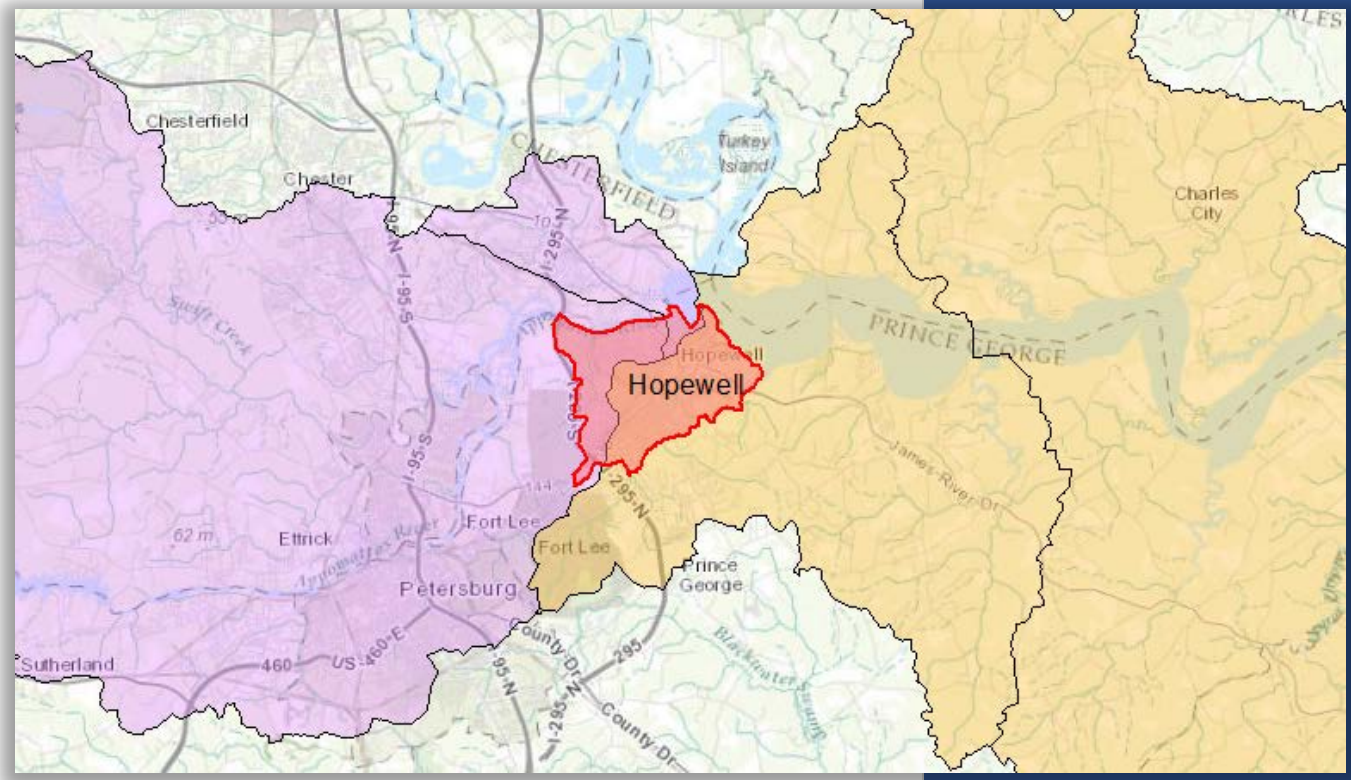
City of Hopewell
Virginia

BACTERIA TMDL ACTION PLAN

A Plan to Address the City's Assigned Waste Load Allocation for the James River and Appomattox Watersheds TMDLs

June 30, 2015

Revised per DEQ January, 2016



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 applicable regulated MS4 area in the *"Bacteria Total Maximum Daily Load Development for the James River – Hopewell to Westover"* approved by the State Water Control Board (SWCB) on April 29, 2009, and "*Total Maximum Daily Load Development for the Appomattox River Basin"* approved by the SWCB on December

EEE Consulting, Inc.

EXECUTIVE SUMMARY

The City of Hopewell 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 following TMDLs:

- "Bacteria Total Maximum Daily Load Development for the James River – Hopewell to Westover," approved on April 29, 2009, and
- "Total Maximum Daily Load Development for the Appomattox River Basin," approved on December 20, 2005.

The TMDLs assigns the City a WLA for Escherichia coli (E.coli) that are equivalent to a reduction in the existing conditions to meet water quality standards. However, the expectation of the TMDLs is for MS4 permittees to address the TMDL WLAs for stormwater 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 and expectations of the TMDL by demonstrating that the City uses an adaptive 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 pump-out program and pet waste controls; and
- ✓ A methodology to measure Action Plan effectiveness through MS4 annual reporting.

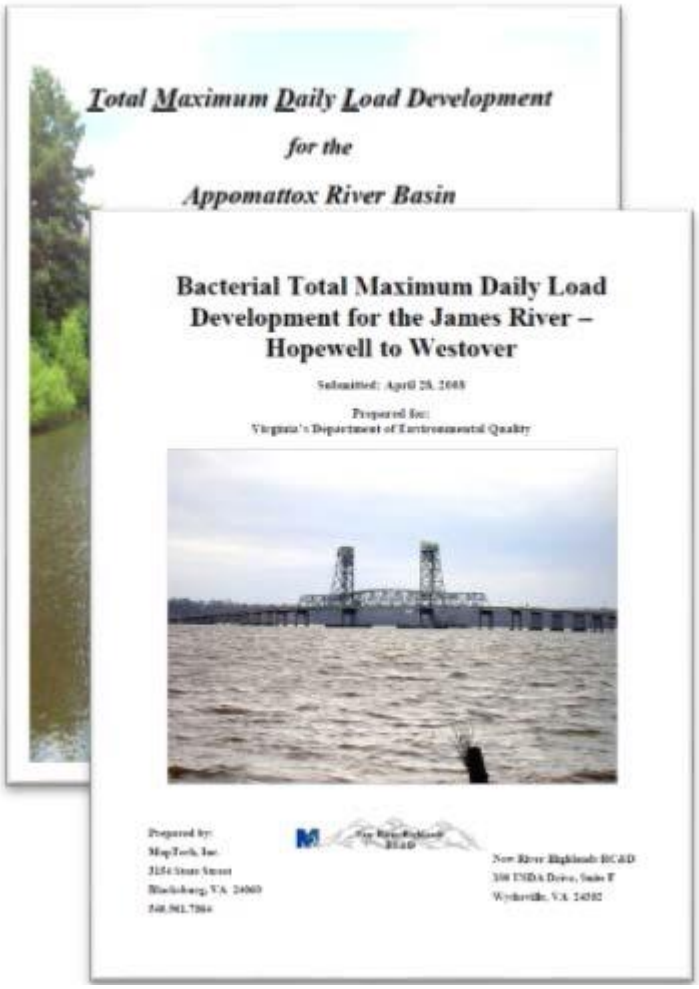
Table of Contents

Appendices

Acronyms

BMP	Best Management Practice
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
City	City of Hopewell
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



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 Hopewell (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."

The Virginia Department of Environmental Quality (DEQ) listed segments of the Appomattox River (1996) and the James Rivers (Tidal)(2002) 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 following TMDLs were developed and approved by the State Water Control Board (SWCB):

- "Bacteria Total Maximum Daily Load Development for the James River – Hopewell to Westover," (James River TMDL) approved on April 29, 2009, and
- "Total Maximum Daily Load Development for the Appomattox River Basin," (Appomattox River TMDL) approved on December 20, 2005.

The TMDLs assigned the City a waste load allocation (WLA) for bacteria discharges to both watersheds for the pollutant Escherichia coli, commonly abbreviated as *E. coli*. The WLAs represent the allowable bacteria load from the City's MS4 to prevent instances of exceedance of bacteria discharge water quality standards. The City was assigned the following WLAs with the James River TMDL:

- 9.51E+10 colony forming units per year (cfu/yr) to Bailey Creek
- 8.18E+12 colony forming units per year (cfu/yr) to Bailey Bay, Bailey Creek (tidal), Cattail Creek (tidal) Creek
- 1.41E+13 colony forming units per year (cfu/yr) to James River (Tidal)

And the following WLA from the Appomattox River TMDL:

- 1.44E+12 cfu/yr in the Appomattox River TMDL.

For both TMDLs, the expectation from the Commonwealth for Hopewell to achieve these WLAs is through iterative implementation of programmatic BMPs. Hopewell's programmatic BMPs applicable to the pollutant of concern are described in the following section. Only failing to implement the programmatic BMPs described herein 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 TMDLs 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 within a portion of the James River and Appomattox 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 Hopewell's MS4 Program and applicable to reductions in *E.coli* discharge from the MS4;
- Enhancement of the Hopewell Public Education and Outreach Plan (PEOP) and employee training program to promote methods to eliminate and reduce discharges of *E.coli* into the Hopewell'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 Hopewell's Bacteria Action Plan

The purpose of Hopewell's Action Plan for the James River and Appomattox River bacteria TMDLs 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 Hopewell's MS4 Program Plan, which outlines the BMPs that address the entirety of the conditions set forth in the MS4 General Permit.

2.0 Hopewell's Applicable Bacteria TMDLs

The James River and Appomattox River TMDLs assign a WLA for the pollutant Escherichia coli, commonly abbreviated as *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. A WLA was calculated for existing point sources, including MS4 permit operators, along with LAs and the MOS to meet the water quality standard and reduce the risk of waterborne illness. The TMDLs were 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 scenarios include reductions from various land uses such as agriculture, commercial and residential uses, straight pipes, livestock and sanitary sewer overflows. Percent reductions for each source vary based on contributing tributaries to each river. The general approach for the determination of the WLA for each TMDL is described in the further detail in the following sub-sections.

2.1 James River TMDL

According to the TMDL, Hopewell is the only permitted MS4 in the James River – Hopewell to Westover study area that contributes bacteria to surface waters. For the purposes of the TMDL development, it was assumed that all impervious land within the boundaries of Hopewell's and the study area drain to an MS4 outfall. All *E. coli* from these areas was allocated to the MS4 with the area for each study watershed shown in Table 1.

Table 1. Impervious land areas used to calculate the MS4 WLAs for the James River TMDL.

Impairment	Total Drainage Area (acres)	Hopewell City Impervious Area (acres)
Bailey Creek	9,044	86.64
Bailey Bay, Bailey Creek (Tidal), Cattail Creek (Tidal)	13,264	629.33
James River (Tidal)	52,633	954.07
Powell Creek	10,279	0

Implementation of the TMDL is presented as 2 stages, with the first stage focused on a 100% reduction in straight pipes, defined as sanitary sewer pipes directly discharging to surface waters, sewer leaks and overflows. The final stage, or TMDL scenario, also calls for reductions in the following sources: direct livestock, agriculture and residential (pets and septic system). Reductions are summarized in Table 2. It is noted that no reductions were proposed for wildlife sources. Reductions applicable to Hopewell are those from the following sources: straight pipes (including sanitary sewer leaks and overflows) and human and pet land based sources (septic system failures and pet waste)

Table 2. Percent reduction to existing bacteria loads for the James River TMDL.

Impairment		Livestock Direct	Agriculture Land Based	Human Direct (Straight Pipes)	Human & Pet Land Based (Low Density Residential)
Bailey Creek	Stage I	0	0	100	0
	Final TMDL	95	42	100	48
Bailey Bay, Bailey Creek (tidal), Cattail Creek (tidal)	Stage I	0	0	100	0
	Final TMDL	0	0	100	72
James River (Tidal)	Stage I	0	0	100	0
	Final TMDL	0	0	100	0

2.2 Appomattox River TMDL

According to the TMDL, there are four permitted MS4 in the Appomattox River basin: Chesterfield County, Colonial Heights City, Hopewell City and Petersburg City. In allocating their TMDL, loads were based on each municipality's share of the contributing urbanized area of the impairment. Modeling scenarios conducted with the TMDL demonstrated difficulty in achieving the water quality standard. For example, the model predicted violations of the water quality standards a scenario devised assuming reductions of 100% in all anthropogenic land-based loads, 100% reduction in sewer overflows and uncontrolled residential discharges, 100% reduction in direct livestock deposition, and a 0% reduction in wildlife direct and land-based loading to the stream. Therefore the TMDL recommends a staged approach that seeks to address sources with the largest impact while continuing monitoring to evaluate improvements (i.e. livestock exclusion from streams). Additionally, the TMDL recommends reducing the human bacteria loading from failing septic systems and straight pipes as a focus during the first stage because of its health implications. Stage I implementation for the impaired study segment including a WLA for Hopewell is summarized in Table 3.

Table 3. Stage I percent reduction to existing bacteria loads for the Appomattox River TMDL.

Appomattox River (3)	Direct Livestock	NPS Pasture/Livestock/Cropland	NPS Res./Urban	Straight Pipe/Sewer Overflow
Stage I	0	50	50	100

3.0 Pollutant Load Characterization in the City of Hopewell

The City resides adjacent to the point of confluence of the Appomattox and James Rivers, at the most downstream portion of the TMDL study area for the Appomattox, and at the most upstream point of the tidally-influenced impaired section of the James River. The adjoining study area for the James River – City of Richmond Bacteria TMDL is upstream of Hopewell and the Appomattox confluence. Mapping depicting the bacteria TMDL watersheds within the City provided in Figure A.

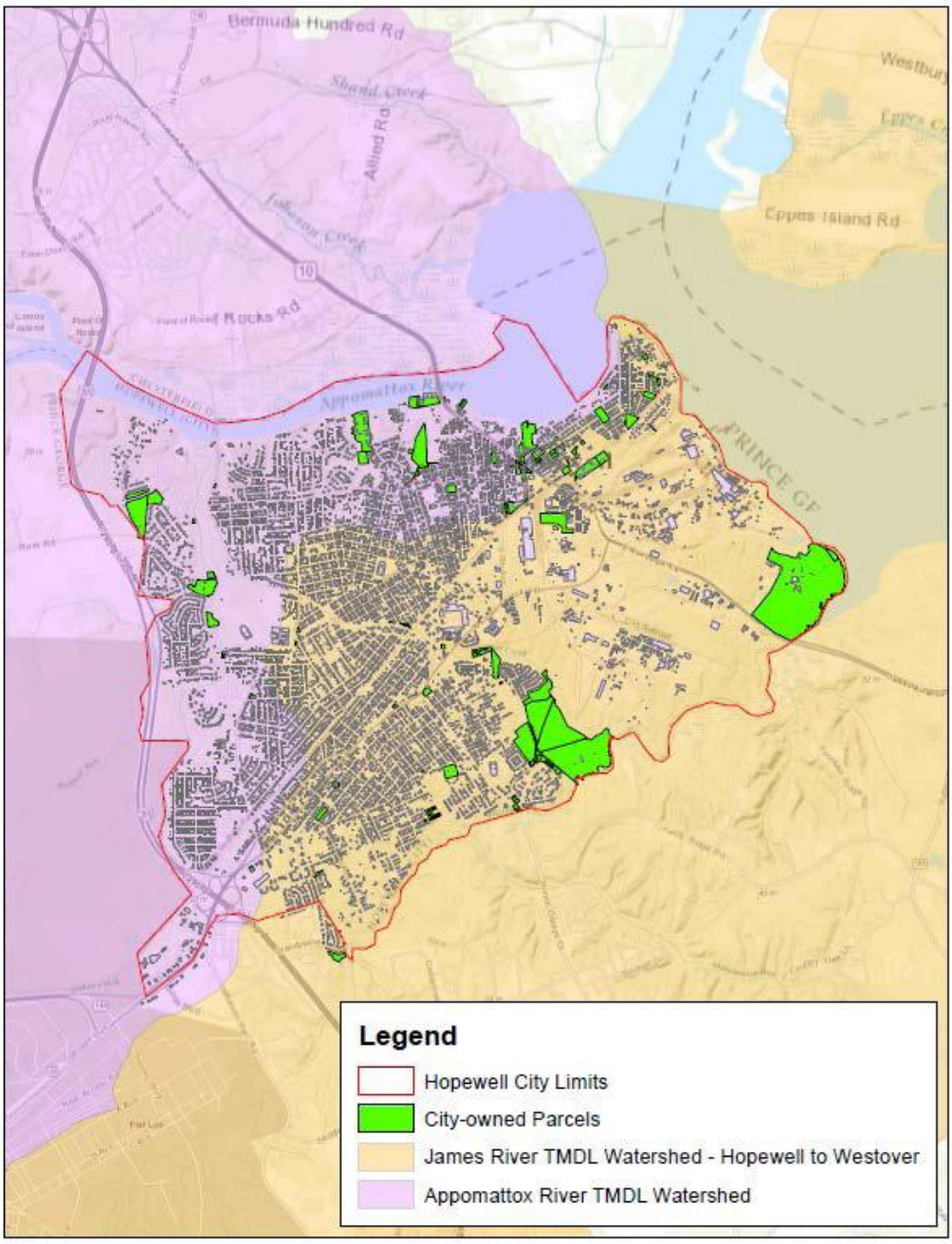


Figure A. James River and Appomattox TMDL watersheds in Hopewell.

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

3.1 Potential Sources of E.coli

In reference to Tables 2 and 3, of the sources considered by the TMDLs, 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 3.1.4. It is noted that agricultural and livestock sources are not considered applicable sources to the City's MS4. Further, the TMDL does not include wildlife source reductions and therefore wildlife is not evaluated herein.

3.1.1 Pet Waste

The TMDLs assumed that an average of 0.534 dogs and 0.598 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 Hopewell is 22,653, and the number of households can be estimated to be 9,967, resulting in an estimate of approximately 5,322 dogs and 5,960 cats. Information from the City suggests a smaller number of pets, though 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 parks, trails, and recreation areas where dogs are permitted.

3.1.2 Public Sewer Systems

The City owns, operates, and maintains a sewer collection system consisting of gravity lines and pump stations, and a treatment facility. The system services industrial, commercial, and residential properties in the City, and flows are directed to the Hopewell Regional Wastewater Treatment Facility (HRWTF). This is a regional facility that also collects waste water from parts of Prince George County, Fort Lee, and the Federal Correctional Complex.

3.1.3 Septic Systems and Straight Pipes

Older septic systems and those not properly maintained can create bypass flows of sanitary waste to the surface 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.

The TMDLs estimated discharges from septic systems per subwatershed based on 1990 and 2000 census data, growth rates, and failure rates. The specific number of systems in the City was not directly calculated. At the present time, the City indicates that nearly 100% of household sanitary sewage is discharged to the public sewer system. City records indicate that 56 properties continue to use a septic system, and no properties are known to discharge sanitary waste directly to streams. Currently the City maintains an internal policy to convert all properties from septic to public sewer when systems are in need of repair or replacement.

3.1.4 City-owned and Operated Properties

The City of Hopewell properties 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 B.

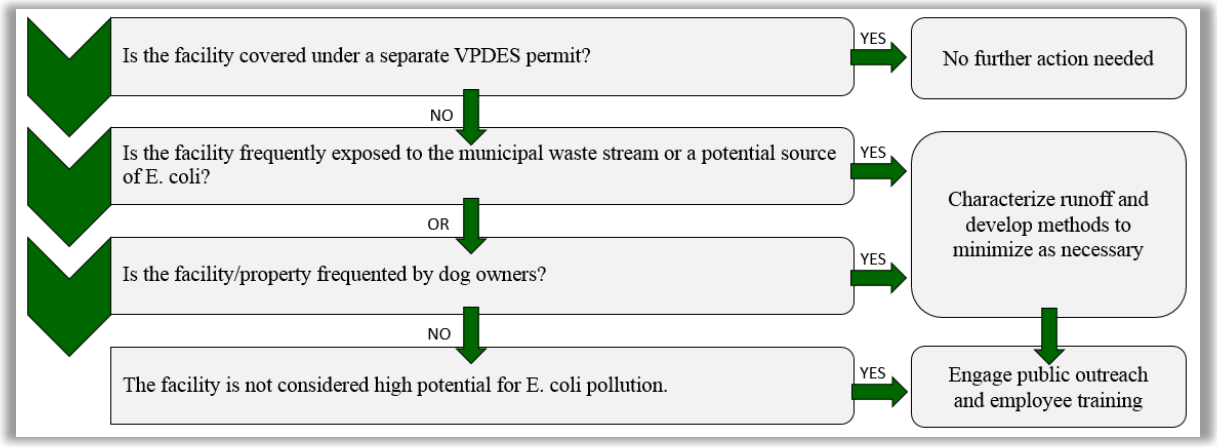


Figure B. City-owned properties assessment process.

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*:

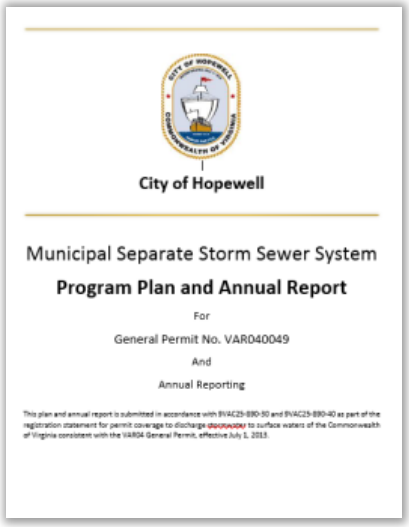
- **City Animal Shelter (507 Station Street) –** The shelter houses the Animal Services Unit and is tasked with holding of domestic animals. Potential exists for animal waste outside the building to enter stormwater. However, animals are maintained indoors and therefore, the property is not considered a *significant* source.
- **Atwater Park and Soccer Complex (Atwater and River Road) –** This Park consists of a large field that is frequented by dog owners. Currently there is signage regarding leash requirements and a pet waste station. The property is considered a potentially *significant* source.
- **Crystal Lake Park (3600 River Road) –** This Park has a walking trail, a lake, and adjacent sports fields, and is also frequented by dog owners. Currently there is signage regarding leash requirements and a pet waste station. The property is considered a potentially *significant* source.
- **Public Works Facility (103 Hopewell Street) –** The potential for bacteria discharges are present at the Facility due to the storage and maintenance of garbage trucks. The trucks are typically maintained indoors; however, trucks have been occasionally parked outdoors and rinsing of the trucks has historically occurred. The property is considered a potentially *significant* source.

4.0 Best Management Practices to Address *E. coli*

Hopewell's MS4 Permit covers stormwater discharges from areas included within census urbanized areas (CUAs). The City's collective efforts, as described in the Hopewell MS4 Program Plan, result in significant reduction of pollutants that may be discharged from its regulated MS4. BMPs already included in the Hopewell 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

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


City of Hopewell

Municipal Separate Storm Sewer System

Program Plan and Annual Report

For

General Permit No. VAR040049

And

Annual Reporting

- ✓ *"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)]

- *Minimum Control Measure 1 (Public Education and Outreach)* – Hopewell'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 Hopewell SWM Webpage. Availability of the Action Plan will increase awareness of the TMDL with web page visitors.

- *Minimum Control Measure 3 (Illicit Discharge Detection and Elimination)* – Hopewell's MS4 Program includes an Illicit Discharge Detection and Elimination (IDDE) Program with 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. Hopewell 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 Hopewell MS4 Program Plan.

- *Minimum Control Measure 4 (Construction)* – The Construction Program includes mechanisms to ensure compliance and enforcement on regulated construction sites that are enforced through Hopewell's SWM and Erosion and Sediment Control 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 Hopewell MS4 Program Plan describe construction site runoff control BMPs.

- *Minimum Control Measure 5 (Post-Construction)* – Hopewell'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 Hopewell MS4 Program Plan describe post-construction stormwater management BMPs.

- *Minimum Control Measure 6 (Good Housekeeping)* – Hopewell'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 Hopewell's Pollution Prevention & Good Housekeeping Manual and annual training for applicable staff. Minimum Control Measure 6 BMPs in the Hopewell 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

E. coli, as it relates to pet waste, is being addressed at City parks through the use of signage and pet waste collections stations, as well as increased enforcement of leash requirements. Currently there is a pet waste station at the Atwood Soccer Complex and at Crystal Lake Park. The stations include a bag dispenser, signage, and a waste container, and Parks and Recreation staff provide regular maintenance.

4.2.2 Sanitary Sewer System Rehabilitation

Historically the sanitary sewer system within the City has experienced a high number of overflows due to infiltration and inflow during heavy rain events. In 2007 the HRWTF initiated an aggressive abatement program and conducted flow monitoring and smoke testing throughout the City. Based on the findings, sub-areas of the system network were targeted for prioritized repair and rehabilitation. HRWTF has since budgeted $2 million each year for improvements in the collection area. In 2013, the system experienced 13 reported overflows, and in 2014 the system experienced four.

The City will continue to rehabilitate and repair the sanitary sewer system with dedicated funds each year to reduce the number of system overflows. HRWTF indicates that all high priority areas that were developed from the evaluation study in 2007 have been addressed and that medium priority areas and older infrastructure repair are currently being completed.

4.2.3 Prevention of Septic System Failures

The City indicates that nearly 100% of household sanitary sewage is discharged to the public sewer system. City records indicate that 56 properties continue to use a septic system. Septic

systems in the City continue to be reduced as new connections to the public sewer are made. Older systems may still be repaired by their owners if they can continue to work as designed. Though there is an internal policy to incentivize a sewer connection, formal processes and procedures have yet to be fully developed. Section K.2.f of Hopewell's zoning ordinance states that, according to the City's health code, any sewage disposal system that does not require a VPDES permit shall be pumped-out at a minimum of once every five years. Hopewell will consider increasing the required frequency of system pump-outs during the permit cycle; however, due to the small number of septic systems remaining in the City, additional policies may not be warranted. This Action Plan will be updated to reflect changes to policies and procedures.

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 MCM 3, 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. In an additional effort to eliminate any straight pipes, Hopewell staff will be conscientious of these sources during daily duties. Straight pipes sources will be incorporated into Hopewell's training and be part of the Public Education and Outreach Program. In addition, Hopewell will consider increased outfall screenings as necessary.

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 will be addressed through a site-specific Stormwater Pollution Prevention Plan (SWPPP) that is required to be developed by the MS4 General Permit by July 1, 2017.

4.3 Enhanced Public Education and Outreach Plan

As previously mentioned, Hopewell lists "information regarding TMDL pollutants of concern," including E.coli, into the relevant message of "*Water Quality Issue #2: Education on Special Water Quality Concerns*" of the Hopewell Public Education and Outreach Plan. As a result, the target

audience, including all City households, will be provided information promoting the elimination and reduction of *E.coli*.

Hopewell'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 (Hopewell'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

Hopewell 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, as summarized in Appendix A. 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)]

Appendix A: Measures of Effectiveness for Action Plan BMPs

Table A.1 Summary of the measure of effectiveness for each BMP described in the Action Plan. Each measure of effectiveness is reported on annually in the City's MS4 annual reporting.

Program Plan BMP #	Description of BMP (E. coli-specific)	Measure of Effectiveness as described in the City's MS4 Program Plan
1.2	WQ Issue #2: Education on special water quality concerns (E. coli)	20% of the target audience is reached each year. Increase, over time, in public knowledge of stormwater, gauged through public survey. (See PEOP for additional details.)
2.1	Online Bacteria TMDL Action Plan posting	Maintain Bacteria TMDL Action Plan on website
3.2	Illicit discharge prohibition	Reported/observed potential bacteria illicit discharges resolved
3.3	Outfall screening	Screened outfalls with potential bacteria discharges investigated and resolved
3.4	Public reporting	Publically reported potential bacteria illicit discharges resolved
4.2	Receive and respond to public complaints about construction sites	Reported potential bacteria illicit discharges from construction activities resolved
4.3	Construction site Stormwater Pollution Prevention Plan (SWPPP)	Ensure SWPPPs provided for applicable construction sites
5.1	Stormwater Management Ordinance	Verify land disturbance projects are compliant with the City's Stormwater Management Ordinance
5.3a	Public stormwater facility inspections	Annual inspection of publicly owned stormwater management facilities. Maintenance performed on facilities, as deemed necessary from inspection.
5.3b	Private stormwater facility inspections	Inspect 20% of privately-owned stormwater management facilities annually and follow-up with owner regarding maintenance, where applicable based on inspection.
6.2	SWPPPs for High Priority Facilities	Reduction of items of concern resulting from annual SWPPP inspections over time.
6.3a	Employee Good Housekeeping/ Pollution Prevention training	Increase, over time, in the "knowledge score" resulting from quizzes given during training events.
6.5	Contractor safeguards	Elimination of bacteria related illicit discharges from contractor activity
SC.1	Maintain pet waste stations	Stations are utilized and maintained regularly throughout the year. Maintenance records will be included with annual reporting.
	Sanitary sewer rehabilitation efforts	System repair and rehabilitation efforts conducted throughout the year. Any reported overflows are resolved.
	Elimination of straight pipes	Elimination of reported sewage related illicit discharges