HARRISONBURG | VA
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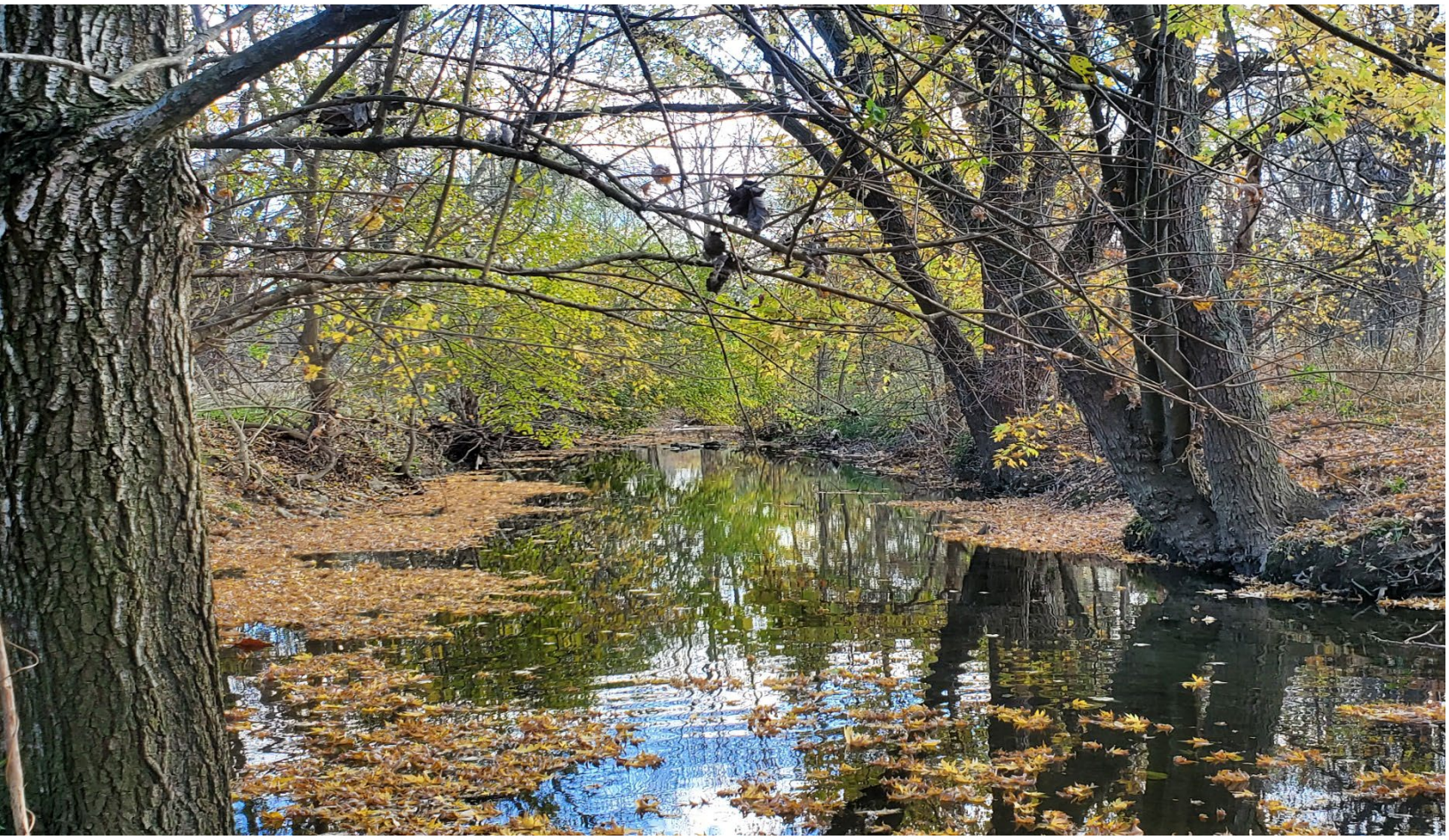

Blacks Run & Cooks Creek TMDL Action Plan

Reporting Period: November 1, 2023 – October 31, 2028
Permit Number: VAR040075

In compliance with the General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4)

Revised March 2026

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Background on Blacks Run & Cooks Creek TMDL Action Plan

Blacks Run was listed as impaired on Virginia's 1998 303(d) Total Maximum Daily Load Priority List and Report (VADEQ, 1998) due to violations of the State's water quality standard for fecal coliform and violations of the general standard (benthics). The TMDL addressing benthic impairments has been developed for EPA and the Commonwealth by TetraTech, Inc. Out of 52 samples collected during the 1998 assessment period, 37 violated the water quality standard for fecal coliform bacteria. During the subsequent 2000 assessment period, 44 of 60 samples violated the water quality standard. Blacks Run and Cooks Creek are both listed as impaired on Virginia's 2016 and draft 2018 Section 305(b)/303(d) Water Quality Assessment Integrated Reports due to water quality violations of the general aquatic life (benthic) standard (VADEQ 2016; VADEQ 2018a).

Bacterial impairments in Blacks Run and Cooks Creek were addressed by TMDLs developed by Tetra Tech and VADEQ, respectively, in 2002 (Tetra Tech, 2002b; VADEQ, 2002). Also in 2002, Tetra Tech developed TMDLs to address the benthic impairments in both Blacks Run and Cooks Creek (Tetra Tech, 2002a). This 2002 TMDL study included a stressor analysis to determine the pollutant(s) causing the benthic impairment. It was determined that in Blacks Run the primary stressor was sediment, and in Cooks Creek both sediment and phosphorus were identified as primary stressors.

Blacks Run and Cooks Creek are located in Rockingham County, VA. The Blacks Run watershed is approximately 12,430 acres and includes the majority of the City of Harrisonburg. Blacks Run is 11.64 miles in length and flows into Cooks Creek south of Harrisonburg. The Cooks Creek watershed is approximately 28,216 acres including Blacks Run. Cooks Creek is located west of Harrisonburg and flows 14.37 miles before draining into the North River. Blacks Run and Cooks Creek are part of the South Fork Shenandoah River basin, which ultimately drains to the Chesapeake Bay.

The City of Harrisonburg is a part of the Blacks Run Watershed and contributes 2,450,000 lbs of sediment (TSS) to the watershed every year. The City of Harrisonburg is also a part of the Cooks Creek Watershed and contributes 298,000 lbs of sediment (TSS) to the watershed every year. Additionally, the City of Harrisonburg contributes 4,350 lbs of phosphorus (TP) to both watersheds per year.

The Blacks Run & Cooks Creek Total Maximum Daily Load (TMDL) was created in 2019 and specified the maximum sediment and phosphorus loads the stream can handle, including the specific Waste Load Allocation (WLA) for the City of Harrisonburg MS4 area. A TMDL Implementation Plan was created in 2006 which describes the ways to reduce fecal bacteria, sediment and phosphorus levels to achieve the water quality goals for the impaired streams.

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 phosphorus 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.

Figure 1: Subwatersheds in Harrisonburg

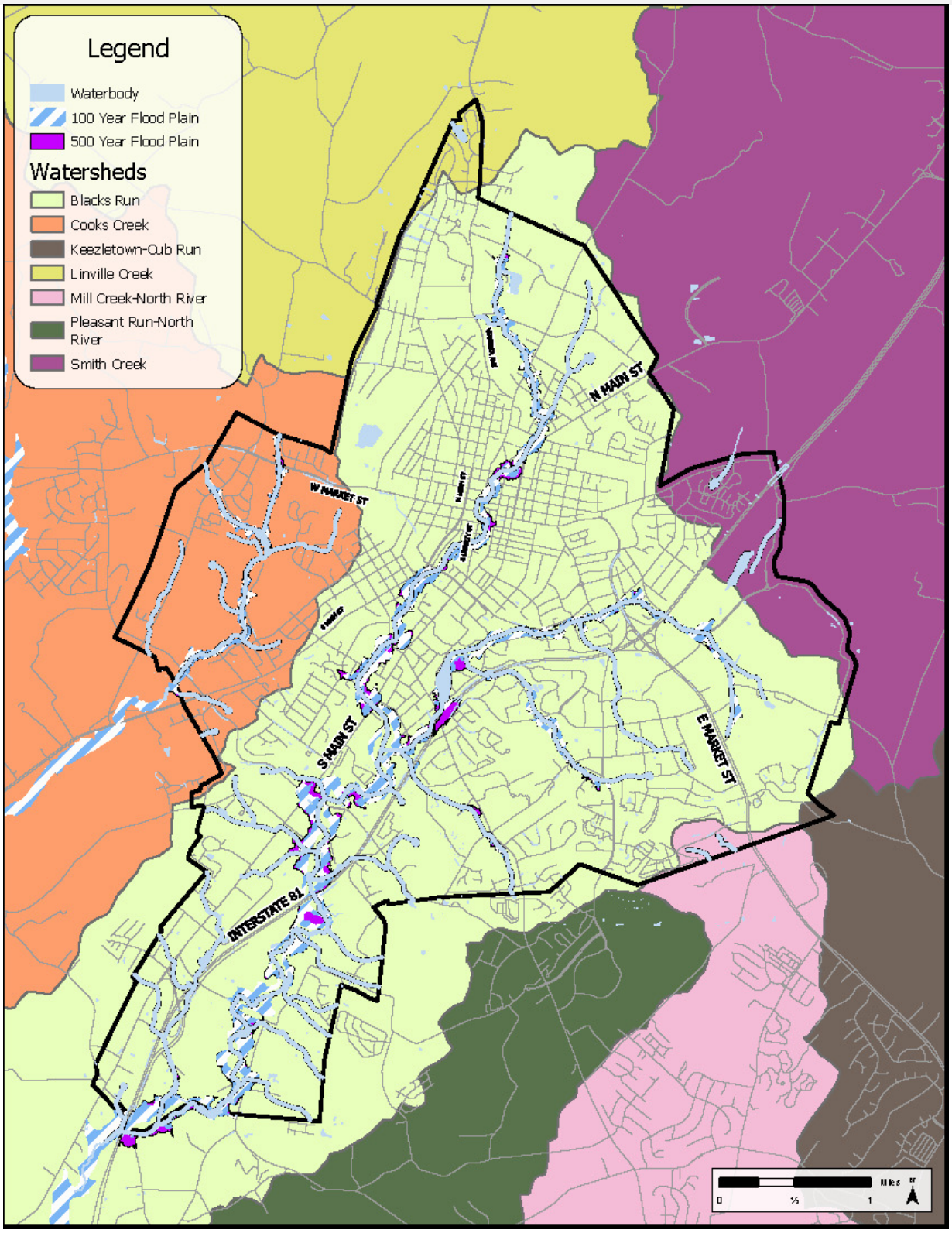
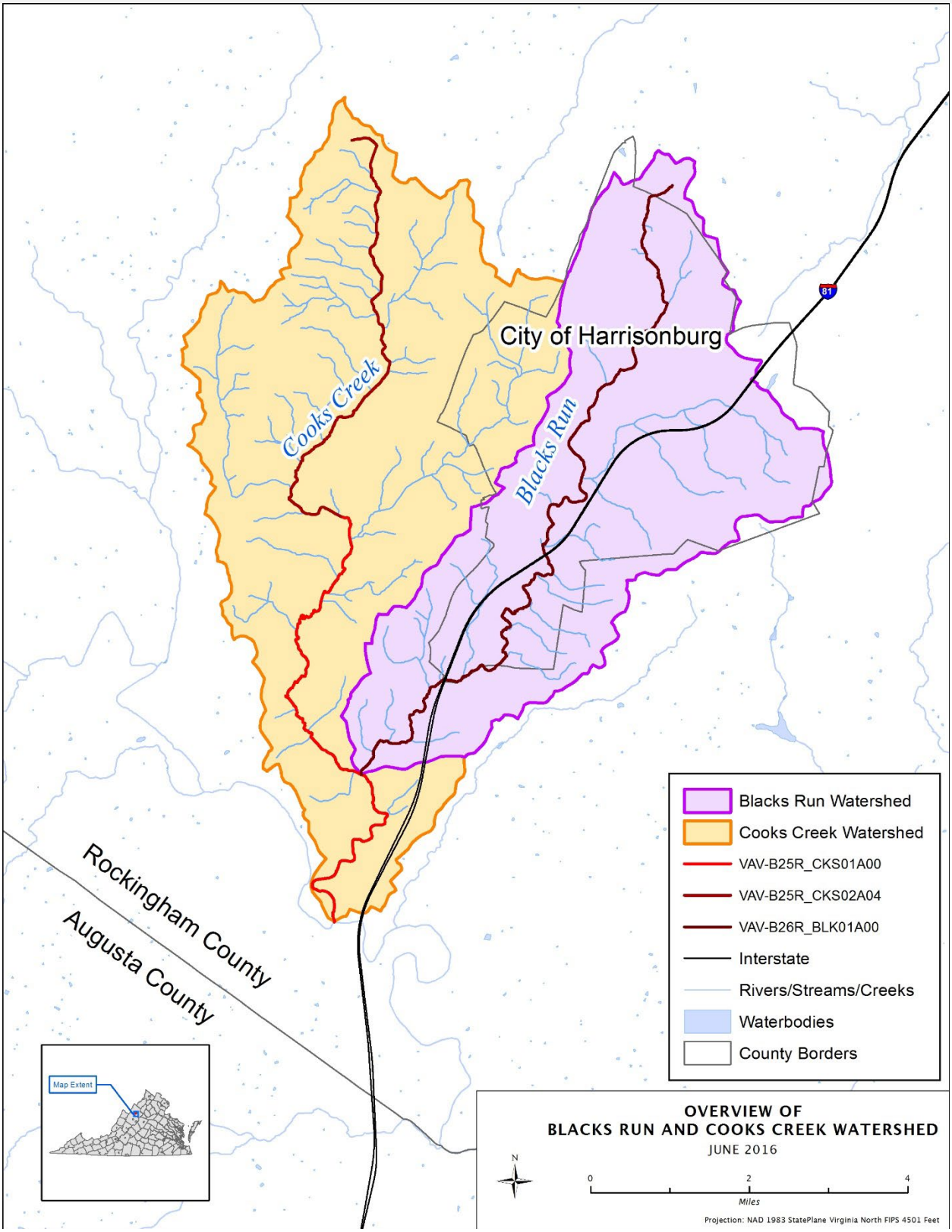


Figure2:Location of the Blacks Run and Cooks Creek watersheds and associated impairments



Blacks Run & Cooks Creek TMDL Action Plan Requirements

Basic Information

Description (Part II B 4 a-b):

The local TMDL action plan will include:

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

Response:

Project Name: Revision of the Benthic Total Maximum Daily Load (TMDL) Developed for the Blacks Run and Cooks Creek Watershed Located in the City of Harrisonburg and Rockingham County

EPA Approval: July 10, 2019

Impaired segments addressed in this TMDL study.

TMDL Watershed	305(b) Segment ID	Cause Group Code 303(d) Impairment ID	Year first Listed
Blacks Run	VAV-B26R_BLK01A00 (11.6 mi)	B26R-01-BEN	1996
Cooks Creek	VAV-B25R_CKS01A00 (7.74 mi) VAV-B25R_CKS02A04 (6.63 mi)	B25R-01-BEN	1996

Wasteload Allocation and Percent Reductions Required

Description (Part II B 4 c):

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

Response:

Blacks Run			
Pollutant	Wasteload Allocation (lbs/yr)	Reduction Amount Required (lbs/yr)	Reduction %
Sediment	726,000	1,724,000	70.4
Cooks Creek			
Pollutant	Wasteload Allocation (lbs/yr)	Reduction Amount Required (lbs/yr)	Reduction %

Sediment	82,900	215,100	72.2
Cooks Creek and Blacks Run			
Pollutant	Wasteload Allocation (lbs/yr)	Reduction Amount Required (lbs/yr)	Reduction %
Phosphorus	1,170	3,180	73.2

Significant Sources of Pollutants

Description (Part II B 4 d):

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:

Virginia's 1998 303(d) list identifies urban runoff as the primary source of pollutants in the Blacks Run watershed. Cooks Creek was listed as impacted by agricultural nonpoint sources with the lower three miles also affected by urban runoff contributed by Blacks Run. Both watersheds were assessed by the 2002 TMDL as having a high potential for nonpoint source pollution based on land use, soils, and other watershed characteristics.

Erosion of the land results in the transport of sediment to receiving waters through various processes. Factors that influence erosion include characteristics of the soil, vegetative cover, topography, and climate. Nonpoint sources, such as agricultural land uses and construction areas, are large contributors of sediment because the percentage of vegetative cover is typically lower. Urban areas can also contribute quantities of sediment to surface waters through the build-up and eventual washoff of soil particles, dust, debris, and other accumulated materials. Pervious urban areas, such as lawns and other green spaces contribute sediment in the same fashion as low-intensity pasture areas or other similar land uses. In addition, streambank erosion and scouring processes can result in the transport of additional sediment loads. Timber operations represent another potential source of sedimentation. Although the sediment yield from undisturbed forests is generally low, clear-cut areas can contribute significant sediment loads.

The City of Harrisonburg and other urban areas contribute to the high percentage of urban land in the Blacks Run and Cooks Creek watersheds. Urban land uses represented in the 2002 TMDL land use coverage data include commercial, industrial, transportation, and residential areas.

Urban land uses consist of pervious and impervious areas. Stormwater runoff from impervious areas, such as paved roads and parking lots, contributes pollutants that accumulate on these surfaces directly to receiving waters without being filtered by soil or vegetation. Sediment and phosphorus deposits in impervious areas originate from vehicle exhaust, industrial and commercial activities, fertilizer spills, outdoor storage piles, wildlife and domestic pet waste, and other sources. Sanitary sewer overflows (SSOs) and leaking sewer lines may also be a source of nutrients in some urban areas. According to

Novotny and Olem (1994), phosphorus concentrations in urban runoff range from 0.2 to 1.7 mg/L. In addition, stormwater runoff can cause streambank erosion and bottom scouring through high flow volumes, resulting in increased sedimentation and other habitat impacts.

The primary sources of sediment and phosphorus are construction sites and other pervious lands. Construction sites have high erosion rates due to the removal of vegetation and top soil. Typical erosion rates for construction sites are 35 to 45 tons per acre per year as compared to 1 to 10 tons per acre per year for cropland. Residential lawns and other green spaces contribute sediment in the same fashion as low-intensity pasture areas or other similar land uses. Fertilizer application on lawns can be a significant source of phosphorus and other pollutants. Wildlife and domestic pet waste is also deposited on urban lands.

Best Management Practices to Reduce Local Phosphorus and Sediment

Description (Part II B 4 e and Part 2 B 6):

The BMPs designed to reduce the pollutants of concern in accordance with Part II B 5, B 6, B 7, and B 8.

The City shall reduce the loads associated with sediment, phosphorus, or nitrogen through implementation of one or more of the following:

1. One or more of the BMPs from the Virginia Stormwater BMP Clearinghouse listed in 9VAC25-870-65 or other approved BMPs found on the Virginia Stormwater BMP Clearinghouse website;

2. One or more BMPs approved by the Chesapeake Bay Program. Pollutant load reductions generated by annual practices, such as street and storm drain cleaning, shall only be applied to the compliance year in which the annual practice was implemented; or

3. Land disturbance thresholds lower than Virginia's regulatory requirements for erosion and sediment control and post development stormwater management.

The City may meet the local TMDL requirements for sediment, phosphorus, or nitrogen through BMPs implemented or sediment, phosphorus, or nitrogen credits acquired. BMPs implemented and nutrient and sediment credits acquired to meet the requirements of the Chesapeake Bay TMDL in Part II A may also be utilized to meet local TMDL requirements as long as the BMPs are implemented or the credits are generated in the watershed for which local water quality is impaired.

Response:

BMPs implemented as part of the City's Chesapeake Bay TMDL will also be utilized in the local TMDL implementation for the watershed in which they are located. BMPs implemented by watershed are detailed in the Anticipated Annual Practices Implemented During the Reporting Period, Progress towards Blacks Run and Cooks Creek TMDL, and BMPS Anticipated to be Implemented During Next Reporting Period sections below. Additional BMPs may be implemented as identified in the Stormwater Improvement Plan (2024) or as opportunities are identified by staff.

Calculations for Reducing Local Phosphorus and Sediment

Description (Part II B 4 f and Part 2 B 6 c):

Any calculations for load reductions achieved from each BMP required in accordance with Part II B 5, B 6, B 7, or B 8.

Response:

See the following Appendices for calculations associated with each BMP.

- Appendix A: Calculation of Annual Street Sweeping Pollutant Load Removal
- Appendix B: Calculation of Annual Storm Drain Cleaning Pollutant Load Removal
- Appendix C: Calculation of Pollutant Removal: Urban Tree Canopy Expansion
- Appendix D: Calculation of Pollutant Removal: Residential Credit
- Appendix E: Residential BMP Inspection & Non-Compliance Determination
- Appendix F: Calculation of Pollutant Removal: Stream Restoration/Ecological Restoration
- Appendix G: Calculation of Pollutant Removal: Pollinator Habitat
- Appendix H: Calculation of Pollutant Removal: Wet Pond Retrofits

Outreach Strategies to Reduce Local Phosphorus and Sediment

Description (Part II B 4 g):

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

Response:

Outreach Strategy

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

- Local News Media: Includes printed media news organizations and press releases created by City staff. Messaging will occur when there is an important stormwater project or program taking place within Harrisonburg.

Strategy 2: Media Materials

- Local News Media: Includes TV, radio, and digital news organizations. Messaging will occur when there is an important stormwater project or program taking place within Harrisonburg.
- Stormwater and Environmental Newsletters: This email newsletter has a subscription list of around 1057 contacts. Newsletters are typically sent out monthly on various stormwater topics.
- Harrisonburg Public Works Facebook and Instagram Page: The Harrisonburg Public Works Facebook and Instagram 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 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. This training includes information about Harrisonburg's watersheds and water quality impairments. The training is given to field staff through an online training platform called TargetSolutions.

Pollutant of Concern 2: Sediment

Strategy 1: Traditional Written Materials

- Local News Media: Includes printed media news organizations and press releases created by City staff. Messaging will occur when there is an important stormwater project or program taking place within Harrisonburg.

Strategy 2: Media Materials

- Local News Media: Includes TV, radio, and digital news organizations. Messaging will occur when there is an important stormwater project or program taking place within Harrisonburg.
- Stormwater and Environmental Newsletters: This email newsletter has a subscription list of around 1057 contacts. Newsletters are typically sent out monthly on various stormwater topics.
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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 sediment is 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. This training includes information about Harrisonburg's watersheds and water quality impairments. The training is given to field staff through an online training platform called TargetSolutions.

Implementation Schedule

Description (Part II B 4 h):

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

Response:

As allowed in Part II.B.3 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 phosphorus to Blacks Run and Cooks Creek.

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.

The City's approach will be consistent with the Maximum Extent Practicable (MEP) standard. To this purpose, in 2024, Tetra Tech completed a desktop review for potential BMPs that could be implemented in order to achieve the required Blacks Run and Cooks Creek TMDL WLA. Their desktop review found 119 potential BMPs located within the watersheds. Tetra Tech then created a hypothetical schedule based on a potential BMP implementation schedule which included timelines for design, Right of Way acquisition, and construction. Because larger, more complex BMPs require additional time for design, permitting, and construction, some BMPs had longer timelines associated with their implementation. Tetra Tech then categorized each of the 119 local TMDL BMP types as Standard, Large, or Stream Restoration (SR). Tetra Tech's work estimated that it would take the City over 300 years to fully meet the WLAs. Creating an action plan with any degree of certainty over that timeframe is impossible and far beyond the MEP standard that MS4 permittees must meet. As such, the proposed implementation schedule looks at a rolling 15-year period with a target set for the first 5-year permit cycle and estimated targets for the second and third future permit cycles. These estimated targets are considered to be practicably achievable at this point. At the conclusion of each permit cycle, the City will re-evaluate the progress made within the previous permit cycle. If progress is made quicker than anticipated, the targets for subsequent permit

cycles may be adjusted to a new reasonable goal to ensure that adequate further progress is made toward attaining the WLA within each subsequent 5-year permit cycle.

It is important to note several limitations that played a role in creating the below implementation timeline. The first unique challenge to BMP development within the Shenandoah Valley region is due to karst features and high presence of bedrock. In the past few years, the City has found BMPs to cost between $83,000 to $150,000 per pound of phosphorus to construct. Additionally, of the 119 BMPs evaluated in the 2024 Tetra Tech study, 82 were determined to be cost unfeasible. Of the remaining 37 BMPs, 28 were considered cost undesirable and 9 were cost desirable. Of the BMPs classified as cost unfeasible BMPs, the average cost per pound of phosphorus removed is $147,000 with almost 10 percent of the cost unfeasible BMPs being over $250,000 per pound of phosphorus. The second challenge regards finding site selection in urban areas where vacant land is often under high demand for development, particularly for housing, increasing the cost for land acquisition and even making the site too competitive to obtain.

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Timeline of Reductions:

	BR/CC TP	BR/CC TP % Reduction	Blacks Run TSS	Blacks Run TSS % Reduction	Cooks Creek TSS	Cooks Creek TSS % Reduction
2009 – 2028	1,294.99	40.72%	930,369.23	53.97%	59.18	0.03%
2028 – 2033	15	0.47%	9,700	0.56%	4,300	2.00%
2033 – 2038	30	0.94%	19,400	1.13%	8,600	4.00%
2038 – 2043	45	1.42%	29,100	1.69%	12,900	6.00%
Subtotal	***90***	***2.83%***	***58,200.00***	***3.38%***	***25,800.00***	***11.99%***
2043 – 2048	45	1.42%	29,100	1.69%	12,900	6.00%
2048 – 2053	45	1.42%	29,100	1.69%	12,900	6.00%
2053 – 2058	45	1.42%	29,100	1.69%	12,900	6.00%
Subtotal	***135***	***4.25%***	***87,300.00***	***5.06%***	***38,700.00***	***17.99%***
2058 – 2063	50	1.57%	30,000	1.74%	13,000	6.04%
2063 – 2068	50	1.57%	30,000	1.74%	13,000	6.04%
2068 – 2073	50	1.57%	30,000	1.74%	13,000	6.04%
Subtotal	***150***	***4.72%***	***90,000.00***	***5.22%***	***39,000.00***	***18.13%***
WLA	**3180**		**1,724,000**		**215,100**	
Annual Practices	**88.25**	2.78%	**52,692**	3.06%	**7,144**	3.32%
Total Reduced	**1,758.24**	**55.29%**	**1,218,560.90**	**70.68%**	**110,703.47**	**51.47%**
Future Cycles Post-2073	*1,421.76*	*44.71%*	*505,439.10*	*29.32%*	*104,396.53*	*48.53%*

Summary of Potential BMPs To Be Implemented Evaluated in Stormwater Improvement Plan (2024) by Tetra Tech								
Category	**Site ID**	**Type**	**TP Load Reduction (lb/yr)**	**TSS Load Reduction (lb/yr)**	**BMP Cost / lb TP**	**BMP Cost / lb TSS**	**Feasible?**	**Main Watershed**
New BMPs	001_D_7	Bioswale	1.1	629	$102,423	$183	Cost unfeasible	Blacks
New BMPs	001_L_0	Sand Filter	1.6	1,216	$97,106	$127	Cost unfeasible	Blacks
New BMPs	004_B_1	Bioretention	1.6	1,300	$103,936	$131	Cost unfeasible	Sieberts
New BMPs	005_D_9	Sand Filter	0.9	1,077	$122,297	$97	Cost unfeasible	Blacks
New BMPs	005_F_1_A_BMP1	Bioretention	0.5	388	$91,413	$124	Cost unfeasible	Blacks
New BMPs	005_F_1_A_BMP2	Bioretention	0.2	178	$88,537	$119	Cost unfeasible	Blacks
New BMPs	005_F_1_BMP1	Sand Filter	3.8	3,084	$89,758	$111	Cost unfeasible	Blacks
New BMPs	005_F_1_BMP2	Bioretention	1.3	1,026	$80,914	$106	Cost unfeasible	Blacks
BMP Retrofits	006_B_3	Wet Pond	17.6	16,208	$18,952	$21	Cost desirable	Blacks
New BMPs	007_A_2_&_007_A_5	Wet Pond	2.9	2,954	$100,390	$99	Cost unfeasible	Blacks
New BMPs	009_D_7	Wet Pond	77.4	61,683	$51,685	$65	Cost unfeasible	Blacks
New BMPs	014_P_3	Bioretention	2.6	1,888	$99,047	$136	Cost unfeasible	Sieberts
New BMPs	018_F_1_3	Bioretention	0.9	610	$112,854	$160	Cost unfeasible	Blacks
New BMPs	019_E_11	Bioretention	0.8	533	$124,956	$182	Cost unfeasible	Blacks
New BMPs	021_D_1_BMP2	Bioretention	1.2	841	$298,935	$430	Cost unfeasible	Cooks
New BMPs	021_D_1_BMP3	Bioretention	4.4	2,759	$254,216	$403	Cost unfeasible	Cooks
New BMPs	021_F_6	Wet Pond	17.6	15,557	$32,135	$36	Cost undesirable	Cooks
New BMPs	024_A_28	Bioretention	0.4	263	$129,081	$193	Cost unfeasible	Blacks
New BMPs	027_N_11_&_027_N_11-A	Veg Filter Strip	1.3	898	$77,365	$115	Cost unfeasible	Sieberts
BMP Retrofits	027_R_15_BMP1	Wet Pond	7.8	5,236	$60,611	$90	Cost unfeasible	Sieberts
New BMPs	027_R_15_BMP2	Wetland	10.4	7,967	$43,267	$57	Cost undesirable	Sieberts
New BMPs	028_J_12	Dry Swale	0.9	707	$41,653	$55	Cost undesirable	Blacks
New BMPs	030_A_3	Veg Filter Strip	1.3	1,014	$70,796	$94	Cost unfeasible	Smith
New BMPs	031_A_6	Bioretention	1.1	851	$79,747	$104	Cost unfeasible	Smith
New BMPs	031_B_1	Bioretention	3.4	2,436	$126,461	$179	Cost unfeasible	Smith
New BMPs	032_B_1_BMP1	Veg Filter Strip	0.5	396	$24,251	$32	Cost desirable	Blacks
New BMPs	032_B_1_BMP2	Bioretention	1.5	850	$195,019	$344	Cost unfeasible	Blacks

New BMPs	032_B_2	Bioretention	0.8	591	$95,252	$130	Cost unfeasible	Blacks
New BMPs	032_C_4	Bioretention	1.5	1,121	$93,576	$127	Cost unfeasible	Blacks
New BMPs	032_K_2	Wet pond	11.5	9,188	$41,352	$52	Cost undesirable	Blacks
New BMPs	032_T_22	Wetland	8.8	7,378	$36,249	$43	Cost undesirable	Blacks
New BMPs	033_L_7	Bioretention	0.6	375	$170,480	$285	Cost unfeasible	Blacks
New BMPs	035_A_1	Veg Filter Strip	6.5	4,662	$24,775	$35	Cost desirable	Blacks
New BMPs	035_A_3	Bioretention	1.9	1,236	$137,737	$211	Cost unfeasible	Blacks
New BMPs	035_A_3_BMP1	Bioretention	0.8	584	$107,142	$152	Cost unfeasible	Blacks
New BMPs	035_A_3_BMP2	Bioretention	0.2	156	$379,010	$510	Cost unfeasible	Blacks
New BMPs	035_U_17	Bioretention	1.5	1,002	$127,902	$188	Cost unfeasible	Blacks
New BMPs	036_N_1	Veg Filter Strip	5.8	3,794	$85,770	$131	Cost unfeasible	Blacks
New BMPs	036_N_2	Bioretention	1.9	1,387	$114,660	$154	Cost unfeasible	Blacks
BMP Retrofits	036_P_1_BMP1	Bioretention	0.9	567	$116,005	$175	Cost unfeasible	Blacks
New BMPs	036_P_1_BMP2	Veg Filter Strip	0.4	302	$203,296	$276	Cost unfeasible	Blacks
New BMPs	036_P_1_BMP3	Dry Swale	2.5	1,835	$29,455	$40	Cost desirable	Blacks
New BMPs	036_Q_7	Bioretention	1.1	718	$130,919	$194	Cost unfeasible	Blacks
New BMPs	036_T_1	Dry swale	11.5	8,451	$100,430	$137	Cost unfeasible	Blacks
BMP Retrofits	037_A_11	Wet Pond	10.5	9,053	$39,106	$45	Cost undesirable	Blacks
New BMPs	038_B_1	Veg Filter Strip	4.5	3,370	$20,137	$27	Cost desirable	Blacks
New BMPs	039_F_1	Veg Filter Strip	0.7	534	$119,247	$161	Cost unfeasible	Blacks
New BMPs	039_J_2-9	Dry Swale	2.1	1,451	$72,477	$107	Cost unfeasible	Blacks
New BMPs	039_Q_15	Bioretention	1.0	789	$133,498	$173	Cost unfeasible	Blacks
New BMPs	040_D_15	Sand Filter	2.6	2,330	$48,310	$54	Cost undesirable	Blacks
New BMPs	040_D_9	Bioretention	0.4	330	$371,534	$399	Cost unfeasible	Blacks
New BMPs	040_E_8	Wetland	0.2	202	$415,847	$343	Cost unfeasible	Blacks
New BMPs	040_U_4	Bioretention	1.0	684	$132,696	$197	Cost unfeasible	Blacks
New BMPs	041_E_3	Bioretention	2.1	1,593	$81,086	$108	Cost unfeasible	Blacks
New BMPs	041_J_1	Bioretention	0.2	203	$134,444	$145	Cost unfeasible	Blacks
New BMPs	041_R_0	Bioretention	1.2	840	$125,136	$184	Cost unfeasible	Blacks
New BMPs	042_G_0	Wet Pond	18.0	14,836	$39,131	$48	Cost undesirable	Blacks
New BMPs	042_Q_0	Bioretention	0.9	631	$93,040	$127	Cost unfeasible	Blacks
New BMPs	045_A_6	Wet Pond	20.9	17,548	$97,941	$117	Cost unfeasible	Blacks
New BMPs	046_B_3	Wet Pond	14.6	14,890	$52,095	$51	Cost unfeasible	Blacks
New BMPs	046_C_4-A	Bioretention	0.5	420	$92,961	$120	Cost unfeasible	Blacks
New BMPs	048_H_4	Wet pond	16.4	13,262	$36,761	$45	Cost undesirable	Blacks
New BMPs	052_C_4	Bioretention	0.4	276	$123,434	$176	Cost unfeasible	Blacks

New BMPs	056_C_5	Bioretention	1.3	964	$126,137	$166	Cost unfeasible	Blacks
New BMPs	056_D_20	Bioretention	1.0	719	$86,105	$114	Cost unfeasible	Blacks
New BMPs	056_D_22	Bioretention	0.9	644	$126,227	$184	Cost unfeasible	Blacks
New BMPs	062_B_2	Wet Pond	2.6	2,909	$58,632	$52	Cost unfeasible	Smith
New BMPs	072_A_13	Bioretention	0.6	522	$217,706	$237	Cost unfeasible	Smith
New BMPs	072_A_16	Bioretention	1.7	1,331	$70,456	$92	Cost unfeasible	Smith
New BMPs	079_D_2	Bioretention	3.1	2,280	$84,793	$113	Cost unfeasible	Sieberts
New BMPs	080_A_0	Wetland	8.1	7,131	$29,875	$34	Cost undesirable	Sieberts
New BMPs	084_A_15	Wet pond	144.4	113,670	$50,567	$64	Cost unfeasible	Sieberts
New BMPs	084_A_9	Bioretention	0.9	627	$225,720	$336	Cost unfeasible	Sieberts
BMP Retrofits	091_A_2_BMP1	Wet Pond	2.4	2,080	$57,255	$67	Cost unfeasible	Sieberts
BMP Retrofits	091_A_2_BMP2	Wetland	3.6	2,948	$36,000	$45	Cost undesirable	Blacks
New BMPs	092_F_6	RSC	5.2	3,838	$31,174	$42	Cost undesirable	Sieberts
New BMPs	093_B_4_5_BMP1	Veg Filter Strip	0.9	559	$93,363	$142	Cost unfeasible	Blacks
New BMPs	093_B_4_5_BMP2	Veg Filter Strip	0.8	465	$107,580	$176	Cost unfeasible	Blacks
New BMPs	101_C_3	RSC	14.6	13,854	$125,968	$133	Cost unfeasible	Blacks
New BMPs	102_A_2	Bioretention	0.6	555	$118,099	$128	Cost unfeasible	Blacks
New BMPs	102_B_2	Veg Filter Strip	0.0	29	$2,146,126	$2,770	Cost unfeasible	Blacks
New BMPs	102_B_3	Sand Filter	3.4	4,385	$94,121	$72	Cost unfeasible	Blacks
New BMPs	103_A_10	Wet Pond	24.3	20,926	$33,152	$39	Cost undesirable	Blacks
New BMPs	103_B_3	Bioretention	0.4	311	$137,743	$196	Cost unfeasible	Blacks
New BMPs	104_F_5	Bioretention	0.4	266	$125,480	$185	Cost unfeasible	Blacks
New BMPs	104_H_12	Bioretention	0.2	176	$82,290	$110	Cost unfeasible	Blacks
New BMPs	104_H_2	Bioretention	0.6	444	$85,902	$115	Cost unfeasible	Blacks
New BMPs	104_H_5-A	Bioswale	1.1	771	$48,278	$66	Cost undesirable	Blacks
New BMPs	104_H_7	Bioretention	0.6	434	$79,811	$106	Cost unfeasible	Blacks
New BMPs	105_A_1	Sand Filter	4.1	5,220	$82,220	$64	Cost unfeasible	Blacks
New BMPs	11_B_16	Veg Filter Strip	0.9	694	$106,273	$135	Cost unfeasible	Blacks
BMP Retrofits	116_A_1_124_B_1_2_BMP1	Wet Pond	15.4	13,469	$30,845	$35	Cost undesirable	Cooks
New BMPs	116_A_1_124_B_1_2_BMP2	Wet Pond	96.7	77,353	$53,360	$67	Cost unfeasible	Cooks
New BMPs	117_A_2_BMP1	Veg Filter Strip	1.1	828	$30,293	$40	Cost undesirable	Cooks
New BMPs	117_A_2_BMP2	Veg Filter Strip	1.8	1,412	$21,373	$28	Cost desirable	Cooks
New BMPs	117_A_2_BMP3	Wet Pond	0.6	383	$163,865	$250	Cost unfeasible	Cooks
New BMPs	117_F_4	Bioretention	1.5	1,189	$112,030	$145	Cost unfeasible	Cooks
New BMPs	12_G_1_BMP1	Wetland	6.9	5,286	$49,673	$65	Cost undesirable	Sieberts
New BMPs	122_B_2	Bioretention	1.5	809	$281,668	$517	Cost unfeasible	Cooks

BMP Retrofits	124_B_6	Wet Pond	2.8	2,532	$48,318	$54	Cost undesirable	Cooks
New BMPs	19_D_11	Veg Filter Strip	1.7	1,228	$59,284	$82	Cost unfeasible	Blacks
New BMPs	27_S_69	Wetland	6.9	5,893	$27,214	$32	Cost undesirable	Blacks
New BMPs	38_A_ 2	Sand Filter	3.2	2,826	$91,182	$103	Cost unfeasible	Blacks
New BMPs	40_Y_ 2	Sand Filter	0.9	731	$72,010	$85	Cost unfeasible	Blacks
New BMPs	46_B_5	Bioretention	1.3	1,178	$120,882	$129	Cost unfeasible	Blacks
New BMPs	69_A_61	Dry Swale	0.5	359	$57,626	$80	Cost unfeasible	Sieberts
New BMPs	74_G_33	Bioretention	1.1	774	$105,471	$144	Cost unfeasible	Sieberts
New BMPs	91_H_1	Wetland	2.9	2,567	$27,662	$32	Cost undesirable	Sieberts
Stream Restoration	HB-12	Stream Restoration	223.6	68,315	$5,414	$18	Cost desirable	Cooks
Stream Restoration	HB-3	Stream Restoration	1,350.1	419,964	$8,318	$27	Cost undesirable	Sieberts
Stream Restoration	HB-5	Stream Restoration	269.5	86,920	$9,050	$28	Cost undesirable	Blacks
Stream Restoration	HB-6	Stream Restoration	137.4	44,279	$6,048	$19	Cost desirable	Blacks
Stream Restoration	HB-7	Stream Restoration	168.3	54,272	$9,263	$29	Cost undesirable	Blacks
Stream Restoration	HB-8	Stream Restoration	171.0	53,574	$8,257	$26	Cost undesirable	Blacks
Stream Restoration	HB-9	Stream Restoration	87.1	28,095	$9,786	$30	Cost undesirable	Blacks
Stream Restoration	SR1	Stream Restoration	199.9	64,453	$9,090	$28	Cost undesirable	Blacks
Stream Restoration	SR2	Stream Restoration	106.2	29,004	$8,522	$31	Cost undesirable	Blacks
Stream Restoration	SR3	Stream Restoration	322.0	97,714	$8,209	$27	Cost undesirable	Cooks
Stream Restoration	SR4	Stream Restoration	22.5	7,253	$15,328	$48	Cost desirable	Blacks

Anticipated Annual Practices Implemented During the Reporting Period

Summary of Annual Practices					
Type of BMP	**Project Name**	**Location**	**Reductions (lbs/yr)**		
			Blacks Run /Cooks Creek	**Blacks Run**	**Cooks Creek**
			TP	**TSS**	**TSS**
Street Sweeping	Street Sweeping (annual)	Harrisonburg, VA	12.70	16,026.47	2,510.45
Storm Drain Cleaning	Storm Drain Cleaning (annual)	Harrisonburg, VA	65.00	34,000	4,500
Various Proprietary & Non-Proprietary Clearinghouse BMPs	HCAP Program	Harrisonburg, VA	0.60	2,665.2	133.84
Residential BMPs	Homeowner BMPs (annual)	Harrisonburg, VA	6.95	0	0
Total			**85.25**	**52,691.67**	**7,144.29**

Homeowner BMPs are part of the stormwater utility fee credit program and represent tree planting/cover, rain barrel, and nutrient management practices. The HCAP Program BMPs are tree planting or post construction BMPs found chapter 8 of the Viriginia Stormwater Management Handbook. Both of these programs track individual practices. Due to the number and various types of practices as well as different lifespan cycles, all practices are combined and reported as one number. Spot check inspection are used to establish a compliance factor and the resulting calculation is reported as an annual practice.

Progress towards Blacks Run and Cooks Creek TMDL

Chesapeake Bay TMDL Action Plan: The City of Harrisonburg has developed a Chesapeake Bay TMDL Action Plan and it is available at http://www.harrisonburgva.gov/MS4-permit-program.

List of Control Measures Implemented During the Reporting Period: Street Sweeping, Homeowner BMPs, HCAP Program BMPs, Septic to Sanitary Sewer Connections, Land Conversion, Bioreactor (Pending DEQ Approval)

Estimate Reduction Achieved by Each Control:

Summary of Completed BMPs post July 1 2019						
Type of BMP	Project Name	Completion Date	Location	Reductions (lbs/yr)		
				Blacks Run /Cooks Creek	Blacks Run	Cooks Creek
				TP	TSS	TSS
Stream Restoration	North End Greenway Stream Restoration	2021-12-31	38°28'00.7"N 78°52'03.5"W	118.91	40,996.22	0
Stream Restoration	Mountain View Drive Stream Restoration	2023-2-01	38°26'13.4"N 78°51'26.4"W	144.97	49,980	0
Stream Restoration	Blacks Run South Stream Restoration-Phase 1	2023-6-01	38°24'58.3"N 78°53'25.6"W	685.8	245,464.22	0
Stream Restoration	Blacks Run South Stream Restoration-Phase 2	2025-4-07	38°24'33.3"N 78°53'32.0"W	342.44	593,672.22	0
Urban Tree Canopy Expansion	New Tree Planting	Multiple locations and dates. See Appendix C for more details.	Multiple locations and dates. See Appendix C for more details.	2.84	256.57	59.18
Land Conversion: Turf to Mixed Open	Pollinator Habitats (1.60 ac)	Multiple locations and dates. See Appendix G for more details.	Multiple locations and dates. See Appendix G for more details.	.03	0	0
			Total	**1294.99**	**930,369.23**	**59.18**

BMPS Anticipated to be Implemented During Next Reporting Period

The anticipated BMPs to be implemented during the next reporting period include (but are not limited to): Storm Drain Cleaning Practice, Septic to Sanitary Sewer Connections, Tree Planting, Permanent Credit Purchases, Stream Restoration, Pollinator Habitat Conversion, Homeowner BMPs, BMP Retrofits, and Bioreactor projects.

Below is a table with the estimated projects and any estimated reduction values for the remainder of the permit period. Additional BMPs may be implemented as identified in the Stormwater Improvement Plan (2024) or as opportunities are identified by staff.

Summary of Planned BMPs for Blacks Run 2028-2033 Permit Cycle					
Planned Type of BMP	**Project Name**	**Planned Location**	**Estimated Reductions (lbs/yr)**		
			Blacks Run /Cooks Creek	**Blacks Run**	**Cooks Creek**
			TP	**TSS**	**TSS**
Wet Pond- Level One	Wet Pond W Market THMS entrance	38°27'13.0"N 78°53'39.8"W	10.40	0	8,959
Wet Pond- Level One	Wet Pond W Market Old Quarry	38°27'06.5"N 78°53'05.4"W	10.50	9,053	0
Wet Pond- Level One	Wet Pond Reservoir/ South Carlton	38°26'34.5"N 78°51'31.3"W	8.00	5,236	0
Urban Tree Canopy Expansion*	New Tree Planting	Harrisonburg, VA [1]	.05	3.25	3
Total for Planned BMPs			**28.95**	**14,292.25**	**8,962.00**
Previously Completed BMPs			**1294.99**	**930,369.23**	**59.18**
Total BMPs (Planned + Completed)			**1,323.94**	**944,661.48**	**9021.18**
Total Amount Needed by 2033			**1,309.99**	**940,069.23**	**4,359.18**
Total WLA			**3,180**	**1,724,000**	**215,100**

1 Denoting a location is not feasible since project locations are selected closer to the planting window.

**Assumes planting an average of 50 trees per year.*

Annual practices not shown in this table as removal rates are variable from year to year.

Public Comment for TMDL Action Plan

Requirements:

Prior to submittal of the final action plan, the permittee shall provide an opportunity for public comment on the additional BMPs proposed to meet the reductions not previously approved in the TMDL action plan for no less than 15 days.

Response:

A 15 day public comment period was held March 18 – April 1, 2026.

Additional edits to the Action Plan will have a 15-day public comment period. Public comment periods will be noted in this section below as applicable. An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan will be provided through the following mediums:

- City Website; https://www.harrisonburgva.gov/MS4-permit-program
- Harrisonburg Public Works Facebook Page; www.facebook.com/harrisonburgpublicworks
- Harrisonburg Public Works Instagram Page; hbgpublicworks
- Press Release sent to local media groups

Comments will be accepted through phone call, social media, hardcopy mediums and e-mail.

Additionally, public comment can be received at any time as noted on our website: https://www.harrisonburgva.gov/MS4-permit-program. Specifically, questions or comments may be emailed to stormwater@harrisonburgva.gov, mailed to Harrisonburg Public Works at 320 East Mosby Road, Harrisonburg, VA 22801, or directed to 540-434-5928. Questions and comments may also be submitted via the online form here: Share your thoughts.

The following is a summary of comments received and responses.

Public Comment Period: March 18 – April 1, 2026.

Comment #1: TBD

Response #1: TBD

Appendix A: Calculations of Annual Street Sweeping Pollutant Load Removal

Blacks Run Street Sweeping Calculations

SCP-1

Routes:

Table 2. Calculate Street Sweeping Loading Rate for the Potomac River Basin-SCP-1

Subsource	Pollutant	Curb Lane Miles Swept (1 curb lan 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	0.00	16.86	0.00
Regulated Urban Impervious	Phosphorus	0.00	1.62	0.00
Regulated Urban Impervious	Total Suspended Solids	0.00	1,171.32	0.00

Table 3. Street Sweeping Load Reductions -SCP-1

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	0.00	0.04	**0.00**
Regulated Urban Impervious	Phosphorus	0.00	0.10	**0.00**
Regulated Urban Impervious	Total Suspended Solids	0.00	0.21	**0.00**

SCP-2

Routes: Downtown

Table 2. Calculate Street Sweeping Loading Rate for the Potomac River Basin -SCP-2

Subsource	Pollutant	Curb Lane Miles Swept (1 curb lan 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	0.00	16.86	0.00
Regulated Urban Impervious	Phosphorus	0.00	1.62	0.00
Regulated Urban Impervious	Total Suspended Solids	0.00	1,171.32	0.00

Table 3. Street Sweeping Load Reductions SCP-2

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	0.00	0.03	**0.00**
Regulated Urban Impervious	Phosphorus	0.00	0.08	**0.00**
Regulated Urban Impervious	Total Suspended Solids	0.00	0.16	**0.00**

SCP-3

Routes:

Table 2. Calculate Street Sweeping Loading Rate for the Potomac River Basin -SCP-3

Subsource	Pollutant	Curb Lane Miles Swept (1 curb lan 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	15.42	16.86	259.98
Regulated Urban Impervious	Phosphorus	15.42	1.62	24.98

Regulated Urban Impervious	Total Suspended Solids	15.42	1,171.32	18,061.75

Table 3. Street Sweeping Load Reductions SCP-3

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	259.98	0.02	**5.20**
Regulated Urban Impervious	Phosphorus	24.98	0.05	**1.25**
Regulated Urban Impervious	Total Suspended Solids	18,061.75	0.11	**1,986.79**

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 lan 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	199.77	16.86	3,368.12
Regulated Urban Impervious	Phosphorus	199.77	1.62	323.63
Regulated Urban Impervious	Total Suspended Solids	199.77	1,171.32	233,994.60

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	3,368.12	0.01	**33.68**

Regulated Urban Impervious	Phosphorus	323.63	0.03	**9.71**
Regulated Urban Impervious	Total Suspended Solids	233,994.60	0.06	**14,039.68**

SCP-5

Routes: Parking lots

Table 2. Calculate Street Sweeping Loading Rate for the Potomac River Basin- SCP-5

Subsource	Pollutant	Curb Lane Miles Swept (1 curb lan 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	0.00	16.86	0.00
Regulated Urban Impervious	Phosphorus	0.00	1.62	0.00
Regulated Urban Impervious	Total Suspended Solids	0.00	1,171.32	0.00

Table 3. Street Sweeping Load Reductions- SCP-5

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	0.00	0.007	**0.00**
Regulated Urban Impervious	Phosphorus	0.00	0.02	**0.00**
Regulated Urban Impervious	Total Suspended Solids	0.00	0.04	**0.00**

Street Sweeping Credits Based Upon 2020 Guidelines for Street Sweeping			
		Removal Rate (%)	Mass Removed (lbs)

Lane Miles/Acres	Street Cleaning Practice	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
15.42	SCP-3	11	2	5	1,986.79	5.20	1.25
199.77	SCP-4	6	1	3	14,039.68	9.71	9.71
0.00	SCP-5	4	0.7	2	0.00	0.00	0.00
215.19	**Total:**				**16,026.47**	**14.91**	**10.96**

Table 1. Street Cleaning Practices Available for Credit

	Practice #	**Description**	**Passes/yr (apx)[2]**	**%TSS Removal**	**%TN Removal**	**% TP Removal**
Advanced Sweeping Technology	SCP-1	2 passes per week	-100	21	4	10
	SCP-2	1 pss per week	-50	16	3	8
	SCP-3	1 pass every 2 weeks	-25	11	2	5
	SCP-4	1 pass every 4 weeks	-10	6	1	3
	SCP-5	1 pass every 8 weeks	-6	4	0.7	2
	SCP-6	1 pass every 12 weeks	-4	2	0	1
	SCP-7	Seasonal scenario 1 or 2	-15	7	1	4
	SCP-8	Seasonal scenario 3 or 4	-20	10	2	5
Mechanical Broom Tech	SCP-9	2 passes per week	-100	1		
	SCP-10	1 pass per week	-50	0.5		
	SCP-11	1 pass every 4 weeks	-10	0.1		

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

Credit methodology taken from Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition Guidance APPENDIX V.G – Street Cleaning and Storm Drain Cleaning.

Storm Drain Cleaning Credit Estimates

Collection Totals

2023-2024

Month	Tons Collected
July	16.36
August	
September	
October	
November	
December	13.13
January	5.19
February	
March	8.68
April	10.39
May	30.48
June	
Total	**84.23**

Cooks Creek Pollutant Removal Calculation

Tons	59.82
lbs	119,640.00
lbs x .7 dry weight conversion	83,748.00

TN (lbs x .0027)	226.12
TP (lbs x .0006)	50.25
TSS (lbs x .3) 250 Micron Correction	25,124.40
Watershed Percentage	11%
Cooks Creek TN	**25.08**
Cooks Creek TP	**5.57**
Cooks Creek TSS	**2,786.30**

Blacks Run Pollutant Removal Calculation	
Tons	59.82
lbs	119,640.00
lbs x .7 dry weight conversion	83,748.00

TN (lbs x .0027)	226.12
TP (lbs x .0006)	50.25
TSS (lbs x .3) 250 Micron Correction	25,124.40
Watershed Percentage	83%
Blacks Run TN	**187.16**
Blacks Run TP	**41.59**
Blacks Run TSS	**20,795.47**

Appendix C: Calculation of Pollutant Removal: Urban Tree Canopy Expansion

Credit methodology taken from Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition Guidance APPENDIX V.N – Urban Tree Canopy Expansion.

Table 1 Average Land Use Loading Rates			
VA Potomac River Basin			
	TN (lbs/acre/year)	**TP (lbs/acre/year)**	**TSS (lbs/acre/year)**
Turf	6.61	1.51	646.73
Roads	11.7	0.95	1784.89
Other Impervious	9.48	0.78	1791.66
Forest	1.16	0.07	57.54

Table 2 Pollution Load Reductions			
	TN Reductions (%)	**TP Reductions (%)**	**TSS Reductions (%)**
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

* In general, unless noted otherwise in Appendix V.N, assume 300 trees = 1 acre

Example Calculation:

Canopy Over Turf:

2 acres x 1.51 = 3.02

3.02 x .238 = 0.72 TP lbs/ac/year

2 acres x 646.73 = 1,293.46

1,293.46 x .058 = 75.02 TSS lbs/ac/year

Canopy Over Impervious:

2 acres x 0.78 = 1.56

1.56 x 0.11 = 0.17 TP lbs/ac/year

2 acres x 1,791.66= 3583.32

3583.32 x .07 = 250.83 TSS lbs/ac/year

Example Watershed Conversion Factor:

Cooks Creek conversion factor

Cooks Creek watershed is 12.03% of the City's total area

TSS: 466.58 lbs/yr * 0.120 = 50.60 lbs/yr

Blacks Run conversion factor

Cooks Creek watershed is 81.60% of the City's total area

TSS: 466.58 lbs/yr * 0.816 = 380.07 lbs/yr

Appendix D: Calculation of Pollutant Removal: Residential Credit

Calculation methodology submitted in September 29, 2016 Annual Report submittal and was received by DEQ on December 8, 2016.

Homeowner BMPs Worksheet- Blacks Run

Reporting Year*: **2024-2025**

*Includes application years: 2016-2024

Site Calculation

	Total Area Draining to BMP		Pollutant Loads	
	Impervious Area (sf)	Pervious Area (sf)	TP Loading	TN Loading
Roof Drain Disconn	248,319.94		9.24	96.11
Rain Barrel/ Cistern	40,498.08		1.51	15.67
Homeowner Nutrient Mgmt		2,271,068.44	21.38	525.02

Site Load Redu

	Removal Rates		Nutrient Load Reduced	
	TP%	TN%	lbs TP/ yr	lbs TN/ yr
Roof Drain Disconn	52%	45%	4.80	43.25
Rain Barrel/ Cistern	33%	28%	0.50	4.39
Homeowner Nutrie	3%	6%	0.64	31.50
		TOTAL	**5.94**	**79.14**

Site Load Reductions with Compliance Factor

	Compliance Factor	Nutrient Load Reduced w/ Compliance Factor	
		lbs TP/ yr	lbs TN/ yr
Roof Drain Disconn	100%	4.80	43.25
Rain Barrel/Cistern	90%	0.45	3.95
Homeowner Nutrie	75%	0.48	23.63
	TOTAL	**5.73**	**70.83**

Due to new internal data management processes established in 2020, changes in how Homeowner BMP reductions are reported were made to reflect all current applications. This change reflects that every five years some applications are renewed and bumped into a new application year along with new applications for that year and some applications are removed due to expiration of credit.

Homeowner BMPs Worksheet- Cooks Creek

Reporting Year*: **2024-2025** *Includes application years: 2016-2024

Site Calculatio

	Total Area Draining to BMP		Pollutant Loads	
	Impervious Area (sf)	Pervious Area (sf)	TP Loading	TN Loading
Roof Drain Disconn	56,047.00		2.08	21.69
Rain Barrel/ Cistern	6,787.00		0.25	2.63
Homeowner Nutrient Mgmt		372,786.10	3.51	86.18

Site Load Redu

	Removal Rates		Nutrient Load Reduced	
	TP%	TN%	lbs TP/ yr	lbs TN/ yr
Roof Drain Disconn	52%	45%	1.08	9.76
Rain Barrel/ Cistern	33%	28%	0.08	0.74
Homeowner Nutrie	3%	6%	0.11	5.17
		TOTAL	**1.27**	**15.67**

Site Load Reductions with Compliance Factor

	Compliance Factor	Nutrient Load Reduced w/ Compliance Factor	
		lbs TP/ yr	lbs TN/ yr
Roof Drain Disconn	100%	1.08	9.76
Rain Barrel/Cistern	90%	0.07	0.66
Homeowner Nutrie	75%	0.08	3.88
	TOTAL	**1.24**	**14.30**

Due to new internal data management processes established in 2020, changes in how Homeowner BMP reductions are reported were made to reflect all current applications. This change reflects that every five years some applications are renewed and bumped into a new application year along with new applications for that year and some applications are removed due to expiration of credit.

Appendix E: Residential BMP Inspection Program & Non-Compliance Determination

Application Cycle 1

Year 1	**Annual Spot Check**	**Year 5**
Application Verification Process	On-Site Inspections	Re-Application Verification Process

Year 1

As a part of the application package, residential property owners take multiple steps to validate that their BMPs exist and function properly at the time of submittal. The application package is reviewed and verified by Public Works staff. Site visits and desktop analysis using Google Earth features are both utilized on an as-needed basis to ensure application information is accurate.

Validation Steps Taken by Applicants at the Time of Initial Application:

- Pictures must be taken of Rain Barrels and Downspout Disconnections no more than 60 days prior to application submittal.
- Application must be filled out and signed.
    - Signature of Agreement; *I hereby certify the above information to be true and correct to the best of my knowledge. I agree that pollutant credits approved by the City of Harrisonburg as Stormwater Utility Fee Credits will no longer be available for any other use, including Virginia Stormwater Management Program requirements.*
- Lawncare Agreement must be filled out and signed.
    - Signature of Agreement; *Upon signing this document, I agree to follow the selected responsible lawn care maintenance items for the extent of the Agreement and for the total land area listed in this Agreement.*
- Maintenance Agreement must be filled out and signed.
    - (Maintenance Agreement Language) Commitment to Operation and Maintenance of Facility; The Property Owner(s), including any homeowners association, shall adequately operate, inspect, and maintain the stormwater management BMP facilities in accordance with the specific operation, inspection, and maintenance requirements set forth in the attachment to the maintenance agreement.
    - Signature of Agreement; *Upon signing this document, The City and the Property Owner(s) agree to the terms and conditions as outlined above and as described in the appropriate Stormwater Utility Fee Credit Manual for Non-Residential or Residential effective on the date signed.*

Maintenance Schedule and Guidelines are available for all BMPs to property owners on the stormwater utility fee website. These fact sheets include a schedule of maintenance tasks associated with each

practice. A maintenance record is also available for the homeowner to log any maintenance activities. This maintenance record is required for submittal as part of the five year re-application.

Annual Spot Check

The City of Harrisonburg will spot-inspect 25% of the active residential properties annually with a maximum of 30 inspections. Letters will be sent to the pool of properties notifying property owners of their upcoming inspection (or phone calls/emails), as is required in the signed maintenance agreement. Staff will have a right to enter the property as is outlined in the maintenance agreement. An inspection report will be completed by staff and kept on file with the credit application information (see attachment). If inspection violations/issues are noted, a formal letter will be sent to the property owner. If violations are not corrected within 90 days after notification is sent, the approved credits for the insufficient BMP will be removed.

Applications are counted as active if their status is Approved (not denied, expired, or moved) and has not had an inspection in the last 5 years. Additionally, applications in final year or approved in the current year are not included as they are verified in the renewal or application.

Year 5

The Stormwater Utility Fee Credit Program allows applicants credit for five years from the date of application approval.

<u>Validation Steps Taken by Applicants at the Time of Re-Application:</u>

- Pictures must be taken of Rain Barrels and Downspout Disconnections within 60 days of re-application.
- Re-Application must be filled out and signed.
    - Signature of Agreement; *I hereby certify the above information to be true and correct to the best of my knowledge. I agree that the BMPs approved by the City of Harrisonburg as Stormwater Utility Fee Credits are maintained properly and functioning as designed.*
- *Maintenance Record filled out and submitted (in compliance with maintenance agreement)*
    - (Maintenance Agreement Language) Required Documentation; The Property Owner(s) shall document any maintenance, landscaping, and repairs performed to the on-site stormwater management BMP facilities on the City's Maintenance Record form and provide a copy of said Maintenance Record to the City or its representatives upon request. Regular inspection by the Property Owner(s) is encouraged, but submittal of inspection forms to the City is not required.

Non-Compliance Factor

The non-compliance factor will be calculated based on the current annual spot check inspection year. The percentage of compliant inspections for each reported practice (i.e. roof drain disconnection, rain

barrel/cistern, and homeowner nutrient management) will be applied to the total active practices for each respective practice. For example, if 10 rain barrel practices were inspected during the annual spot check and 1 was found to be non-compliant, the non-compliance factor would be calculated as follows and applied to the final site load reduction for all active rain barrel practices:

1 non-compliant inspection out of 10 = 90% compliance

Nutrient Load Reduced * compliance factor = Final Site Load Reduction

0.77 lbs TP/yr * 0.90 = 0.69 lbs TP/yr

Appendix F: Calculation of Pollutant Removal: Stream Restoration/Ecological Restoration

Credit methodology taken from Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition Guidance APPENDIX V.J – Urban Stream Restoration

Pollutant Reduction Reports completed by project engineer's are available upon request for each completed stream restoration project.

Project	Year Completed	Length Restored (lin ft)	Protocols
Northend Greenway	2021	3,137	1 and 2
Mountain View Drive	2023	1,650	1 and 2
Blacks Run South- Phase 1	2023	5,500	1, 2 and 3
Blacks Run South- Phase 2	2025		1, 2 and 3

Appendix G: Calculation of Pollutant Removal: Pollinator Habitat

Credit methodology taken from Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition Guidance APPENDIX V.H – Land Use Change, Turf to Mixed Open

Table V.H.1 - Land Use Change Conversion Efficiency Table

Basin	Land Use From	Conversion	TN Reductions (lbs/ac/year)	TP Reductions (lbs/ac/year)	TSS Reductions (lbs/ac/year)
Potomac	Impervious	Forest	9.85	0.80	1797
Potomac	Impervious	Mixed Open	9.55	0.48	877
Potomac	Impervious	Turf	4.27	0.00	1240
Potomac	Turf	Forest	5.58	1.46	557
Potomac	Turf	Mixed Open	5.28	1.15	0.00
Potomac	Mixed Open	Forest	0.30	0.32	920

Example Calculation

Pollinator Habitat converted from Turf:

2 acres x 5.28 = 10 TN lbs/ac/year

2 acres x 1.15 = 2.3 = TP lbs/ac/year

Pollinator Habitat converted from Impervious:

2 acres x 9.55 = 19.1 TN lbs/ac/year

2 acres x 0.48 = 0.96 = TP lbs/ac/year

2 acres x 877 = 1,754 TSS lbs/ac/year

Appendix H: Calculation of Pollutant Removal: Wet Pond Retrofits

Credit methodology taken from Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition Guidance APPENDIX V.B – Chesapeake Bay Program, Retrofit Curves/Equations

Wet Pond at W Market THMS Entrance

The following calculations assumed 1 inch treatment.

Category	City BMP ID	Existing BMP Type	New BMP Type	Modified Initial TN Efficiency	Modified Initial TP Efficiency	Modified Initial TSS Efficiency
BMP Retrofits	116_A_1_124_B_1_2_BMP1	Detention Basin	Wet Pond	5.0%	10.0%	10.0%

Enhanced TN Efficiency	Enhanced TP Efficiency	Enhanced TSS Efficiency	Change in Efficiency TN	Change in Efficiency TP	Change in Efficiency TSS	Watershed
35.0%	54.9%	69.9%	30.0%	44.9%	59.9%	Cooks Creek

Drainage Area (acres)								
Regulated pervious	Regulated impervious	Unregulated pervious	Unregulated impervious	Forest	Total	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
18.66	16.38	0.14	0.03	0.00	35.20	139.3	15.35	13,469

Wet Pond at W Market Old Quarry

The following calculations assumed 1 inch treatment.

Category	City BMP ID	Existing BMP Type	New BMP Type	Modified Initial TN Efficiency	Modified Initial TP Efficiency	Modified Initial TSS Efficiency
BMP Retrofits	037_A_11	Detention Basin	Wet Pond	5.0%	10.0%	10.0%

Enhanced TN Efficiency	Enhanced TP Efficiency	Enhanced TSS Efficiency	Change in Efficiency TN	Change in Efficiency TP	Change in Efficiency TSS	Watershed
35.0%	54.9%	69.9%	30.0%	44.9%	59.9%	Blacks Run

Drainage Area (acres)								
Regulated pervious	Regulated impervious	Unregulated pervious	Unregulated impervious	Forest	Total	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
19.99	8.36	0.76	1.98	2.22	33.31	108.0	10.46	9,053

Wet Pond at Reservoir and South Carlton

The following calculations assumed 1 inch treatment.

Category	City BMP ID	Existing BMP Type	New BMP Type	Modified Initial TN Efficiency	Modified Initial TP Efficiency	Modified Initial TSS Efficiency
BMP Retrofits	027_R_15_BMP1	Detention Basin	Wet Pond	5.0%	10.0%	10.0%

Enhanced TN Efficiency	Enhanced TP Efficiency	Enhanced TSS Efficiency	Change in Efficiency TN	Change in Efficiency TP	Change in Efficiency TSS	Watershed
35.0%	54.9%	69.9%	30.0%	44.9%	59.9%	Sieberts Creek/Blacks Run

Drainage Area (acres)								
Regulated pervious	Regulated impervious	Unregulated pervious	Unregulated impervious	Forest	Total	TN Load Reduction (lb/yr)	TP Load Reduction (lb/yr)	TSS Load Reduction (lb/yr)
27.63	10.78	0.00	0.00	0.00	38.41	96.0	7.78	5,236