Phase III MS4 General Permit
Program Plan Update

Chesapeake Bay TMDL Action Plan

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Appendices

1.0 Introduction

The following updated TMDL Action Plan has been developed in accordance with the current General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (General Permit), which became effective July 1, 2018 and the Department of Environmental Quality's Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition Guidance, issued February 6, 2021 (Guidance Memo). Per Section II.A.12 of the General Permit, the updated TMDL Action Plan addresses the following components:

A. A review of legal authorities,
B. The load and cumulative reduction calculations for the James River basin,
C. The total reductions achieved as of November 1, 2023 for each pollutant of concern,
D. A list of BMPs implemented prior to November 1, 2023 to achieve reductions associated with the Chesapeake Bay TMDL, including the date of implementation and the reductions achieved,
E. The BMPs implemented by the City of Petersburg prior to the expiration of this permit to meet the cumulative reductions calculated per the General Permit, and
F. A summary of any comments received resulting from public participation, including the City's response, any public meetings, and any revisions necessitated by the public comments.

2.0 Review of Legal Authorities

The City of Petersburg has reviewed its MS4 Program to evaluate its ability to comply with the Special Conditions for the Chesapeake Bay TMDL (Part II Section A) of the General Permit. The City currently implements their MS4 Stormwater Program and associated Program Plan, including reference to the City's Illicit Discharge Detection and Elimination Procedures, VSMP Policies and Procedures, Stormwater Management Facility Inspection Procedures, Pollution Prevention and Good Housekeeping Standard Operating Procedures, Municipal Employee Training Plan and Schedule. The Program Plan also includes High-Priority SWPPP Implementation Plans, Nutrient Management Plans and Implementation Schedules, and City Contract Procurement Terms for Good Housekeeping. The Program Plan can be found on the City of Petersburg Stormwater Management webpage or by request.

2.1 Existing Legal Authority

The following is a list of the City's relevant existing legal authorities and policies applicable to reducing the pollutants identified the Chesapeake Bay TMDL:

- City of Petersburg MS4 Program Plan
- City of Petersburg Code of Ordinances
  - Stormwater Management Ordinance (Chapter 50-Environment, Article IV)
  - Erosion and Sediment Control Ordinance (Chapter 50-Environment Article V)
  - Chesapeake Bay Preservation Areas Ordinance (Chapter 122-Waterways, Article II)
  - Illicit Discharge Ordinance (Chapter 122- Waterways, Division 2. Subdivision IV.)
  - Floodplain Management Ordinance (Chapter 58-Floods, Article II)
  - Animals Ordinance (Chapter 18-Animals)
  - Parks and Recreation Ordinance (Chapter 78-Parks and Recreation, Article III)

- Stormwater Management Guidelines and Agreement Document
- Declaration of Covenants for Storm and Surface Water Facility and System Maintenance agreement

In addition, the City of Petersburg has operated a stormwater utility since 2013. The utility is governed by the Stormwater Utility Ordinance, Chapter 114-Utilities, Article IV.

2.2 New or Modified Legal Authority

The City of Petersburg has reviewed its current MS4 Program and determined that the authorities as stated above are sufficient for compliance with this special condition. However, Petersburg may choose to coordinate with other adjacent MS4s and explore the idea of establishing Memorandums of Understanding (MOU) to clarify MS4 service boundary lines and inter-jurisdictional responsibilities for POC loads and subsequent required POC load reductions in the future.

3.0 Determination of Estimated Existing Source Loads

Per the MS4 General Permit, the City of Petersburg is required to "reduce the load of total nitrogen and total phosphorus from existing developed lands served by the MS4 as of June 30, 2009, within the 2010 Census urbanized areas by at least 100% of the Level 2 (L2) Scoping Run Reductions."

In accordance with the MS4 General Permit and TMDL Guidance methodology, the City determined the area of land within the MS4 service area located within the Chesapeake Bay watershed from the 2010 Census of Urbanized Area. The City of Petersburg straddles the ridgeline for the Chesapeake Bay with nearly 52% of the total city area located within the Chesapeake Bay watershed. There are excluded properties within the City, including federal properties, VDOT roadways, other VPDES permitted sites, wetlands, forested areas, and open water (see Appendix A1). The total regulated land within the urbanized area of the Chesapeake Bay watershed for the City of Petersburg is 4,956 acres (Figure 1).

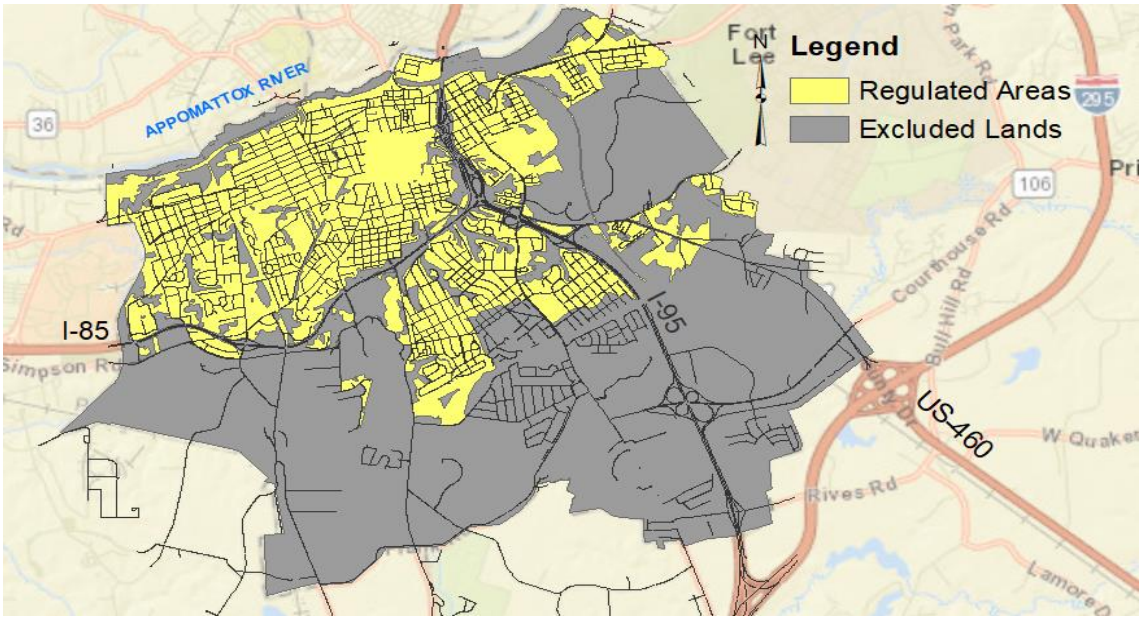

Figure 1. Map of Regulated Area Land within the Urbanized Area of the Chesapeake Bay Watershed.

A land cover analysis was completed for the regulated area within the Chesapeake Bay watershed for the City of Petersburg, as presented below in Figure 2. Approximately 68% of the regulated area is pervious (3,357.69 acres), and 32% is impervious (1,597.88 acres). A detailed description for the regulated area determination and the land cover analysis can be found in Appendix A1 and A2, respectively.

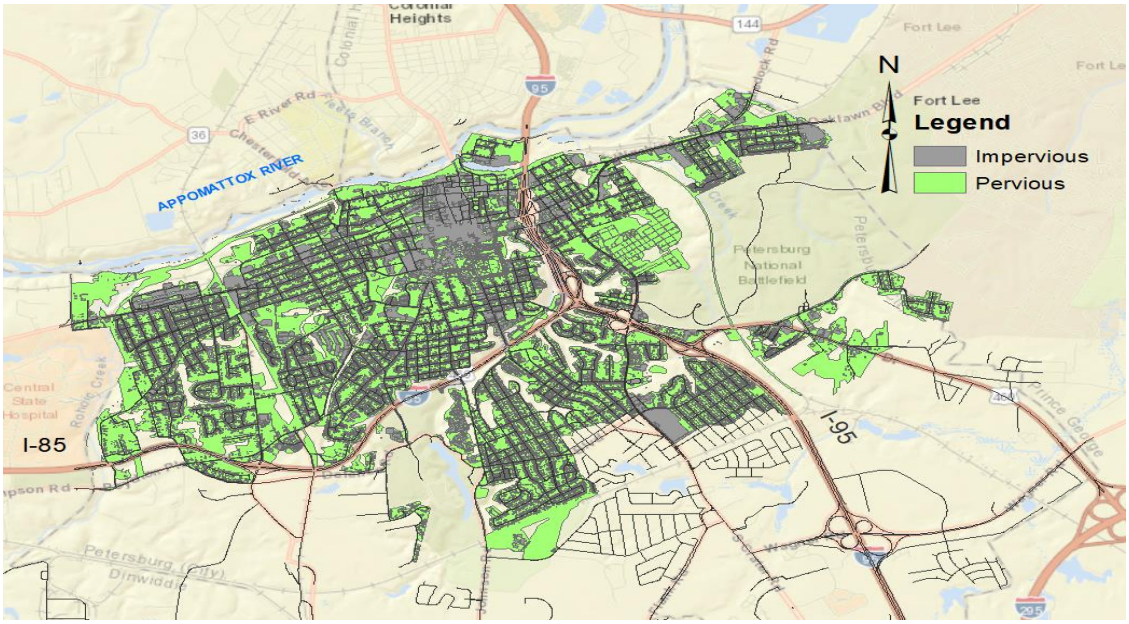

Figure 2. Land Cover Analysis within the City's Regulated Area of the Chesapeake Bay Watershed.

The total contributing area and land uses were then applied to Table 2a. of the 2013-2018 MS4 General Permit to estimate the loads from each pollutant of concern (Table 1).

Table 1. Pollutants of Concern Loadings

Table 2a: Calculation Sheet for Estimating Existing Source Loads for the James River Basin *Based on Chesapeake Bay Program Watershed Model Phase 5.3.2				
Sub source	**Pollutant**	**Total Existing Acres Served by MS4 (6/30/09)**	**2009 EOS Loading Rate (lbs/acres)**	**Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)**
Regulated Urban Impervious	Nitrogen	9.39	1,597.88	15,004.09
Regulated Urban Pervious		6.99	3,357.69	23,470.25
Regulated Urban Impervious	Phosphorus	1.76	1,597.88	2,812.27
Regulated Urban Pervious		0.5	3,357.69	1,678.85

4.0 Load Reduction Requirements

4.1 Existing Developed Lands

The pollutant load reduction requirements for nitrogen and phosphorus from existing developed lands were calculated using Table 3a presented in Part II.A.3 of the MS4 General Permit and presented below as Table 2. The total calculated reduction requirements are reported to the nearest pound.

Table 2. 2013-2028 Permit Cycle Required Reductions (100%)

Table 3a: Calculation Sheet for Estimating Existing Source Loads and Reduction Requirements for the James River Basin								
Sub source	**Pollutant**	**Loading Rate (lbs/ac/yr)**	**Existing Developed Lands as of 6/30/09 served by the MS4 within the CUA (acres)**	**Loads (lbs/yr)**	**Percentage of MS4 Required Chesapeake Bay Total L2 Loading**	**Percentage of L2 Required Reduction by 10/31/2028**	**100% Cumulative Reduction Required by 10/31/2028 (lbs/yr)**	**Sum of 100% Cumulative Reduction (lbs/yr)**
Regulated Urban Impervious	Nitrogen	9.39	1,597.88	15,004.09	9%	100%	1350.37	2759
Regulated Urban Pervious		6.99	3,357.69	23,470.25	6%	100%	1408.22	
Regulated Urban Impervious	Phosphorus	1.76	1,597.88	2,812.27	16%	100%	449.96	572
Regulated Urban Pervious		0.5	3,357.69	1,678.85	7.25%	100%	121.72	

4.2 Offsets from New Sources

The City is required to calculate offsets from new sources for the 2010 census urban area and the expanded 2020 census urban area, initiating construction between July 1, 2009 and June 30, 2019 designed in accordance with Part II C of the VSMP regulations if the activity disturbed one acre or greater and the resulting TP load was greater than 0.45 lb/acre/year. The City of Petersburg has not allowed any projects to be built with a land cover condition greater than 16% impervious area for the design of post-development stormwater management facilities through a “fee-in-lieu of” or similar program.

4.3 Grandfathered Projects

The City is required to calculate offsets from grandfathered projects that began construction after July 1, 2014 that disturbed one acre or greater and the resulting TP load was greater than 0.45 lb/acre/year. The City of Petersburg did not have any grandfathered projects for which offset of the increased POC loads was required.

5.0 Best Management Practices

5.1 Summary of Reductions achieved as of July 1, 2018

The City of Petersburg met the 5% POC reduction requirement determined for the 2013-2018 permit cycle by claiming credit for its Street Sweeping program and implementation of the Canal Street Biofilter.

Street Sweeping POC removal methodology and calculations were summarized in the City's 2015 Chesapeake Bay TMDL Action Plan. At that time, the POC Removal was calculated using the Chesapeake Bay TMDL Special Condition Guidance Memo 15-2005.

The Canal Street Biofilter was constructed in 2015 to treat impervious roadway runoff. Associated pollutant reductions of the level 2 bioretention facility were listed on the Construction Drawings and engineering calculations. The as-built record drawings were certified by the design engineer. The summary of pollutant reductions achieved by July 1, 2018 is presented below in Table 2.

Table 2. Summary of Best Management Practices as of July 1, 2018 (2013-2018 Permit Cycle)*

Best Management Practice	Implementation Date	Project Type	Location	% Removal Efficiency	Pollutant of Concern Removal (lbs/yr)		
					TN	TP	TSS
Street Sweeping (Lane Miles Method)	2013-2018	Street Sweeping	City Streets draining to Appomattox	657,429 Dry weight lbs collected per yr	1,643.57	657.43	197,228.65
Canal Street	12/18/2015	Bioretention	37.230851, -77.416388	60% TN, 50% TP, 88% TSS**	1.29	0.16	45.20
Credits (2018)					**1,644.86**	**657.59**	**197,273.85**
Total Reduction Required (5%)					**154.12**	**25.00**	**12,642.44**

* Relic values reported in the City's 2015 Chesapeake Bay TMDL Action Plan and effective though 2018

**Event mean concentration (EMC) reduction efficiency

5.2 Summary of Reductions achieved as of June 30, 2023

Petersburg reviewed the revised Guidance Memo issued by DEQ in February 2021 and associated revisions to the Street Sweeping BMP. The revisions resulted in a dramatically reduced credit given to street sweeping activities for which the City of Petersburg had previously relied upon to achieve a significant portion of Chesapeake Bay TMDL compliance in the 2013-2018 permit cycle, as presented above. The credits, which can be applied to the City of Petersburg's current practices per Appendix V.G.1 of the Guidance Memo, were revised, and included in Appendix B.1. Street Sweeping Crediting Methodology and B.2. 2020 Street Sweeping Schedule. The revised tabulation of credits associated with this BMP are presented in Table 5, below. Note, the City is required to document the street sweeping activities as follows:

1. "Actual sweeper routes (and type of road)
2. Total curb miles swept on each route
3. Average parking conditions and controls along the route (optional) Expert Panel Report on Street Sweeping and Storm Drain Cleaning
4. Sweeper technology used (AST or MBT)

Number of sweeping passes per year on each qualifying route. In addition, the locality should maintain records of the actual miles swept, by date, for entire the MS4 sweeper fleet, over the reporting year."

A summary of progress toward Chesapeake Bay TMDL implementation projects is presented in Table 5, which lists BMPs implemented by the permitee prior to the expiration of this permit to meet cumulative reductions.

Table 5. Summary of Progress with Planned Best Management Practices.

Project Name	Project Status***	Type of BMP	Location	% Removal Efficiency	Pollutant of Concern Removal (lbs/yr)		
					TN	TP	TSS
Street Sweeping (Lane Miles Method)	Ongoing	Street Sweeping	City Streets draining to Appomattox	657,429 Dry weight lbs collected per yr	6.04	0.38	871.54
Culpeper Avenue	Completed	Hydrodynamic Structure	37.23569290, -77.37553535	35% TN, 20% TP, 70% TSS*	14.43	1.15	604.00
Fleets Branch, Phase 2	Ongoing	Stream Restoration	37.242323, -77.419040	50% TN, 50% TP, 50% TSS	510.32	134.01	44,637.10
Canal Street	Completed	Bioretention	37.230851, -77.416388	60% TN, 50% TP, 88% TSS*	1.29	0.16	45.20
Shirley Ave Stream Restoration (Project J)	Ongoing	Stream Restoration	33.206143, -77.400323	50% TN, 50% TP, 50% TSS	503.90	153.70	53,003.00
Credits (lbs/yr)					1,035.98	289.40	99,160.84
Total Reduction Required (40%, 2023)					1,103.43	228.67	98,412.35
Credit Surplus (2023)						60.73	748.49

*Event mean concentration (EMC) reduction efficiency

**Refer to Appendix B for calculations and 2020 street sweeping schedule

*** Project status as of the writing of this report

5.3 Compliance Planning for this Permit Cycle (2023-2028)

5.2.1 Street Sweeping

Petersburg continues to utilize street sweeping as one facet of compliance achievement techniques and applies credit in accordance with the revised Guidance Memo issued by DEQ in February 2021 and associated revisions to the Street Sweeping BMP. Note, the City is required to document the street sweeping activities as follows:

5. "Actual sweeper routes (and type of road)
6. Total curb miles swept on each route
7. Average parking conditions and controls along the route (optional) Expert Panel Report on Street Sweeping and Storm Drain Cleaning
8. Sweeper technology used (AST or MBT)
9. Number of sweeping passes per year on each qualifying route. In addition, the locality should maintain records of the actual miles swept, by date, for entire the MS4 sweeper fleet, over the reporting year."

5.2.2 Retrofit Projects

The City will continue to identify and implement retrofit activities, including the retrofit of hydrodynamic facilities and other stormwater BMPs.

5.2.3 Stream and Outfall Restoration

5.2.3.1 City-wide Stream and Outfall Restoration Projects

In 2020, the City conducted a study to identify stream restoration and/or outfall restoration on large parcels, including privately owned lands, which has not previously been considered. Ten potential stream restoration projects were identified for Chesapeake Bay TMDL credit (Table 3). Each of these projects provides a varying amount of POC removal and water quality benefits. Project sheets further explaining each proposed project can be found in Appendix C.

Table 3. Proposed Stream and Outfall Restoration Projects

	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Total Suspended Solids (lbs/yr)
Project A	307.10	72.70	25,055.90
Project C	205.60	56.40	19,440.70
Project F	398.30	70.40	24,276.50
Project G	208.10	76.10	10,855.00
Project H	1060.90	213.80	64,067.00
Project J Extension	247.01	75.34	25,981,86
Project K	576.10	128.20	41,661.00
Project L	337.90	75.00	25,863.00
Project M	85.50	16.00	5,518.40
Project N	234.70	56.30	18,264.00

5.2.4 Surplus Property Evaluation for Land Conversion Potential

The City analyzed 42 discrete publicly owned parcels for the Land Use Change strategy described in Appendix V.H of the Guidance Memo. Two discrete sets of analyses were performed for the surplus properties: 1) existing land cover to Forested and 2) existing land cover to Mixed Open.

Pounds of POC removal potential were analyzed for each property to determine which properties have potential for converting land cover to Forested or Mixed Open land cover. Costs per pound of POC removed were also considered in the analysis. The analysis identified three (3) potential cost effective opportunities for land cover change credit, see Table 4:

- A planning area identified in the surplus property evaluation includes several adjoining or adjacent parcels on Pocahontas Island. Pocahontas Island represents significant potential for land cover change; however, it was noted that the land cover conversion could be accomplished in concert with economic and/or re-development.
- The former southside regional hospital site may have potential for land cover change should economic development projects fall though; or enhanced pollutant removal could be achieved through redevelopment.

- The parcel at 522 Hinton Street, as well as surrounding parcels, may have potential for land cover change.

Table 4. Land Use Change POC Removal Potentials per Petersburg Planning Areas

Planning Area	Pollutant of Concern Removal (lbs/yr) Conversion to Forested			Pollutant of Concern Removal (lbs/yr) Conversion to Mixed Open		
	TN	TP	TSS	TN	TP	TSS
Pocahontas Island	251.87	33.54	23,880.42	237.78	25.50	4,619.32
Former Southside Hospital	196.05	23.13	19,352.79	185.77	17.23	4,238.59
Hinton Street	5.19	1.13	378.93	4.80	0.91	0

5.2.5 Storm Drain Cleaning

The Guidance Memo offers credit methodology for Storm Drain Cleaning, which requires documentation and record keeping. The City does not presently have a system for pro-active cleaning and maintenance of storm drains but intends to track the quantity of dry sediment and associated nutrient removed prior to proper disposal in this permit cycle.

6.0 Cumulative Reduction Strategy (2023-2028 General Permit)

A summary of progress toward Chesapeake Bay TMDL implementation projects is presented in Table 5, which lists BMPs implemented by the permitee prior to the expiration of this permit to meet cumulative reductions.

Table 5. Summary of Progress with Planned Best Management Practices.

Project Name	Type of BMP	Location*	% Removal Efficiency	Pollutant of Concern Removal (lbs/yr)		Preliminary Schedule
				TN	TP	Completed By:
Extension of Stream Restoration Project J	Stream Restoration	1600 Shirley Avenue	50% TN, 50% TP, 50% TSS	247.01	75.34	February 2025
Stream Restoration Project G	Stream Restoration	1602 Johnson Road	50% TN, 50% TP, 50% TSS	208.10	76.10	May 2025
Stream Restoration Project C	Stream Restoration	1100 Patterson Street	50% TN, 50% TP, 50% TSS	205.60	56.40	February 2027
Stream Restoration Project L	Stream Restoration	1200 East Washington Streer	50% TN, 50% TP, 50% TSS	337.90	75.00	May 2026
Stream Restoration Project A	Stream Restoration	522 South West Street	50% TN, 50% TP, 50% TSS	307.10	72.70	July 2028
Stream Restoration Project K	Stream Restoration	1200 East Washington Street	50% TN, 50% TP, 50% TSS	576.10	128.20	June 2028
Credits achieved in this cycle (lbs/yr)				1,881.81	128.20	
Credits achieved in prior cycles (lbs/yr)**				1,035.98	289.40	
Cumulative Credits (lbs/yr)				**2,917.79**	**773.14**	
Total Reduction Required (100%, 2028)				2,759	572	
Credit Surplus				158.79	201.14	

*Event mean concentration (EMC) reduction efficiency

**Refer to Appendix B for calculations and 2020 street sweeping schedule

The City of Petersburg plans to use the strategies described above and referenced in the Appendices for future regulatory pollutant of concern (POC) reduction requirements.

7.0 Public Comments

Per Part II A.11.f and A.12 of the General Permit, the City will provide a 15-day period (minimum) for public participation to provide input on the additional BMPs being proposed this Action Plan. The City Stormwater Manager will present this Action Plan to Council and public and allow for comments for 15 days (minimum). Any comments that are received from the public will be recorded, along with the City's responses and changes made to the Action Plan as a result. These comments will be included in the final version of the Action Plan.