



Smith Creek TMDL Action Plan

Reporting Period: July 1, 2023 – June 30, 2028

Revised: April 2024

Permit Number: VAR040075

In compliance with the Virginia Stormwater Management Program (VSMP) General Permit

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Smith Creek TMDL Action Plan

In 1996 Smith Creek was added to Virginia's impaired waters list when water quality monitoring showed Smith Creek was violating standards for both bacteria and aquatic life use. High levels of E. coli are responsible for the bacterial water quality standard violation, and high levels of sediment are responsible for creating an environment that does not support aquatic life.

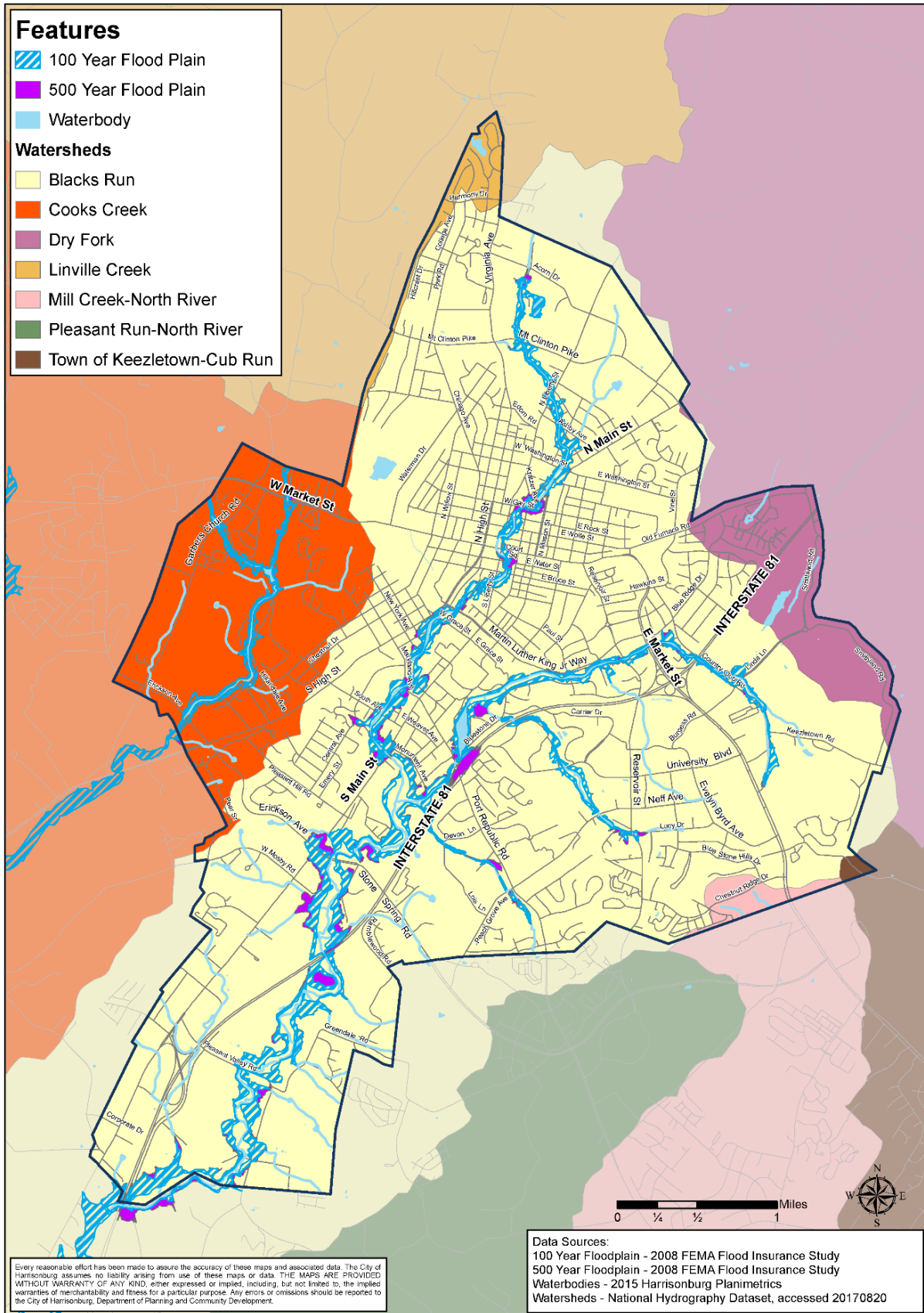
The City of Harrisonburg is a part of the Smith Creek Watershed and contributes 25,381.5 lbs of sediment (TSS) to the watershed every year, as well as 2.88×10^{12} cfu of E. coli to the watershed per year.

The Smith Creek Total Maximum Daily Load (TMDL) was created in 2004 and specified the maximum bacteria and sediment loads the stream can handle, including the specific Waste Load Allocation for the City of Harrisonburg MS4 area. A TMDL Implementation Plan was created in 2009 which describes the ways to reduce bacteria and sediment in the Smith Creek Watershed.

The City intends to implement this Action Plan through multiple MS4 General Permit cycles using an adaptive iterative approach, making progress to reduce pollutant discharge in a manner consistent with the assumptions and requirements of the applicable TMDL WLAs. While this Action Plan presents current and future practices intended to mitigate sediment and bacteria impairments described in this report, the City reserves the right to make modifications to the Action Plan as new opportunities become available or proposed projects / strategies are deemed infeasible or ineffective.

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Figure 1: Subwatersheds in Harrisonburg



Smith Creek TMDL Action Plan Requirements

Basic Information

Description (Part 2 B 3 a-b):

The local TMDL action plan will include:

- The TMDL project name
- The EPA approval date of the TMDL

Response:

The Smith Creek TMDL was approved in 2004.

Wasteload Allocation and Percent Reductions Required

Description (Part 2 B 3 c):

The wasteload allocated to the City (MS4 VAR 040075) and the corresponding percent reduction.

Response:

- Sediment wasteload allocation: Existing load = 25,381.5 TSS (lbs/year). Maximum WLA= 19,797.6 TSS (lbs/year) – 22% Reduction
 - A 22% reduction equates to 5,583.93 TSS (lbs/yr)
- Bacteria wasteload allocation: Existing load = 2.88E+12 (E. coli cfu/year). Maximum WLA =1.44 E +11 (E. coli cfu/year) – 95% Reduction
 - A 95% reduction equates to 2.74E+12 (E. coli cfu/year).

Significant Sources of Pollutants

Description (Part 2 B 3 e):

Identification of the significant sources of the pollutants of concern that are discharging to the city's MS4 and are not covered under a separate VPDES permit. A significant source of pollutants means a discharge where the expected pollutant loading is greater than the average pollutant loading for the land use identified in the TMDL.

Response:

The Smithland Road Dog Park would potentially contribute additional pollutant loading of bacteria into the Smith Creek Watershed. Best management practices in place at the Smithland Road Dog Park will likely prevent this additional pollutant loading and will hopefully decrease the overall pollutant loading since dog owners will have a designated location to take their pets and resources are available to appropriately dispose of pet waste.

Best Management Practices to Reduce Bacteria

Description (Part 2 B 3 e-f and Part 2 B 4):

An outreach strategy and the BMPs designed to reduce the pollutants of concerns, as well as any calculations. Select and implement at least three of the strategies listed in the permit.

Response:

Outreach Strategy

See Appendix D

BMP Strategy 1: Domestic Pets (Cats and Dogs)

- Provide signage to pick up dog waste, provide pet waste bags and disposal containers.
 - There are 20 pet waste stations with signage throughout city parks. Approximately 72,000 bags are used at the stations every year.
- Maintain dog parks by removing disposed of pet waste bags.
 - Smithland Road Dog Park was constructed in early 2015 and includes four pet waste stations. Park rules include that pet waste must be picked up and properly disposed of. City of Harrisonburg Parks and Recreation staff will continue maintaining these pet waste stations on a regular basis and additional stations will be installed on an as needed basis.

BMP Strategy 2: Urban Wildlife

- Clean out storm drains to remove wildlife waste.
 - The City provides maintenance and repair to the storm drain system that is located on the public street right-of-way or in easements specifically assigned to the City and designated for drainage. One flusher truck cleans outfalls from approximately April – October, as weather allows.
- Implement rooftop disconnection programs or site designs that minimize connections to reduce bacteria from rooftops.
 - The Stormwater Utility Fee Credit Program provides incentives for homeowners who disconnect roof drains from the storm sewer system. The program provides best practice and site design specifications for this practice.

BMP Strategy 3: Illicit Connections or Illicit Discharges to the MS4

- Implement a program to identify potentially failing septic systems. Implement a septic tank inspection and maintenance program.
 - Sec. 7-3-1 to 7-3-80 of the sewer ordinance requires septic systems to be inspected and pumped out every five years. The sewer ordinance was updated to include this requirement in August 2018.

Best Management Practices to Reduce Sediment

Description (Part 2 B 3 e-f and Part 2 B 5):

The BMPs designed to reduce the pollutants of concerns, as well as any calculations. Reduce the loads associated with sediment through implementation of one or more of the following:

- One or more of the BMPs from the Virginia Stormwater BMP Clearinghouse.
- One or more BMPs approved by the Chesapeake Bay Program.
- Land disturbance thresholds lower than Virginia’s regulatory requirements for erosion and sediment control and post development stormwater management.

No later than 36 months after the effective date of the permit, the City will submit the anticipated end dates by which the City will meet the WLA for sediment.

Response

Based on the following BMPs implemented in the Smith Creek Watershed, the City of Harrisonburg has not yet met the required TSS reductions. The City was previously in compliance with the TSS Waste Load Allocation; however, the 2020 change to the credit methodology of street sweeping significantly reduced the amount of TSS reductions.

- **Street Sweeping:** The Public Works Department is responsible for clearing debris from public roadways. This includes litter, gravel, and accident debris. By removing this debris, the City is also actively reducing the sediment, bacteria, and pollutants that flow through the storm drain system and eventually into local streams. Using Market Street and Main Street as a divider, the Public Works Department routinely sweeps city streets in a counterclockwise rotation.
 - The street sweeping program annually removes an estimated 391.76 lbs of TSS from the Smith Creek Watershed per year. Calculations for reductions associated with street sweeping are attached in Appendix A.
- **Storm Drain Cleaning:** The Public Works Department is responsible for cleaning publicly owned drop inlets once every two to three years as a part of storm drain maintenance. A flusher truck is used to remove sediment and debris from the storm drain system.
 - The storm drain cleaning program annually removes an estimated 94.81 lbs TSS from the Smith Creek Watershed per year. Calculations for reductions associated with storm drain cleaning, as well as the storm drain cleaning standard operating procedures, are attached in Appendix B.
- **New Tree Planting:** The Public Works Department is responsible for greenspace management in City Right of Ways (ROW). In addition, the Parks and Recreation Department is responsible for management of park facilities in the city. New trees are planted annual in both park facilities and in City ROW.
 - The New Tree Planting program annually removes an estimated 21.00 lbs TSS from the Smith Creek Watershed every year. Calculations for reductions associated with new tree planting are attached in Appendix C. (Smith Creek watershed is 4.43% of the City's total area).
- **HCAP Program BMPs- only BMPs implemented in Smith Creek:** voluntary installation of certain stormwater Best Management Practices (BMPs) within City limits on private property with a 10 year maintenance agreement. BMPs based on the Virginia Stormwater Best Management Practice Clearinghouse specifications and pollutant reduction values.
 - These BMPs are intended to capture and/or infiltrate surface runoff produced immediately following a 1-inch rainfall event, on average. An estimated annual amount of 0.00 lbs TSS is collected during this process.

Outreach Strategy

Description (Part 2 B 3 g):

An outreach strategy to enhance the public's education (including employees) on methods to eliminate and reduce discharges of sediment and bacteria.

Response:

The outreach strategy (Appendix D) to enhance the public’s education on methods to eliminate and reduce discharges of sediment and bacteria builds on current stormwater outreach. Monthly outreach on various city media sources is currently conducted. Resources include: press releases, social media posts, Stormwater and Environmental newsletter articles, local news media outlets. Monthly outreach may rotate which type of media outlet is used to target the broadest audience possible. These resources reach both city residents and city employees.

Implementation Schedule

Description (Part 2 B 3 h):

A schedule of anticipated actions planned for implementation during this permit term.

Response:

As permitted in Part II.B.2 of the MS4 General Permit, the City is proposing to implement this Action Plan in multiple Phases over more than one permit cycle using an adaptive iterative approach to ensure that adequate progress continues to be made towards reducing the discharge of sediment and bacteria to Smith Creek.

Street sweeping – implemented annually

Storm drain cleaning – implemented annually

Bacteria Reduction BMPs – implemented annually

Public Education and Outreach strategies – implemented annually

The City intends to demonstrate its progress on implementation of this Action Plan by tracking and reporting on BMP implementation in its MS4 Annual Report that is submitted to DEQ on or before October 1st of each permit year. In accordance with the adaptive iterative approach adopted by the City and referenced in this Action Plan, the City may modify/replace BMPs, as necessary, to achieve the most effective plan for reducing the discharge of sediment and bacteria from the city’s MS4 and meeting the assigned TMDL WLAs.

Table 6: Summary of Planned BMPs					
Type of BMP	Project Name	Anticipated Date Implemented	Location	Reductions (lbs/yr)	
				Sediment	Bacteria
BMPs Identified in 2023 SWIP Update (<i>in progress</i>)				5,583.93	2.74E+12
Total				5,583.93	2.74E+12

Public Comments on Action Plan

Description (Part 2 B 7):

Prior to submittal of the action plan required in Part II B 1, the permittee shall provide an opportunity for public comment proposed to meet the local TMDL action plan requirements for no less than 15 days.

Response

This revision of the Smith Creek TMDL Action Plan was opened for public comments on September 13, 2022, through September 27, 2022. The following is a summary of comments received and responses.

Comment #1: I think one thing you could add to Strategy 3 for both nutrients and sediments in the Public Education and Outreach Plan would be to meet with HOA's to recommend BMPs that could be implemented throughout them. I think it would be an easy way to inform a large number of homeowners about ways they can help out.

Response #1: The Education and Outreach Plan includes Strategy 3: Speaking Engagements. While Strategy 3 does not enumerate potential audiences, it would include HOA's. City staff have met with HOA's in the past for other stormwater educational events. The decision to develop Strategy 3 without listing audiences was done to allow for the greatest flexibility and reach as opportunities present. No changes to the Action Plan were made.

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Appendix A: Calculations of Annual Street Sweeping Pollutant Load Removal

Street Sweeping Estimated Based Upon Current Operations – Smith Creek Watershed

SCP-4				
Routes: Areas 1-4 & Areas A-D				
Table 2. Calculate Street Sweeping Loading Rate for the Potomac River Basin- SCP-4				
Subsource	Pollutant	Curb Lane Miles Swept (1 curb lane mile swept = 1 acre)	2009 EOS Loading Rate (lbs/acre/yr) Potomac River Basin	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	5.57	16.86	93.98
Regulated Urban Impervious	Phosphorus	5.57	1.62	9.03
Regulated Urban Impervious	Total Suspended Solids	5.57	1,171.32	6,529.40
Table 3. Street Sweeping Load Reductions- SCP-4				
Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	Removal Rate Percentage (lbs/acre/yr)	Total Reduction Credit (lbs/yr)
Regulated Urban Impervious	Nitrogen	93.98	0.01	0.94
Regulated Urban Impervious	Phosphorus	9.03	0.03	0.27
Regulated Urban Impervious	Total Suspended Solids	6,529.40	0.06	391.76

Street Sweeping Credits Based Upon Draft Guidelines for Street Sweeping							
Lane Miles/Acres	Street Cleaning Practice	Removal Rate (%)			Mass Removed (lbs)		
		TSS	TN	TP	TSS	TN	TP
0.00	SCP-1	21	4	10	0.00	0.00	0.00
0.00	SCP-2	16	3	8	0.00	0.00	0.00
0.00	SCP-3	11	2	5	0.00	0.00	0.00
5.57	SCP-4	6	1	3	391.76	0.27	0.27
0.00	SCP-5	4	0.7	2	0.00	0.00	0.00
5.574393	Total:				391.76	0.27	0.27

Appendix B: Calculation of Annual Storm Drain Cleaning Pollutant Removal and Storm Drain Cleaning Standard Operating Procedure

Credit methodology from 2016 Recommendations of the Expert Panel's Final Report to Define Removal Rates for Street and Storm Drain Cleaning Practices. Sediment removal estimates from Credit methodology in 2011 Technical Memo on Street Sweeping and Expert Panel Recommendations

Smith Creek Drop Inlets

3,322 Total City Maintained Inlets

77 City Maintained Inlets in Smith Creek

$77/3,322 = 2.32\%$ Percentage of City Maintained Drop Inlets in Smith Creek

Pollutant Removal Calculations

Annual Billing Statement:

9.73 tons collected 7/01/2021 – 6/30/2022

Total Suspended Solids

Wet mass: 9.73 tons x 2,000 = 19,460 lbs

Dry weight conversion: 9,460 lbs x 0.7 conversion factor = 13,622

$13,622 * 0.3$ (250 Micron Correction) = 4,086.60 lbs TSS/yr

$4,086.60$ lbs TSS/yr * 2.32% Smith Creek Percentage = 94.81 lbs TSS/yr

Flusher Truck Operation and Inspection Procedure

Daily Procedure

Start of Day

1. Fill out pre-trip inspection forms to assess the flusher truck for any maintenance needs.
2. If no maintenance needs are noted, drive to designated section of the City (See Main Route & Residential Map for the City of Harrisonburg) to begin work.
3. Remove the drop inlet (D.I.) manhole lid, observe the D.I.
 - a. During winter season, the flusher crew inspects D.I.'s using the D.I. Inspection Form.
 - b. During the summer months, the flusher crew may inspect *and* clean out D.I.'s

Daily Inspections

4. Mark whether the D.I. was cleaned out at the time of inspection.
5. Note the amount of debris that was/is present in the D.I. and mark LOW, MODERATE, or CRITICAL in the *Debris* section of the D.I. Inspection Form.
 - a. LOW: Minimum to no debris, the D.I. does not need to be cleaned each year, there is no observed risk of clogging.
 - b. MODERATE: Average amount of debris, the D.I. should be cleaned each year, but there is minimal risk of clogging.
 - c. CRITICAL: Large amount of debris, the D.I. should be monitored and cleaned out regularly, the amount of debris poses a risk of clogging.

6. Note if vegetation is growing out the facility. Mark YES or NO in the *Vegetation* section of the D.I. Inspection.
 - a. If the vegetation was not removed at the time of inspection and needs to be sprayed, mark YES on the D.I. Inspection Form in the *Vegetation Needs Future Spraying* section.
7. Look at the structural components of the D.I. and note if there is any damage by marking LOW, MODERATE, or CRITICAL in the *Structural Damage* section of the D.I. Inspection Form.
 - a. LOW: No damage, structure is aging normally.
 - b. MODERATE: Minor damage, does not compromise the structure performance.
 - c. CRITICAL: Significant damage, D.I. needs to be replaced within the year.
8. If there are surrounding issues in the nearby pavement, curbing, etc., note YES that there are *Other Issues that Require Supervisor to Review* on the D.I. Inspection Form.
9. Continue to the next D.I. until the truck is full.

Emptying the Truck

1. Dewater solid material from the liquids using the dewatering plate.
2. Empty the liquids into the designated sanitary sewer manhole. The three Public Utilities approved location are at manholes near the following:
 - a. East Market Street Location
 - b. West Market Street Location
 - c. Public Utilities Facility
3. Continue collecting material, dewatering, and discharging liquids into the sanitary sewer system until the flusher truck is full of only dewatered solid material.
4. Take dewatered solid material to the landfill. Be sure to collect the landfill ticket at the weight station.

End of Day

5. Return to the Public Works facility.
6. Wash the tank of the truck using the internal spray bar system and the hand wash pressure washer (affixed to the truck).
7. Park flusher truck in the Public Works garage.

Cityworks Process

- If *Structural Damage* is marked as MODERATE or CRITICAL, Sly will be alerted through Cityworks.
- If *Other Issues Require Supervisor Review* Sly will be alerted through Cityworks.

Appendix C: Calculations of New Tree Planting Pollutant Load Removal
 Calculation from Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition Guidance
 dated February 6, 2021 for Urban Tree Canopy Expansion

Average Land Use Loading Rates for VA Potomac River Basin			
	TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Turf	6.61	1.51	646.73
Roads	11.70	0.95	1784.89
Other Impervious	9.48	0.78	1791.66

Step 1: convert the number of street trees to acres of tree canopy

of tree planted * 1/300 acre = acres planted

Trees over Imperious= 261 trees * 1/300 acre = 0.87 acres

Trees over Turf= 2860 * 1/300 acre = 9.53 acres

Step 2: Calculate the pollution loads prior to the tree plantings

Trees over Imperious

TN: 0.87 acres * 9.48lb/ac/yr = 8.25 lbs/yr TN

TP: 0.87 acres * 0.78lb/ac/yr = 0.68 lbs/yr TP

TSS: 0.87 acres * 1791.66lb/ac/yr = 1558.74 lbs/yr TSS

Trees over Turf

TN: 9.53 acres * 6.61lb/ac/yr = 62.99 lbs/yr TN

TP: 9.53 acres * 1.51lb/ac/yr = 14.39 lbs/yr TP

TSS: 9.53 acres * 646.73lb/ac/yr = 6163.34 lbs/yr TSS

Step 3: Calculate the pollution load reductions for each tree planting project

Table 2. Tree canopy relative land use loading rates based on the underlying land use land cover (Source Hynicka and Divers 2016)			
Land Use	TN Reduction (%)	TP Reduction (%)	TSS Reduction (%)
Canopy Over Turf	23.8	23.8	5.8
Canopy Over Roads	8.5	11.0	7.0
Forest	85.0	90.7	81.6*

*Percent reduction is based on average MS4 land use loading rate for sediment.

Trees over Imperious

TN: $8.25 \text{ lbs/yr TN} * 0.085 = 0.70 \text{ lbs/yr TN}$

TP: $0.68 \text{ lbs/yr TP} * 0.11 = 0.0748 \text{ lbs/yr TP}$

TSS: $1558.74 \text{ lbs/yr TSS} * 0.07 = 109.11 \text{ lbs/yr TSS}$

Trees over Turf

TN: $62.99 \text{ lbs/yr TN} * 0.238 = 14.99 \text{ lbs/yr TN}$

TP: $14.39 \text{ lbs/yr TP} * 0.238 = 3.42 \text{ lbs/yr TP}$

TSS: $6163.34 \text{ lbs/yr TSS} * 0.058 = 357.47 \text{ lbs/yr TSS}$

Total

TN: $0.70 \text{ lbs/yr} + 14.99 \text{ lbs/yr} = 15.69 \text{ lbs/yr}$

TP: $0.0748 \text{ lbs/yr} + 3.42 \text{ lbs/yr} = 3.49 \text{ lbs/yr}$

TSS: $109.11 \text{ lbs/yr} + 357.47 \text{ lbs/yr} = 466.58 \text{ lbs/yr}$

Step 4: apply Smith Creek conversion factor

Smith Creek watershed is 4.43% of the City's total area

TSS: $466.58 \text{ lbs/yr} * 0.0443 = 20.67 \text{ lbs/yr}$

Appendix D: Public Education and Outreach Plan

Using the adaptive iterative approach, the plan may be modified at any time during the permit cycle to address changes in local stormwater issues or concerns.

Pollutant of Concern 1: Nutrients

Strategy 1: Traditional Written Materials

- Stormwater and Environmental Newsletters: This email newsletter has a subscription list of around 600 contacts. Newsletters are typically sent out monthly on various stormwater topics.
- Harrisonburg Stormwater Facebook Page: The Harrisonburg Stormwater Facebook page promotes high-quality receiving waters, education about the Chesapeake Bay and local TMDLs, and information about local events and projects. Facebook posts generally take place multiple times per month on various topics, including leaf collection, preventing trash juice, reducing fertilizer use, and keeping lawn clippings out of storm drains.

Strategy 2: Media Materials

- Local News Media: Includes TV, radio, print, and digital news organizations. Messaging will occur when there is an important stormwater project or program taking place within Harrisonburg.

Strategy 3: Speaking Engagements

- All speaking engagements attended by stormwater staff are focused on explaining water quality, including TMDLs, as well as Harrisonburg's role in meeting TMDLs. These speaking engagements do not include Blacks Run Clean Up Day, 6th and 7th grade Plant a Seed Field Trips, and the annual rain barrel workshop as these events are counted as Public Involvement Activities.

Strategy 4: Workshops/City Programs

- As part of advertising city programs aimed at installing or promoting stormwater BMP installation, city staff communicate the reasons why nutrients are an issue in local water quality as well as ways for landowners to reduce impacts from their property.

Strategy 5: Staff Training

- As part of the Good Housekeeping / Illicit Discharge training, city staff are trained bi-annually on stormwater issues. In addition to the requirements identified in Part I E 6 m, 15his training also includes information about Harrisonburg's watersheds and water quality impairments, and TMDLs. The training is given to staff through an online training platform called VectorSolutions (formerly TargetSolutions).

Pollutant of Concern 2: Sediment

Strategy 1: Traditional Written Materials

- Stormwater and Environmental Newsletters: This email newsletter has a subscription list of around 600 contacts. Newsletters are typically sent out monthly on various stormwater topics.
- Harrisonburg Stormwater Facebook Page: The Harrisonburg Stormwater Facebook page promotes high-quality receiving waters, education about the Chesapeake Bay and local TMDLs, and information about local events and projects. Facebook posts generally take place multiple

times per month on various topics, including keeping a healthy stand of vegetation, minimizing soil disturbance, the importance of stream bank restoration and buffers, and enrolling in one of our programs to address erosion issues.

Strategy 2: Media Materials

- Local News Media: Includes TV, radio, print, and digital news organizations. Messaging will occur when there is an important stormwater project or program taking place within Harrisonburg.

Strategy 3: Speaking Engagements

- All speaking engagements attended by stormwater staff are focused on explaining water quality, including TMDLs, as well as Harrisonburg's role in meeting TMDLs. These speaking engagements do not include Blacks Run Clean Up Day, 6th and 7th grade Plant a Seed Field Trips, and the annual rain barrel workshop as these events are counted as Public Involvement Activities.

Strategy 4: Workshops/City Programs

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Strategy 5: Staff Training

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Pollutant of Concern 3: Bacteria

Strategy 1: Traditional Written Materials

- Stormwater and Environmental Newsletters: This email newsletter has a subscription list of around 600 contacts. Newsletters are typically sent out monthly on various stormwater topics.
- Harrisonburg Stormwater Facebook Page: The Harrisonburg Stormwater Facebook page promotes high-quality receiving waters, education about the Chesapeake Bay and local TMDLs, and information about local events and projects. Facebook posts generally take place multiple times per month on various topics, including issues like pet waste and feeding waterfowl.

Strategy 2: Media Materials

- Local News Media: Includes TV, radio, print, and digital news organizations. Messaging will occur when there is an important stormwater project or program taking place within Harrisonburg.

Strategy 3: Speaking Engagements

- All speaking engagements attended by stormwater staff are focused on explaining water quality, including TMDLs, as well as Harrisonburg's role in meeting TMDLs. These speaking engagements

do not include Blacks Run Clean Up Day, 6th and 7th grade Plant a Seed Field Trips, and the annual rain barrel workshop as these events are counted as Public Involvement Activities.

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