – Agricultural sources of *E. coli* include land application of manure and biosolids to pastures and therefore considered an indirect source.
- Non-point Source (Urban) – This category includes MS4s as the nonpoint source runoff is ultimately discharges through the MS4. *E. coli* sources incorporated into the TMDL within the urban area include pet waste, primarily cats and dogs.

- Direct Wildlife – Whereas indirect wildlife sources are those that are carried to the stream from the surrounding land via rain and runoff events, direct sources are those that are directly deposited into the stream. An example of wildlife serving as a direct source are those that live within close vicinity of the stream such as muskrat, geese and beaver.

The City is categorized into the "non-point urban" source classification and therefore is assigned a WLA equivalent to a 98.8% reduction from existing loads of *E. coli*.

3.0 Potential E.coli Source Characterization in the City of Salem

A review of the TMDLs, the City's MS4 Program Plan and a field investigation of City-owned and operated properties resulted in the characterization related to potential *E.coli* sources described in the following sub-sections.

In reference to Tables 1, of the sources considered by the TMDL, the following are applicable to the City and further considered in the following sub-sections:

- Pet waste (urban runoff);
- Sanitary sewer overflows; and
- Septic system failures (urban runoff) and straight pipes;

Consistent with the special conditions of the MS4 General Permit, an evaluation of City-owned and operated properties for significant sources of *E.coli* is also applicable and described in Section 3.4. It is noted that agricultural and livestock sources are not considered applicable sources to the City's MS4. Further, neither DEQ nor EPA propose elimination of wildlife to allow for attainment of this e water quality standard, and changing of the natural background conditions is not the intent of the TMDL. As such, the focus of this Action Plan is to reduce those non-natural *E. coli* sources until such time that a Use Attainability Analysis reconsiders the water quality standard for the impaired surface waters.

3.1 Pet Waste

The TMDL assumed that an average of 1.7 dogs and 2.2 cats resided in each household in the City and constituted the primary pets that contributed potential bacteria loading. As of the 2010 Census, the population of the City of Salem was 24,802, and the number of households can be estimated to be 9,976. Based on the estimated number of households, approximately 17,000 dogs and 22,000 cats reside within the City. Information from the City suggests a smaller number of pets with approximately 3,200 licensed dog owners, per the City database. Actual dog and cat numbers are not available. Waste loading associated with these animals is largely confined to residential areas, but it may also be assumed that waste can enter waterways along adjoining streets and in areas frequented by dog owners, such as dog parks, trails, and recreation areas where dogs are permitted.

3.2 Public Sanitary Sewer System

The City owns, operates, and maintains a sanitary sewer collection system consisting of approximately 170 miles of gravity sewer lines ranging in size from 4 to 60 inches. The system services mainly residential and commercial properties. Wastewater flows to the Western Virginia Water Authority Water Pollution Control (WAWPC) system and the Roanoke Regional Water Pollution Control Plant (WPCP) (VPDES Permit #VA0025020). Wet weather peak flows, along with

blockage factors typical to municipal systems, have periodically resulted in overflows at manholes and system bypasses. Since 2012 there have been 19 overflows, of which 17 reached a local waterway. The majority of these overflows were due to sewer line blockages.

3.3 Failed Septic Systems and Straight Pipes

In general, residences and commercial properties that are not currently connected a municipal sanitary sewer are either using septic systems or straight pipes to discharge wastes. Older septic systems and those not properly maintained can create bypass flows of sanitary waste that may flow overland to streams. Residences within 200 feet of a stream that are not using either a septic system or sanitary sewer connection may be discharging wastes directly to streams via straight pipes.

To determine the extent of failed septic systems within the City, the TMDL used data from the 1990 Census that provided the percent of houses within the City on public sewer (93.10%), septic system (6.86%) or other means (0.04%), with other means assumed to be straight pipes. The information was then used with 2000 Census household (9,954) data to determine the number of septic systems in the City. Finally, a failure rate of 3% was assumed. Based on the information in Table 2 and Salem's estimated 9,954 households, the TMDL would have approximated 683 septic system. Considering the 3% failure rate, the TMDL estimated 20 septic system failures for the purposes of the TMDL.

At the present time, the City believes that nearly 100% of household sanitary sewage is discharged to the public sewer system. It is estimated by the Roanoke Health Department that approximately 78 properties continue to use a septic system, and no properties are known to discharge sanitary waste directly to streams. A comparison of the TMDL estimates and the City's current estimates is provided in Table 2.

Table 2. Estimate of failed septic systems in the City of Salem.

Sewage Disposal Method	TMDL Estimation (1990 & 2000 Census Data)		City Engineer Estimation (Present)	
	Percentage (%)	# Households	Percentage (%)	# Households
Public Sewer	93.10%	9,267	99.99%	24,744
Private Septic System	683 (6.86%)	682	0.01%	78
- Potentially Failing Systems	0.2%	20	0.02%	2*
Straight Pipe	0.04%	4	0.00%	0

* Based on 3% failure rate

3.4 City-owned and Operated Properties

Properties owned and operated by the City of Salem were assessed to determine each of their potential for presence of sources of *E. coli* to the city's MS4 or directly into surface waters. Potential sources include those associated with the municipal waste stream, those potentially producing bacteria pollution as a part of their operations, or those subject to loading from outside sources, such as pets at recreational parks. The assessment was generally conducted as illustrated in Figure A and included the properties shown in Figure B.

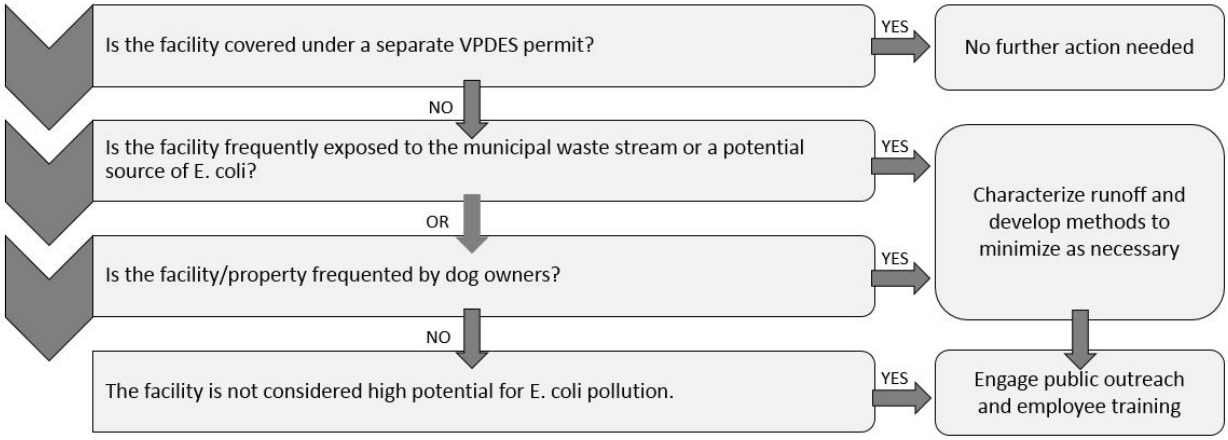


Figure A. City-owned properties assessment process.

The assessment address the following MS4 General Permit special condition:

- ✓ *Assess all significant sources of pollutant(s) from facilities of concern owned and operated by the MS4 operator that are not covered under a separate VPDES permit and identify all municipal facilities that may be a significant source of the identified pollutant.* [Section I(B)(2)(b)]

The assessment identified the following properties as potential sources of *E.coli*:

- **City of Salem Trash Transfer Facility** - The City's waste transfer station serves as a facility for collection and transfer of municipal waste from trash trucks to tractor trailers for transport to the landfill. The leachate from loading bays and stored trucks is a potential source of *E. coli* to the storm sewer.
- **Salem Rotary Dog Park** – The Park provides an off-leash area for dogs and is frequented by local residents with dog licenses. The facility is located adjacent to the City's waste transfer station, next to the Parks and Recreation building. Signage, pet waste bags, and trash receptacles are provided to encourage cleanup of pet waste. The City's website for the park also states that dog owners must pick up after pets.

- **Roanoke River Greenway** – This linear trail system in the City is frequented by dog owners. Pet waste stations are currently maintained a six locations along approximately 2.5 miles of trail.
- **Public Works Facility** – Garbage trucks are stored and maintained. Potential exists for leachate from stored trucks to convey to the storm sewer.

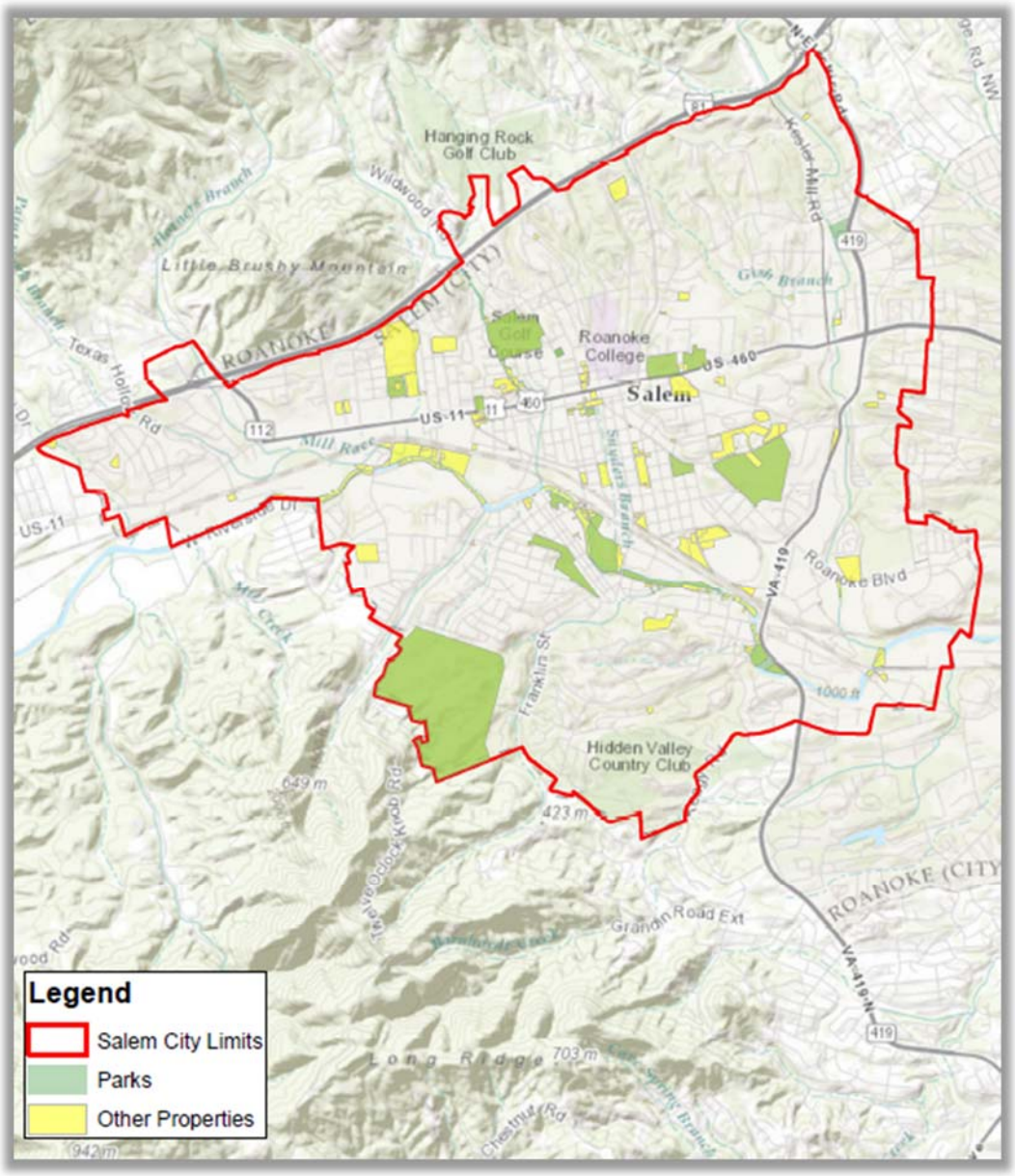


Figure B. City-owned properties included in the bacteria source assessment.

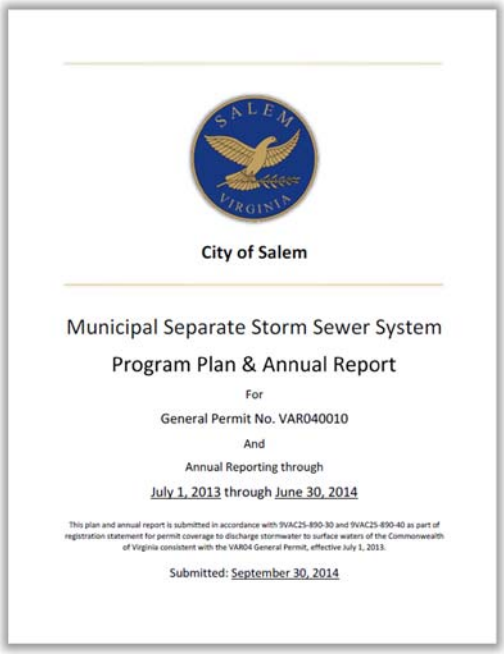
4.0 Best Management Practices to Address E. coli

Salem's MS4 Permit covers stormwater discharges from areas included within census urbanized areas (CUAs). The City's collective efforts, as described in the Salem MS4 Program Plan, result in significant reduction of pollutants that may be discharged from its regulated MS4. BMPs already included in the Salem Program Plan that address *E. coli* are described in the following sections. Each subsection is provided to address the referenced special condition in the MS4 General Permit.

4.1 Current Program and Existing Legal Authority

Salem's current MS4 Program provides appropriate policies and procedures to implement a compliant program aligned with the goals and requirements of the Roanoke Bacteria TMDL. The following summary of the Salem MS4 Program Plan MCMs list laws, programs, and other regulatory mechanisms relied upon by Salem that are applicable to reducing *E. coli*. A summary addresses the following special condition:

- ✓ *"Develop and maintain a list of its legal authorities such as ordinances, state and other permits, orders, specific contract language, and inter-jurisdictional agreements applicable to reducing the pollutant identified in each applicable WLA."* [Section I(B)(2)(a)]



City of Salem

Municipal Separate Storm Sewer System

Program Plan & Annual Report

For

General Permit No. VAR040010

And

Annual Reporting through

July 1, 2013 through June 30, 2014

This plan and annual report is submitted in accordance with 9VAC25-890-30 and 9VAC25-890-40 as part of registration statement for permit coverage to discharge stormwater to surface waters of the Commonwealth of Virginia consistent with the VAR04 General Permit, effective July 1, 2013.

Submitted: September 30, 2014

- *Minimum Control Measure 1 (Public Education and Outreach)* – Salem's MS4 Program includes, by reference, a Public Education and Outreach Program (PEOP) that incorporates educational information about TMDL pollutants of concern, including *E.coli*. The PEOP includes, as Water Quality Issue #2, the distribution of educational materials regarding pet waste management to reduce introduction of *E.coli* into stormwater runoff.

- *MCM 2 (Public Participation)* – The City will post this Action Plan on their stormwater pollution prevention webpage at the Salem SWM Page. Availability of the Action Plan will increase awareness of the TMDL with web page visitors.

- *Minimum Control Measure 3 (Illicit Discharge Detection and Elimination)* – Salem's MS4 Program includes an includes an Illicit Discharge Detection and Elimination (IDDE) Program that includes written procedures to detect, identify, and address non-stormwater discharges,

including illegal dumping, to the small MS4 with policies and procedures for when and how to use legal authorities. Salem prohibits non-stormwater discharges into the storm sewer system through language provided within an Illicit Discharge Ordinance. The IDDE Program is includes a proactive approach to reduce illicit discharges with annual outfall screening to seek out and remove non-stormwater discharges into the MS4. IDDE BMPs are described in the MCM 3 BMPs of the Salem MS4 Program Plan.

- *Minimum Control Measure 4 (Construction)* – The City's Construction Program includes mechanisms to ensure compliance and enforcement on regulated construction sites that are enforced through Salem's SWM and Erosion and Sediment Control (ESC) Ordinances that are consistent with the Virginia Erosion and Sediment Control and SWM Laws and Regulations and includes:
    - Required plan approval prior to commencement of a regulated land disturbance activity;
    - Construction site inspections and enforcement; and
    - Certification of post-construction SWM facilities

  Through inspections and enforcement, especially in regards to stormwater pollution prevention plan (SWPPP) inspections, potential for *E.coli* discharges (i.e. port-a-johns) is minimized. Minimum Control Measure 4 BMPs in the Salem MS4 Program Plan describe construction site runoff control BMPs.

- *Minimum Control Measure 5 (Post-Construction)* – Salem's MS4 Program includes a Post-Construction SWM Program that ensures water quality criteria in the Virginia Stormwater Management Regulations has been achieved on new developments and developments on prior developed land through implementation of a SWM Ordinance. Included within the ordinance are requirements for as-built certifications for SWM BMPs and long term maintenance covenants to ensure that SWM facilities are designed and installed in accordance with appropriate law and regulations. Although the facilities are designed to achieve target phosphorus reductions, many water quality BMPs also are effective at *E.coli* removal. Minimum Control Measure 5 BMPs in the Salem MS4 Program Plan describe post-construction stormwater management BMPs.

- *Minimum Control Measure 6 (Good Housekeeping)* – Salem's MS4 Program includes a Pollution Prevention/Good Housekeeping Program that includes policies and procedures to ensure that day-to-day operations minimize the exposure of pollutants to rainfall on City-owned and operated properties to the maximum extent practicable. The program is supported with Salem's Pollution Prevention & Good Housekeeping Manual and annual

training for applicable staff. Minimum Control Measure 6 BMPs in the Salem MS4 Program Plan describe pollution prevention and good housekeeping BMPs.

No new policies and procedures or modifications to existing policies and procedures were identified as necessary to meet the requirements of the special conditions.

4.2 Practices and Controls beyond the Minimum Control Measures

The City has existing prohibitions and increased training aimed to improve the water quality of the local waterways. Additional practices beyond the MCMs to address each of the sources described in the TMDL scenario listed in Section 3 are addressed with practices and controls in as described in the following sub-sections. The inclusion of these practices and controls addresses the following special condition:

- ✓ *"Identify and maintain an updated list of all additional management practices, control techniques and system design and engineering methods, beyond those identified in Section II V, that have been implemented as part of the MS4 Program Plan that are applicable to reducing the pollutant identified in the WLA."* [Section I(B)(2)(b)]

4.2.1 Pet Waste Controls

The City's approach to address pet waste controls are threefold, including prohibition on most City properties, pet stations at strategic locations where pets are allowed and targeted public education outreach.

The City prohibits the owner of a dogs, cat and other animals to allow the animal on the premises of any city park or school facilities, either on or off leash (*Salem City Code – Chapter 14-2*). A violation is a class 4 misdemeanor. The Salem Rotary Dog Park, which is equipped with pet waste stations (bag dispensers, signage and waste containers), is the lone exception to the prohibition. Other than parks and schools, the assessment of City-owned and operated properties identified the Roanoke River Greenway trail system as a potential contributing source of *E. coli*. Pets are allowed on a leash at the trail and 6 pet stations are strategically provided along the route.

Whereas prohibitions and pet waste stations target City properties, the City addresses pet waste sources through a targeted educational outreach program as part of the City's MS4 Public Education and Outreach Plan. Pet waste is specifically addressed as "Water Quality Issue #2: Education on dog waste impacts and pick-up" that required annual mailings to registered dog owners.

4.2.2 Sanitary Sewer System Rehabilitation

As described in Section 3.2, the City own, operates and maintains a sanitary sewer collection system that has historically experienced overflows, mostly due to blockages. The City and DEQ entered into a Special Order by Consent (Order) in December of 2005 for issues related to inflow and infiltration (I&I) to its existing sanitary sewer network that resulted in system overflows and bypasses at the downstream treatment plant. The Order indicated several priority repair projects and the City submitted a Corrective Action plan to address the issues in a phased approach based on the five-year VPDES permit cycle. Priority repairs to the system were completed and a Corrective Action Plan for the collection system was initiated in 2007, which included a phased approach to subsequent I&I abatement. The Corrective Action Plan provides methods for eliminating and/or properly managing any peak flows that significantly contribute to overflows of the system and bypasses at the plant. A schedule was also developed for the remaining permit term and subsequent five-year terms to further address I&I. At the time of development of this plan, I&I abatement projects continue being implemented in accordance with the schedule.

4.2.3 Prevention of Septic System Failures

The City currently requires the connection of new residences and commercial facilities to the sanitary sewer system, and septic system installation requires a special use permit (*City Code - Article III, Division 3-Sewage Disposal)*. Variances are only approved by the City Engineer when sanitary sewer service is not reasonably available. The Roanoke Health Department oversees the permits for new and existing septic systems, with print records going back fifty years or more. During the current permit cycle, this information will be cross-referenced with utility data to confirm the number and location of properties that are not currently connected to the sanitary system. During the subsequent cycle, the City may develop a prioritized schedule to inspect older systems and offer assistance, as necessary, for repair or connection to the sanitary sewer system. However, as demonstrated in Table 2, the relatively small number of septic systems may deem formal policies unnecessary.

4.2.4 Elimination of Straight Pipe Connections

There are no known straight pipe discharges to surface waters within the City. As previously described, the City's IDDE Program includes a proactive approach to reduce illicit discharges with annual outfall screening to seek out and remove non-stormwater discharges into the MS4. As part of MCM3, the City will continue annual outfall screening and to add new outfalls to mapping as they are discovered. In the case that annual dry-weather screening should identify an illicit discharge, including sewage, the existing policies and procedures will aim to eliminate the discharge through an IDDE investigation and enforcement of the City's IDDE Ordinance.

4.2.5 Source Controls at City-owned and Operated Properties

The primary anthropogenic source of potential *E. coli* pollution at City owned facilities is pet waste. The City will review its approach to reduction of pet waste as an *E. coli* source which includes public education and pet waste stations. The review may include an evaluation of the municipal code and the possibility of additional pet waste stations on City properties. For the two park properties that are potentially significant contributors, as described in Section 3.1.4, the City will continue maintaining the existing signage and pet waste stations. Potential *E. coli* sources at the Public Works facility and Tash Transfer Facility will be addressed through site-specific Stormwater Pollution Prevention Plans (SWPPPs) required by the MS4 General Permit by July 1, 2017. SWPPPs include mapping that identifies potential sources and BMPs to minimize and eliminate discharges.

4.2.6 Additional Applicable City Codes

In addition to the IDDE, ESC and SWM Ordinances described in Section 4.1, the following City Code sections also serve as mechanisms to reduce the potential for *E. coli* discharge to the MS4:

- "*Removal of trash, garbage, etc.,*" as described in the City Code, Article 1, Section 30-4. A violation is a class 4 misdemeanor. Proper disposal of waste can prevent exposure to precipitation and subsequent runoff to the storm sewer.
- "*Allowing noxious, etc., matter or nuisance to be placed, etc., in or upon house, lot, etc.,*" as described in the City Code, Article 1, Section 30-5. The prohibition of noxious, unwholesome or offensive matter can prevent potential of materials stored outdoors on property that contain *E. coli* that could be exposed to precipitation and subsequent runoff to the storm sewer.
- "*Performance of plumbing work, etc., by registered plumber,*" as described in the City Code, Article IV, Section 18-262. The Code ensures a registered plumber is required to make connections to the City's sanitary system and therefore decreases potential discharge of sewage from poor connections.
- "Connection of premise with public sewer required," as described in the City Code, Article III, Section 90-121. The Code requires homes in subdivisions connect to the public sanitary sewer system and discontinue use of privies, septic tanks, cesspools and the like; provided that such a connection will not require a private sewer line over 150 feet in length, in which the requirement may be excused at the discretion of the council.
- "Permit for construction of septic tanks," as described in the City Code, Article III, Section 90-151. The Code requires a permit from the City Manager prior to construction of a septic system.

4.3 Enhanced Public Education and Outreach Plan

Salem's MS4 Program includes, by reference, a PEOP that incorporates educational information about TMDL pollutants of concern, including *E.coli*. The PEOP includes, as Water Quality Issue #2, the distribution of educational materials regarding pet waste management to reduce introduction of *E.coli* into stormwater runoff. As a result, the target audience, including all registered dog owners, will be provided information promoting responsible pet waste practices.

Salem's PEOP also identifies City staff as a target audience and requires annual training, a more frequent training schedule than the biennial training required by the MS4 General Permit. Staff training material (Salem's Good Housekeeping/Pollution Prevention Manual) includes information regarding TMDL pollutants of concern. The inclusion of information regarding *E.coli* sources in stormwater runoff into the Public Education and Outreach Program and staff training materials addresses the following permit special condition:

- ✓ *"General Permit SEC I.B.2.c: Enhance [its] public education and outreach and employee training programs to also promote methods to eliminate and reduce discharges of the pollutants identified in the WLA.*

5.0 Implementation to the MEP

Salem will implement the MS4 Program components described in Section 4 to reduce the potential of E.*coli* discharge to surface waters to the MEP. The method of assessment is implemented through the annual reporting process with the review of the effectiveness of each MS4 Program Plan BMP. Interim milestone activities consist of the annually reported implementation of the Program components described herein; therefore addressing the following special condition:

- ✓ *"Develop and implement a method to assess TMDL Action Plans for their effectiveness in reducing the pollutants identified in the WLAs."* [Section I(B)(2)(e)]