PORT TOBACCO WATERSHED

SEDIMENT TMDL RESTORATION PLAN

OCTOBER | 2020

PREPARED FOR

Charles County

Department of Planning and

Growth Management

Watershed Protection and Restoration Program

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List of Acronyms

AFG	Accounting for Growth
BIBI	Benthic Index of Biotic Integrity
BMP	Best Management Practice
BSID	Biological Stressor Identification
CAST	Chesapeake Assessment Scenario Tool
CBP	Chesapeake Bay Program
CIP	Capital Improvement Program
CWA	Clean Water Act
EOS	Edge of Stream
EOT	Edge of Tide
EPA	United States Environmental Protection Agency
ESD	Environmentally Sensitive Design
FAP	Financial Assurance Plan
FIBI	Fish Index of Biotic Integrity
GIS	Geographic Information System
LA	Load Allocation
LULC	Land use / Land cover
MBSS	Maryland Biological Stream Survey
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MS4	Municipal Separate Storm Sewer System
NGO	Non-governmental Organization
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometer Turbidity Units
ROW	Right of Way
SPSC	Step Pool Storm Conveyance
SW to MEP	Stormwater to the Maximum Extent Practicable
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
WIP	Watershed Implementation Plan
WLA	Waste Load Allocation
WM P6	Watershed Model Phase 6
WPRP	Watershed Protection and Restoration Program
WQIP	Water Quality Improvement Projects

Executive Summary

This restoration plan addresses the total suspended solids (TSS; sediment) TMDL for the Port Tobacco River watershed in Charles County, Maryland, which was approved by the Environmental Protection Agency (EPA) on October 11, 2019.

Sediment, both from upland and in-stream sources, can degrade in-stream habitat for aquatic organisms by covering and filling gravelly and rocky substrate with finer clays, silts, and sands. Increases in sediment loads in channels that cannot adequately transport the load can lead to deposition and aggrading streams. These factors often negatively impact channel flow, causing additional erosion and increases in flooding. Suspended sediment in the water column may limit light penetration and prohibit healthy propagation of algae and submerged aquatic vegetation.

The majority of sediment loads in the Port Tobacco River watershed originate from urban stormwater, agricultural runoff, and in-stream sources related to channel erosion. The most significant contributing land use categories related to urban and agricultural stormwater in terms of both loading rates and proportion of watershed include row crops, transportation, commercial, and industrial areas. Although channel bed and bank erosion occurs naturally as streams work to maintain a state of dynamic equilibrium, excessive erosion can occur due to increased streamflow velocities. Increased velocities can be associated with development activities that increase imperviousness and agricultural activities that encroach on riparian buffers within the watershed.

The Port Tobacco River watershed TMDL requires a 34.0% reduction of sediment loads from 2009 baseline levels to achieve the target stormwater waste load allocation (SW-WLA) for Charles County's National Pollutant Discharge Elimination System (NPDES) regulated stormwater discharges. A planning horizon of 2035 is used as the date to achieve the load reductions.

The Chesapeake Assessment Scenario Tool (CAST) Chesapeake Bay Program Watershed Model Phase 6 (CBP WM P6) model was used to model baseline, progress, and planned loads. Using CAST, the sediment loads are translated from the values derived by the Bay model version 5.3.2 that was used in the development of the TMDL and calibrated to the Phase 6 model, making them compatible with current methods following MDE recommendations. The 2009 Phase 6 calibrated baseline load was determined to be 13,488,638 lbs/year. Applying the 34% required reduction results in a reduction goal of 4,586,137 lbs/yr.

A suite of possible best management practice (BMP) types was developed that, if implemented, would achieve the required load reduction. BMPs include stormwater BMPs, such as stream restoration, bioretention, bioswale, wet ponds; land use change BMPs, such as impervious surface reduction and tree planting; and programmatic annual practices, such as inlet cleaning. The total projected cost to implement the projects described in this plan for the Port Tobacco River watershed is approximately $24,769,414.

Progress will be measured through tracking implementation of management measures, estimating load reductions through modeling, and tracking overall program success through long term monitoring. Planning targets will be re-evaluated against progress and revised to ensure that Charles County is on track to meet established goals.

1 Introduction

1.1 Background and Purpose

Charles County Department of Planning and Growth Management (PGM) is developing restoration plans to address local water quality impairments for which a Total Maximum Daily Load (TMDL) has been established by the Maryland Department of the Environment (MDE) and approved by the U.S. Environmental Protection Agency (EPA). A TMDL establishes a maximum load of a specific single pollutant or stressor that a waterbody can assimilate and still meet water quality standards for its designated use class.

Under the Federal Clean Water Act (CWA), the State of Maryland is required to assess and report on the quality of waters throughout the state. Where Maryland's water quality standards are not fully met, Section 303(d) requires the state to list these water bodies as impaired waters. States are then required to develop a TMDL for pollutants of concern for the listed impaired waters. The Port Tobacco River watershed has a listing in Maryland's Integrated Report of Surface Water Quality [303(d) list and 305(b) Report] for sediment pollution. An approved total suspended solids (TSS; sediment) TMDL for the Port Tobacco River watershed from urban stormwater sources was approved by the EPA on October 11, 2019. The Port Tobacco River watershed is entirely contained within Charles County, therefore this plan will specifically address the Port Tobacco River sediment TMDL under the responsibility of Charles County.

Responsibility for the Port Tobacco River sediment reduction is divided among the pollution source categories, which in this case includes non-point sources (termed load allocation or LA) and point sources (termed waste load allocation or WLA). The WLA consists of loads attributable to regulated process water or wastewater treatment, and to regulated stormwater. For the purposes of the TMDL and consistent with implementation of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Discharge Permit (MS4), stormwater runoff from MS4 areas is considered a point source contribution.

Charles County's current MS4 permit (11-DP-3322, MD0068365) issued in its final form by the MDE on December 26, 2014 requires development of restoration plans for each stormwater WLA approved by EPA prior to the effective date of the permit (permit section IV.E.2.b). This plan satisfies this permit requirement and provides the loading target, recommended management measures, load reduction estimates, schedule, milestones, cost estimates and funding sources, and the tracking and monitoring approaches to meet the stormwater WLA (SW-WLA).

It is noted that TMDL restoration plans are an important first step. The MS4 permit calls for an iterative and adaptive plan for implementation. If new methods of stormwater treatment are identified, or better approaches to source control are found, the plans can be extended and updated to take the changes into account. Similarly, if some elements of the plans are not as successful as expected, adaptations and improvements will be incorporated in future updates.

This plan demonstrates that Charles County will meet its sediment SW-WLA for the Port Tobacco River watershed by 2035. The strategies proposed will provide treatment to reduce current sediment loads from the urban stormwater sector.

1.2 TMDL Allocated and Planned Loads Summary

The following Restoration Plan only addresses loads allocated to Charles County NPDES regulated stormwater point source sediment. Additional SW-WLAs for the Port Tobacco River watershed TMDL assigned to Maryland State Highway Administration, the Town of La Plata, and other NPDES regulated stormwater are not the responsibility of Charles County and are not addressed in this plan.

The Port Tobacco watershed TMDL requires a 34.0% reduction of sediment loads from 2009 baseline levels to achieve the target SW-WLA for Charles County NPDES regulated stormwater. A planning horizon of 2035 will be used as the date to achieve these load reductions with 2025, 2030, and 2035 proposed as interim milestones to assess progress.

The Chesapeake Assessment Scenario Tool (CAST) Chesapeake Bay Program Watershed Model Phase 6 (CBP WM P6) model was used to model baseline, progress, and planned loads. CAST, created by the Chesapeake Bay Program, is a web-based pollutant load estimating tool that calculates pollutant loads and reductions calibrated to the Chesapeake Bay Program Partnership Watershed Phase 6 Model. Using CAST, the sediment loads are translated from the values derived by the Bay model version 5.3.2 that was used in the development of the TMDL and calibrated to the Phase 6 model, making them compatible with current methods following MDE recommendations. The 2009 baseline load was determined to be 13,488,638 lbs/year. The 34% required reduction results in a reduction of 4,586,137 lbs/yr. Details of the modeling and load calculations are included in sections 4 and 5.

Based on MDE guidance, growth in the stormwater load since the TMDL baseline year was not accounted for in the development of this plan. Local TMDLs are considered met, from a planning perspective, when the load reductions associated with 2009 restoration progress coupled with the planned restoration load reductions exceed the load reduction required.

This section of the plan, including Table 1, provides a concise summary of the loads and reductions at important timeline intervals including the 2009 baseline, 2019 progress, 2030 interim milestone and 2035 final planning intervals. These terms and dates are used throughout the plan and explained in more detail in the following sections. They are presented here to assist the reader in understanding the definitions of each, how they were derived, and to provide an overall summary demonstrating the percent reduction required and percent reduction achieved through full implementation of this plan. Sediment loads and wasteload allocations are presented as tons/year in the *Total Maximum Daily Load of Sediment in the Non-Tidal Port Tobacco River Watershed, Charles County, Maryland* document but will be discussed as lbs/year in this restoration plan.

- **2009 Baseline Loads**: Baseline levels (i.e., land use loads with baseline best management practices or BMPs) from 2009 conditions in the Port Tobacco River watershed were calculated and calibrated by modeling the BMP implementation up to baseline year 2009 in the Chesapeake Assessment Scenario Tool (CAST) Chesapeake Bay Program Watershed Model Phase 6 (CBP WM P6) model. Baseline loads were used to calculate the stormwater allocated sediment loads, or SW-WLA.
- **FY2019 Progress Loads and Reductions**: Progress loads and load reductions achieved from stormwater best management practice (BMP) implementation through FY2019 were calculated using CAST. The FY2019 Progress Load Reductions are calculated from the 2009 Baseline Loads by the following calculations: 2009 Baseline Load – FY2019 Progress Load.

- **2030 Interim Milestone Goal Loads and Planned Loads and Reductions**: Planned 2030 loads and reductions will result from implementation of strategies through 2030. The 2030 Planned Load Reductions are calculated from the 2009 Baseline Loads by the following calculation: 2009 Baseline Load – 2030 Planned Load.
- **2035 Allocated Load**: Allocated loads are calculated from the 2009 baseline levels, calibrated to CBP WM P6 as noted above, using the following calculation: 2009 Baseline Load – (2009 Baseline Load x 0.34).
- **2035 Planned Loads and Planned Reductions**: Loads and reductions that will result from implementation of this plan. The 2035 Planned Load Reductions are calculated from the 2009 Baseline Load by the following calculation: 2009 Baseline Load – 2035 Planned Load.

Table 1: Port Tobacco River Local TMDL Allocated and Planned Loads

	Sediment (tons/year)	Sediment (lbs/year)
2009 Baseline Loads	6,744	13,488,638
2019 Progress Loads	6,709	13,417,490
2019 Progress Reductions	36	71,148
2030 Planned Loads	5,156	10,311,694
2030 Planned Reductions	1,588	3,176,945
2035 TMDL Allocated Loads	4,451	8,902,501
2035 Planned Loads	4,355	8,709,370
2035 Planned Reductions	2,354	4,779,268
Required Percent Reduction	34.0%	34.0%
Planned Percent Reduction Achieved	35.4%	35.4%

1.3 Restoration Plan Elements and Structure

This plan is developed within the context of on-going watershed management planning, restoration, and resource protection being conducted by Charles County. The County initiated comprehensive watershed assessment and management plans in 2014, beginning with the Port Tobacco Watershed, and has completed plans for all of the 10 major watersheds. A comprehensive watershed assessment for the Port Tobacco River watershed was completed in 2015. The County also prepared a Phase II Watershed Implementation Plan (WIP) in 2013 and a Restoration Plan in 2016, in response to requirements set forth in the Chesapeake Bay TMDL for nitrogen, phosphorus and sediment. Information synthesized and incorporated into this plan for the Port Tobacco River watershed draws upon these sources with updates and additions where necessary to meet the specific goals of the SW-WLA. The TMDL analyses and reports developed by MDE are also referenced. These primary sources include:

- Port Tobacco River Watershed Assessment (Charles County, 2015)
- Charles County Phase II Watershed Implementation Plan Strategy (Charles County, 2013)
- Charles County Municipal Stormwater Restoration Plan (Charles County, 2016b)
- Total Maximum Daily Load of Sediment in the Non-Tidal Port Tobacco River Watershed, Charles County, Maryland (MDE, 2019c)

MDE has prepared several guidance documents to assist municipalities with preparation of TMDL restoration plans. This plan is developed following the guidance detailed in the following documents with modifications as necessary:

- General Guidance for Developing a Stormwater Wasteload Allocation (SW-WLA) Implementation Plan (MDE, October 2014a)
- Guidance for Developing Stormwater Wasteload Allocation Implementation Plans for Nutrient and Sediment Total Maximum Daily Loads (MDE, November 2014b)
- Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated (MDE, August 2019a)

The Port Tobacco River plan has been prepared in accordance with the EPA's nine essential elements for watershed planning. These elements, commonly called the 'a through i criteria' are important for the creation of thorough, robust, and meaningful watershed plans and incorporation of these elements is of particular importance when seeking implementation funding. The EPA has clearly stated that to ensure that Section 319 (the EPA Nonpoint Source Management Program) funded projects make progress towards restoring waters impaired by nonpoint source pollution, watershed-based plans that are developed or implemented with Section 319 funds to address 303(d)-listed waters must include at least the nine elements.

The Port Tobacco River watershed restoration plan is organized based on these elements. A modification to the order has been incorporated such that element c., a description of the management measures, is included before element b., the expected load reductions. We feel this modified approach is easier to follow. The letters (a. through i.) are included in the headers of the plan's major sections to indicate to the reader the elements included in that section. The planning elements are:

a. An identification of the causes and sources that will need to be controlled to achieve the load reductions estimated in the plan and to achieve any other watershed goals identified in the plan, as discussed in item (b) immediately below. (Section 3)

b. An estimate of the load reductions expected for the management measures described under paragraph (c) below, recognizing the natural variability and the difficulty in precisely predicting the performance of management measures over time. (Section 5)

c. A description of the management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above as well as to achieve other watershed goals identified in the plan, and an identification of the critical areas in which those measures will be needed to implement this plan. (Section 4)

d. An estimate of the amount of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan. (Section 6)

e. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the recommended management measures. (Section 7)

f. A schedule for implementing the management measures identified in this plan that is reasonably expeditious. (Section 8)

g. A description of interim, measurable milestones for determining whether management measures or other control actions are being implemented. (Section 8)

h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the plan needs to be revised. (Section 9)

i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above. (Section 10)

The outcomes of the planning effort are to provide guidance for the strategic implementation of watershed protection and restoration efforts that will advance progress toward meeting Charles County's local TMDLs pollutant loading allocations, and ultimately meeting water quality standards. Successful implementation of the plan will lead to improvements in local watershed conditions and aquatic health.

1.4 Additional County Planning Documents

The solutions outlined in this Restoration Plan to meet the Port Tobacco River watershed sediment TMDL align with goals presented in several other County plans, listed below. BMPs such as stormwater management, tree planting, and stream restoration, will not only help achieve sediment reduction in the watershed, but will also further the County's goals related to hazard mitigation, climate resilience, flooding, and protection of natural resources. Many of the goals outlined in these other County plans will also have the additional benefit of reducing sediment runoff throughout the County.

1.4.1 Hazard Mitigation Plan

The Charles County 2018 Hazard Mitigation Plan Update (HMP; Charles County, 2018) presents the County's strategy for reducing the risks of hazards through implementation of policies, programs, and projects. Hazards identified in the Plan include, among others, erosion, extreme weather, floods, hurricanes, tropical storms, and nor'easters.

Goal 1 of the HMP is to "protect existing natural resources and preserve environmentally sensitive areas where hazard potential is high" (Charles County, 2018). Objectives under this goal include protecting natural resources, open space, parks, wetlands, floodplains, and steep slopes and improving the flood controlling abilities of these spaces through restoration when needed. Goal 3 of the HMP is to "attempt to reduce the current and future risk of flood damage" (Charles County, 2018). Objectives under this goal include addressing stormwater issues, reducing future development in flood hazard areas, and evaluating and updating existing floodplain ordinances.

Objectives described under these two goals (preserving and restoring natural resources, addressing stormwater management in existing communities, reducing future development) also have the potential to reduce sediment loads in the watershed.

1.4.2 Climate Resilience Action Strategy

The University of Maryland has drafted the *Climate Resilience Action Strategy* on behalf of Charles County (University of Maryland, 2020) with the goal of creating more resilient communities and restoring natural resources in order to be better prepared for the increasing effects of climate change. Stormwater management facilities can help mitigate roadway flooding associated with the increased flooding that is expected with climate change, therefore a goal that 50% of all stormwater associated with roads is managed on-site by 2030 and 100% managed by 2050 was established. Another goal of repairing, maintaining, and upgrading non-road stormwater management facilities was established, with a performance target of 10% of the prioritized stormwater management structures improved by 2030, 25%

by 2040, and 50% by 2050. The county aims to develop a public outreach plan to work with home owners and HOAs on maintenance and repair of these facilities. Achievement of the goals established in this plan will help deal with the effects of climate but, but also result in more stormwater treatment and a reduction in sediment loads to nearby receiving streams, and ultimately the Port Tobacco River and Chesapeake Bay.

1.4.3 County Commissioners Goals

The Charles County Board of Commissioners established its 2019-2021 Goals and Objectives during a retreat in February 2019 (Board of Commissioners, 2019). The five goals relate to economic development and supportive services, institutional governance and policy, environment, education, and quality of life. Goal 3 addresses environmental goals, including conservation programs such as forest conservation and agricultural land preservation, natural resource management, and environmental management such as wastewater, protecting clean water, and stormwater management. Projects identified in this Restoration Plan can help achieve many of these goals.

1.4.4 Nuisance and Urban Flooding Plan

The Charles County Nuisance and Urban Flooding Plan looks to address issues associate with both nuisance and urban flooding, which are happening more frequently in areas outside of floodplains. Nuisance flooding occurs as a result of high tides and is occurring more frequently due to rising water levels in the Chesapeake Bay. Urban flooding is not related to high tides, but is largely a result of increased impervious surfaces and inadequate stormwater management systems. Both types of flooding can result in traffic disruptions, damage to buildings and infrastructure, and waterway pollution. The Plan will determine where both nuisance and urban flooding is occurring throughout the County, identify the sources, and offer recommendations to reduce the flooding and make County residents safer and more resilient to the flooding (Charles County, n.d.). Designing best management practices to treat additional water quality treatment volume and additional storage in excess of the typical 1 inch of rainfall depth is one potential solution to nuisance flooding, but could also protect the watershed from additional sediment entering the streams and reduces risks of downstream flooding and erosion. Green Stormwater Infrastructure (GSI) describes BMPs designed to use natural processes with vegetation and soils. These BMPs are typically more sustainable, have higher TSS removal efficiencies, and may also be an excellent solution to both nuisance flooding and protecting streams from sedimentation (MDE, 2019a).

2 Watershed Characteristics

2.1 Watershed Delineation

The Port Tobacco River watershed is one of 10 major watersheds in Charles County, Maryland. The watershed is situated in the central portion of the County, with Mattawoman Creek watershed to the north, Nanjemoy Creek watershed to the west, and Zekiah Swamp watershed to the east (Figure 1Figure 1). The watershed falls entirely within Charles County's boundary. The Port Tobacco River watershed drains directly south into the Port Tobacco River, which drains to the Potomac River, which ultimately leads to the Chesapeake Bay. Communities within the Port Tobacco watershed include La Plata, Pomfret, and Port Tobacco.

The Port Tobacco River watershed is approximately 30,100 acres (47.0 square miles) in area and contains approximately 104 total miles of streams. The watershed includes several named streams, including Hoghole Run, Wills Branch, and Jennie Run.

Figure 1: Port Tobacco River Watershed

2.2 Land Use/Land Cover

The type and density of various land uses can have a dramatic effect on water quality and stream habitat. Forested areas slow stormwater flow and allow water to gradually seep into soils and drain into streams. Vegetation and soils bind nutrients and pollutants found within stormwater—improving water quality as it infiltrates the ground. Developed areas, with a high percentage of impervious surfaces (buildings, paved roads, parking lots, etc.), do not reduce either the volume or flow of stormwater—increasing the amount of pollutants entering streams. Increased stormflow affects stream habitat negatively by increasing bank erosion and decreasing instream and riparian habitat. Agricultural land, if managed incorrectly, can also impair streams with increases in nutrients, sediment, and bacteria.

See Figure 2 for aerial imagery of the Port Tobacco watershed. Two land use/land cover (LULC) datasets were analyzed: 2010 LULC from Maryland Department of Planning (MDP; Figure 3) and 2013/2014 land cover from the Chesapeake Conservancy (Figure 4). These data were used to characterize the watershed and show potential pollution sources. MDP dataset was generated from a combination of aerial photography and parcel data and classifies the land area into 13 distinct types of land use (i.e. low to high density residential, commercial, industrial) or land cover (i.e. agriculture, forest). The Chesapeake Conservancy created a higher resolution (one-meter) land cover dataset from aerial photography and LiDAR elevation data, which is used in the load calculations of the Chesapeake Bay Program Partnership Watershed Model Phase 6.

2.2.1 Maryland Department of Planning 2010 Land Use/Land Cover

According to 2010 LULC data (Table 2), the largest category in the Port Tobacco watershed is forested land (45.6%) followed by low density residential (15.5%) and cropland (13.5%). Developed land accounts for 30.6% of the watershed and largely consists of residential (25.8%) and commercial (2.2%). Development in the watershed is clustered around Route 301, particularly around the town of La Plata.

Table 2: 2010 Land Use / Land Cover, MDP 2010 Dataset

Land Use / Land Cover Type	Acres	Percent of Watershed
Low-Density Residential	4,655.1	15.5%
Medium-Density Residential	678.9	2.3%
High-Density Residential	271.8	0.9%
Commercial	668.7	2.2%
Industrial	85.7	0.3%
Institutional	461.7	1.5%
Extractive	51.7	0.2%
Open Urban Land	104.7	0.3%
Cropland	4,076.3	13.5%
Pasture	344.6	1.1%
Deciduous Forest	10,650.8	35.4%
Evergreen Forest	344.8	1.1%
Mixed Forest	2,715.6	9.0%
Brush	279.6	0.9%
Water	2,032.3	6.8%

Wetlands	224.0	0.7%
Bare Ground	123.6	0.4%
Transportation	144.8	0.5%
Large lot subdivision (agriculture)	432.4	1.4%
Large lot subdivision (forest)	1,723.7	5.7%
Feeding Operations	13.4	<0.1%
Agricultural Building	16.1	0.1%
Total	**30,100.2**	**100.0%**

2.2.2 Chesapeake Conservancy 2013/2014 Land Cover

The Chesapeake Conservancy 2013/2014 land cover is a much higher resolution dataset than the MDP parcel scale dataset. This results in a higher percentage of natural land cover types (i.e. shrubland, herbaceous vegetation (includes residential lawns), tree canopy) since these types have been delineated separately from adjacent developed land cover types. For example, lawns and many forested areas are included within residential areas in MDP dataset.

Tree canopy accounts for the largest proportion of land cover, at 63.7%, followed by herbaceous vegetation (includes residential lawns, cropland, and pasture) at 20.5%. Structures and impervious surfaces only account for 4.6% of the watershed area (Table 3).

Table 3. Land Cover, Chesapeake Conservancy 2013/2014 Dataset

Land Cover Type	Acres	Percent of Watershed
Water	2,137.1	7.1%
Wetlands	255.7	0.8%
Tree Canopy	19,184.8	63.7%
Shrubland	122.8	0.4%
Herbaceous Vegetation	6,163.6	20.5%
Barren	106.1	0.4%
Structures	474.7	1.6%
Impervious Surfaces	917.1	3.0%
Impervious Roads	526.2	1.7%
Tree Canopy over Structures	45.8	0.2%
Tree Canopy over Impervious Surfaces	100.9	0.3%
Tree Canopy over Impervious Roads	67.2	0.2%
Total	**30,102.0**	**100.0%**

2.2.3 Impervious Surfaces

Impervious surfaces concentrate stormwater runoff, accelerating flow rates and directing stormwater to the receiving stream. This accelerated, concentrated runoff can cause stream erosion and habitat degradation. Runoff from impervious surfaces picks up and washes off pollutants and is usually more polluted than runoff generated from pervious areas. In general, undeveloped watersheds with small amounts of impervious cover are more likely to have better water quality in local streams than urbanized watersheds with greater amounts of impervious cover. Impervious cover is a primary factor when determining pollutant characteristics and loadings in stormwater runoff.

The degree of imperviousness in a watershed also affects aquatic life. There is a strong relationship between watershed impervious cover and the decline of a suite of stream indicators. As imperviousness increases the potential stream quality decreases with most research suggesting that stream quality begins to decline at or around 10 percent imperviousness (Schueler, 1994; CWP, 2003). However, there is considerable variability in the response of stream indicators to impervious cover observed from 5 to 20 percent imperviousness due to historical effects, watershed management, riparian width and vegetative protection, co-occurrence of stressors, and natural biological variation. Because of this variability, one cannot conclude that streams draining low impervious cover will automatically have good habitat conditions and a high quality aquatic life.

Impervious surfaces make up 5.7% of the overall Port Tobacco River drainage (Table 4 and Figure 5; impervious surfaces data obtained from Charles County, based on 2011 aerials and partially updated in 2019 based on 2017 aerials). Impervious surface coverage is highest in areas surrounding the Route 301 corridor. La Plata, located in the east-central part of the watershed and White Plains, located in the northern extent of the watershed, have the highest concentration of impervious surfaces in the watershed. The most common impervious surface types in the watershed are paved roads, buildings, park/playgrounds, and driveways.

Table 4: Port Tobacco Watershed Percent Impervious Cover

Impervious Type	Acres	Percent
Athletic Courts/Fields	6.86	0.4%
Buildings	460.96	26.7%
Driveway	251.21	14.5%
Park/Playground	335.93	19.4%
Paved Path	4.42	0.3%
Patio	20.50	1.2%
Pool	8.94	0.5%
Paved Road	556.39	32.2%
Shed	0.04	0.0%
Sidewalk	68.31	4.0%
Silo	0.01	0.0%
Track	1.72	0.1%
Unknown	12.39	0.7%
Total	1,727.69	100.0%

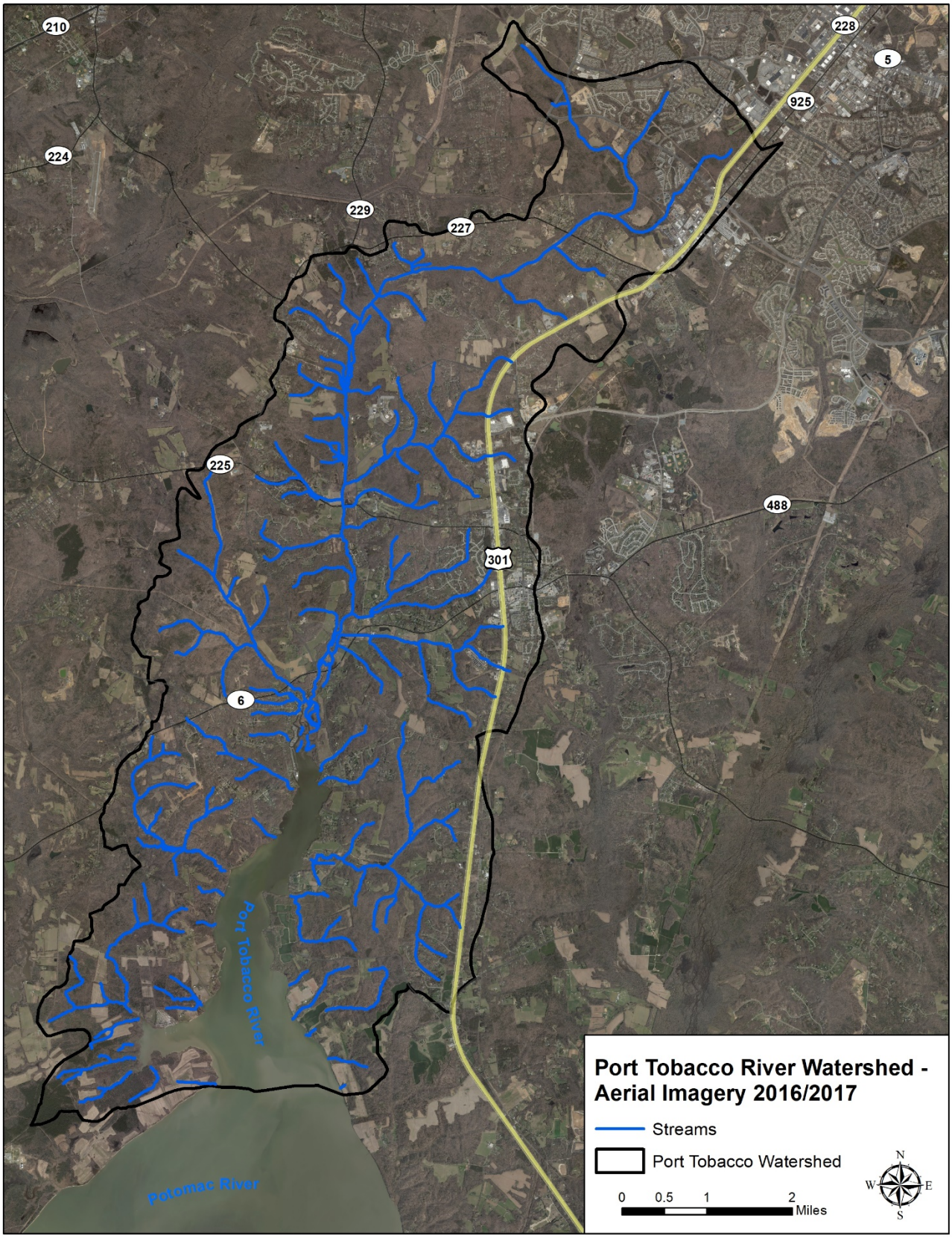

Figure 2: Port Tobacco River Watershed Aerial Imagery (2016/2017)

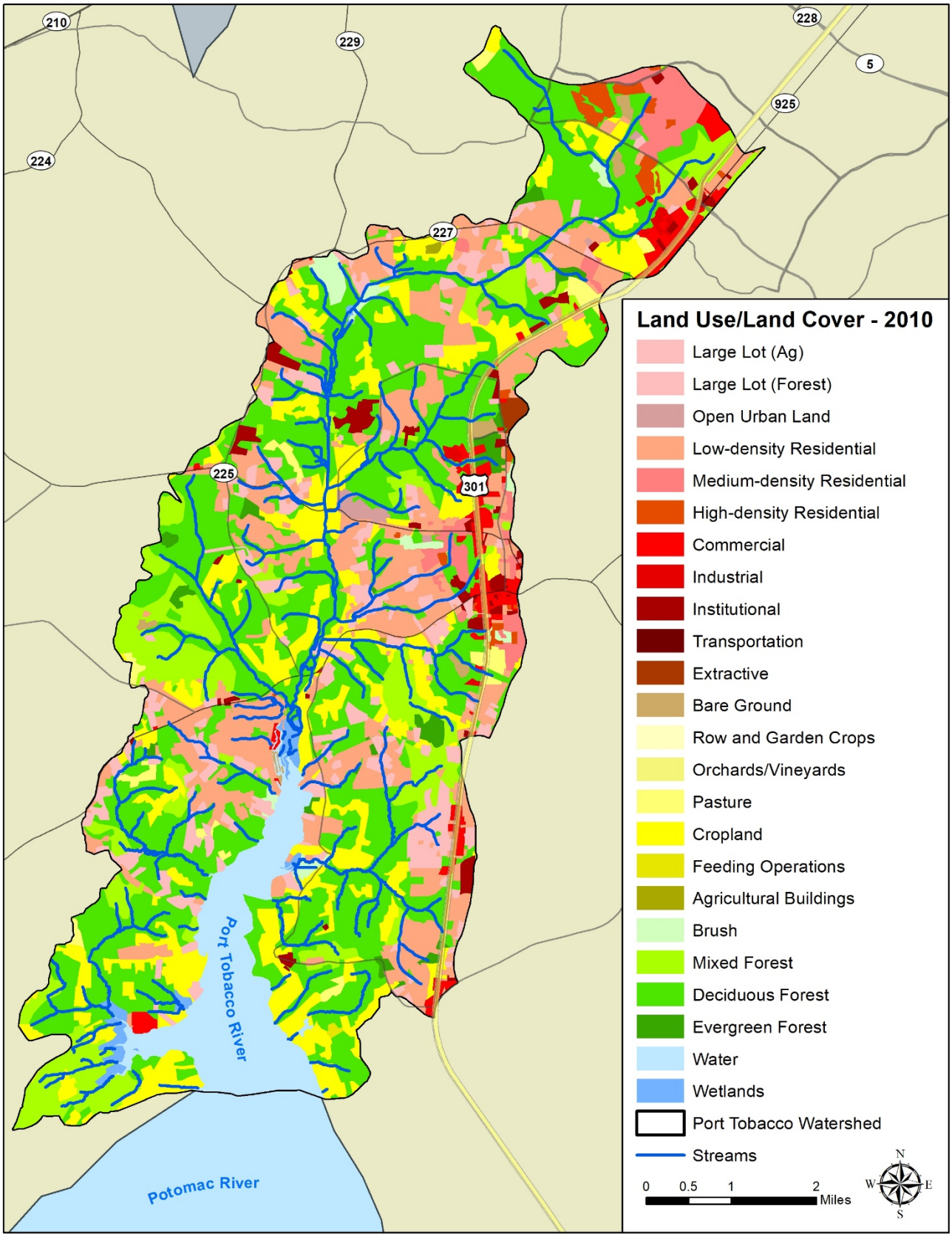

Figure 3. Port Tobacco River Watershed Land Use/Land Cover (2010)

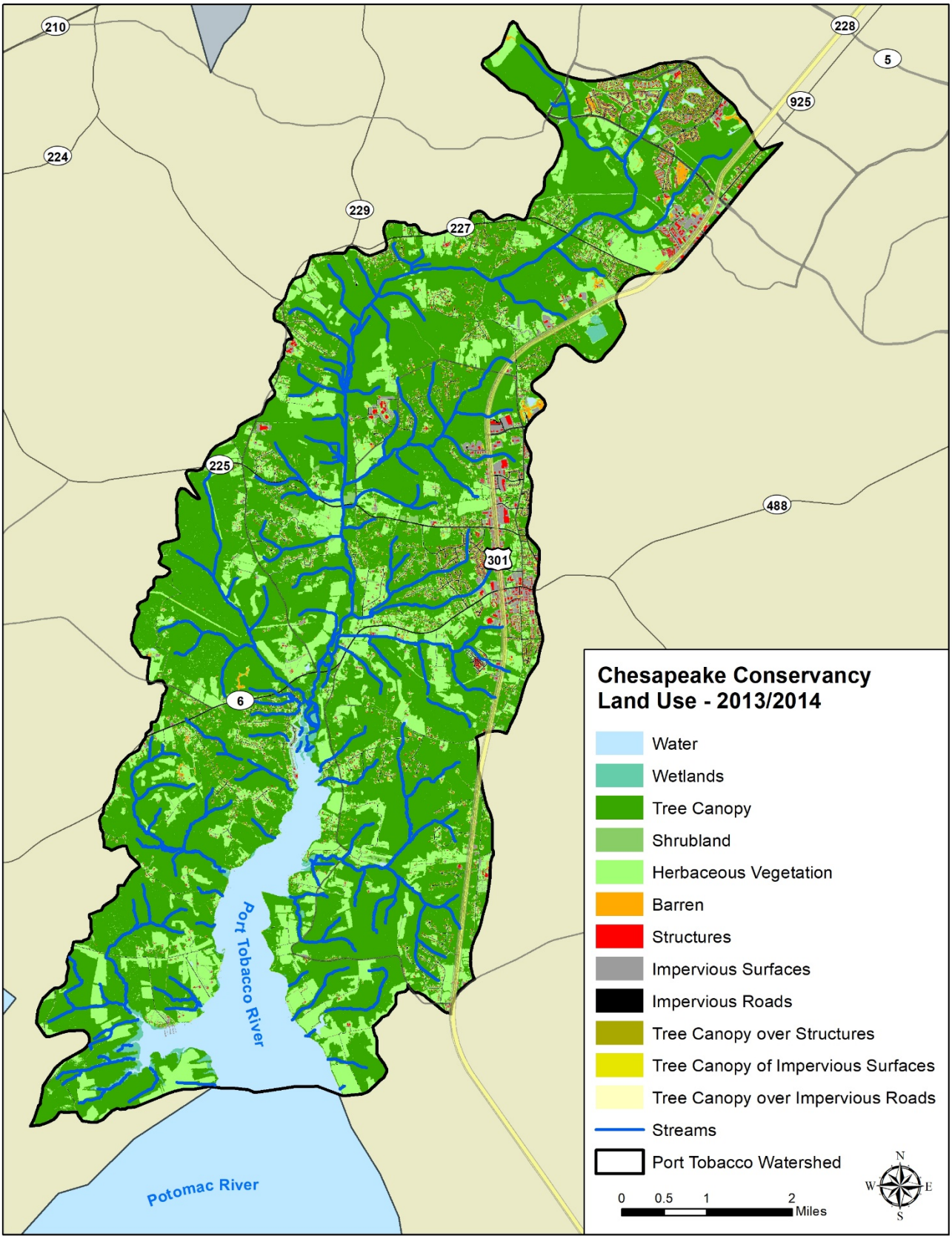

Figure 4: Port Tobacco River Watershed Land Cover (2013/2014)

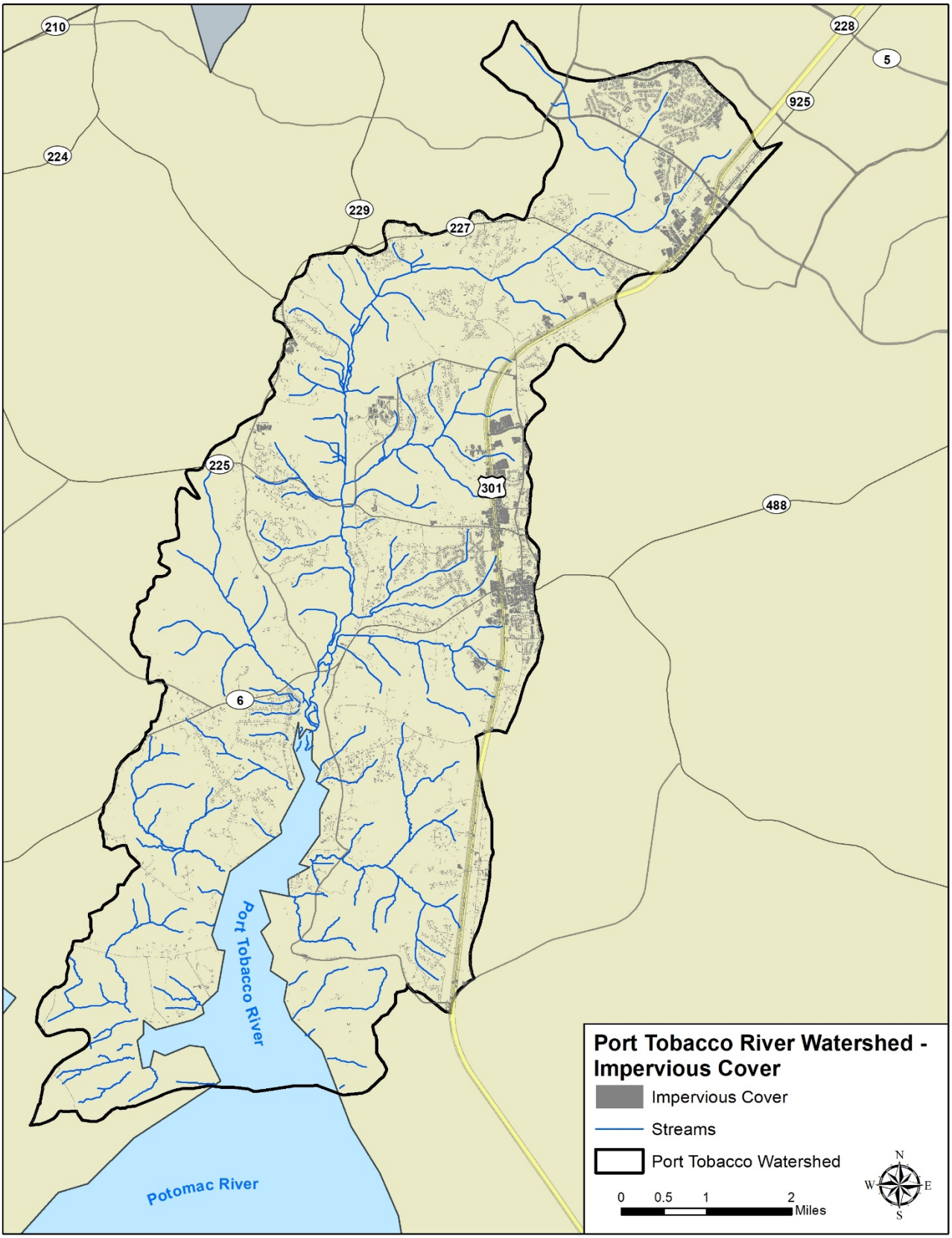

Figure 5. Port Tobacco River Watershed Impervious Cover (2011 conditions with updates based on 2017 conditions)

2.3 Water Quality

2.3.1 Use Designations

According to water quality standards established by MDE in the Code of Maryland Regulations (COMAR) 26.08.02.03-.03 - Water Quality, the Port Tobacco River watershed contains both Use I and II waters. Use Class I has the following designated uses: growth and propagation of fish (not trout), other aquatic life and wildlife; water contact sports; leisure activities involving direct contact with surface water; fishing; agricultural water supply; and industrial water supply. Use Class II refers to tidal waters and contains all of the designated uses of Use Class I with the addition of: propagation and harvesting of shellfish; seasonal migratory fish spawning and nursery use; seasonal shallow-water submerged aquatic vegetation use; open-water fish and shellfish use; and seasonal deep-channel refuge use.

In general, tidal portions of the Port Tobacco River are designated Use II, while all of the non-tidal tributary streams are designated Use I (Table 5).

Table 5: Use Designations of the Port Tobacco River Watershed

Designated Uses	Use I	Use II
Growth and propagation of fish (not trout), other aquatic life and wildlife	X	X
Water contact sports	X	X
Leisure activities involving direct contact with surface water	X	X
Fishing	X	X
Agricultural water supply	X	X
Industrial water supply	X	X
Propagation and harvesting of shellfish	-	X
Seasonal migratory fish spawning and nursery use	-	X
Seasonal shallow-water submerged aquatic vegetation use	-	X
Open-water fish and shellfish use	-	X
Seasonal deep-water fish and shellfish use	-	X
Seasonal deep-channel refuge use	-	X
Growth and propagation of trout	-	-
Capable of supporting adult trout for a put and take fishery	-	-
Public water supply	-	-

Source: https://mde.maryland.gov/programs/Water/TMDL/WaterQualityStandards/Pages/wqs_designated_uses.aspx

2.3.2 303(d) Impairments

According to Maryland's final 2018 303(d) list of impaired waters (MDE, 2019b), several segments within the Port Tobacco River watershed are listed for water quality impairments.

The Port Tobacco River watershed contains two Category 2 listings, which include those waters that meet some water quality standards, but insufficient data limits determination of all water quality standards being met. The Port Tobacco River Oligohaline is listed for TSS, SAV and Water Clarity (SAV restoration goals are being met), and the Port Tobacco River non-tidal segments are listed for enterococcus.

The Port Tobacco River watershed contains four Category 4a listings, which include those waters that are not meeting their use designation but for which a TMDL has been developed to address the impairments.

Those listed are for Total Nitrogen and Total Phosphorus for the Oligohaline portion of the river, and are addressed by the Bay TMDL.

Category 5 waters of the Port Tobacco River watershed, which include those waters that are not meeting their use designation and require a TMDL, include sulfate, TSS, and chloride for all 1st through 4th order streams. Jennie Run, Hoghole Run, Wills Branch, and Port Tobacco Creek each have individual listings for enterococcus.

2.3.3 TMDLs

Total Maximum Daily Loads (TMDLs) are established for waterbodies on Maryland's 303(d) integrated list of impaired waterbodies to set pollutant limits to achieve attainment of the designated use. For each combination of waterbody and pollutant, the State must estimate the maximum allowable pollutant load, or TMDL, that the waterbody can receive and still meet water quality standards. TMDLs are required by the Clean Water Act.

Category 4a of the 303(d) list describes impaired waters with a TMDL or other reduction measure in place. Category 5 lists impaired waters in need of a TMDL. The non-tidal 1st through 4th order tributary streams to the Port Tobacco River are listed as impaired by sediment and requiring a TMDL (Category 5) in MDE's 2018 Integrated Report. A TMDL for sediment in the Port Tobacco River watershed for Charles County was approved by EPA on October 11, 2019. This Restoration Plan focuses on implementing strategies to address the sediment TMDL which requires a 34% reduction of Charles County NPDES regulated stormwater point source sediment.

In addition to local TMDLs in the Port Tobacco River watershed, the County also has responsibilities for the WLAs allocated from the *Chesapeake Bay Total Maximum Daily Loads for Nitrogen, Phosphorus, and Sediment* (USEPA, 2010). The Bay TMDL is a result of requirements under the CWA to meet water quality standards that put a renewed emphasis and focus on the Chesapeake Bay. The County's current NPDES MS4 permit requires treatment of 20% of the County's untreated impervious surfaces as the method for meeting the Bay TMDL goals. The local sediment TMDL for the Port Tobacco River watershed is more geographically specific than the Bay-wide allocated loads assigned in the Bay TMDL. However, all load reductions achieved from implementation efforts described in this plan will help support the County's impervious surface and Bay TMDL efforts.

2.3.4 NPDES

Section 402(p) of the Clean Water Act required the EPA to add Municipal Separate Storm Sewer System (MS4) discharges to the NPDES permit program. In 2002, EPA directed permit writers to include WLA requirements in NPDES permits, including those for MS4 discharges. Charles County holds a Phase I – Medium Jurisdiction (population between 100,000 and 250,000) MS4 permit (11-DP-3322, MD0068365) issued by the MDE. The County's first generation permit was issued in 1997. The current third generation permit was issued in December of 2014 and expired December of 2019 with administrative continuation.

TMDL Permit Requirements

The objective of this plan is to meet the County's MS4 NPDES permit requirement to develop restoration plans for local TMDLs per permit condition IV.E.2.b. Plans must be developed within one year of EPA approval of TMDL WLAs. The Port Tobacco River watershed Sediment TMDL was approved October 11, 2019, therefore the restoration plan must be complete by October 11, 2020.

The permit states the County must submit "…a restoration plan for each stormwater Waste Load Allocation (WLA) approved by EPA prior to the effective date of the permit." For each WLA, the County is required to:

PART IV. Standard Permit Conditions
E. Restoration Plans and Total Maximum Daily Loads
2. Restoration Plans
b. Within one year of permit issuance, Charles County shall submit to MDE for approval a restoration plan for each stormwater WLA approved by EPA prior to the effective date of the permit. The County shall submit restoration plans for subsequent TMDL WLAs within one year of EPA approval. Upon approval by MDE, these restoration plans will be enforceable under this permit. As part of the restoration plans, Charles County shall:

i. Include the final date for meeting applicable WLAs and a detailed schedule for implementing all structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives necessary for meeting applicable WLAs;
ii. Provide detailed cost estimates for individual projects, programs, controls, and plan implementation;
iii. Evaluate and track the implementation of restoration plans through monitoring or modeling to document the progress toward meeting established benchmarks, deadlines, and stormwater WLAs; and
iv. Develop an ongoing, iterative process that continuously implements structural and nonstructural restoration projects, program enhancements, new and additional programs, and alternative best management practices (BMPs) where EPA approved TMDL stormwater WLAs are not being met according to the benchmarks and deadlines established as part of the County's watershed assessments.

Further, the permit requires continual outreach to the public regarding the development of its watershed assessments and restoration plans and requires public participation in the TMDL process (permit section IV.E.3.a-d).

The permit requires an annual progress report presenting the assessment of the NPDES stormwater program based on the fiscal year. A TMDL assessment report to include complete descriptions of the analytical methodology used to evaluate the effectiveness of the County's restoration plans and how these plans are working to achieve compliance with EPA approved TMDLs is a component of the annual report. The assessment will include: estimated net change in pollutant load reductions from water quality improvement projects; a comparison of the net change to targets, deadlines, and applicable WLAs; cost data for completed projects; cost estimates for planned projects; and a description of a plan for implementing additional actions if targets, deadlines, and WLAs are not being met (permit section IV.E.4.a-e).

Impervious Surface Permit Requirements

The County's permit requires implementation of restoration efforts for 20% of the County's impervious surface area that has not already been restored to the maximum extent practicable (MEP) (permit section

(IV.E.2.a). Though projects and strategies outlined in this plan will certainly add treatment of impervious surfaces, accounting for impervious treatment is not included in this report.

3 Causes and Sources of Impairment (EPA Planning Criteria A)

3.1 Impairments

Elevated levels of sediment currently impair the Port Tobacco River watershed as evident through the 303(d) listings and local TMDL requirement. Sediment, both from upland and in-stream sources, can impact in-stream habitat by covering and filling gravelly and rocky substrate, which is a preferred substrate habitat for some aquatic organisms (fish and benthic community) and necessary for some fish species for spawning. Finer clays, silts and sands associated with sediment as a pollutant are more mobile and transient and provide less liveable space for more sensitive benthic macroinvertebrate species by filling the interstitial spaces between larger substrate particles in the channel bottom. Increases in sediment loads in channels that cannot adequately transport the load can lead to deposition and aggrading streams. These factors often negatively impact channel flow, causing additional erosion and increases in flooding, particularly if road crossing capacity is limited by sediment accumulation. Suspended sediment in the water column may limit light penetration and prohibit healthy propagation of algae and submerged aquatic vegetation. Suspended sediments can cause gill abrasion in fish and can limit clarity which impacts aquatic species that rely on sight for feeding.

3.2 Sources

The majority of sediment loads in the Port Tobacco River watershed originate from urban and agricultural stormwater runoff (MDE, 2019c). An additional likely source is in-stream processes related to channel erosion.

3.2.1 Stormwater Runoff

Table 6 presents the baseline sediment load by land use in the watershed, according to the TMDL document. Cropland, developed regular urban land, regulated urban construction, and forest are the largest sediment contributors to the Port Tobacco River (MDE, 2019c).

Table 6. Baseline Sediment Loads (MDE, 2019c)

Land Use Type	Detailed Land Use	Tons	Percent of Total
Forest	Forest	244	14
	Harvested Forest	8	0.5
Agriculture	Animal Feeding Operations	1.3	0.1
	Pasture	7	0.4
	Crop	927	52
Nursery	Nursery	0.2	0
Regulated Urban	Construction	225	13
	Developed	359	20
	Extractive	4	0
Point Sources	Industrial Point Sources	0	0
	Municipal Point Sources	4.3	0.2
	Total	**1,780**	**100**

The TMDL baseline loads presented in Table 6 were calculated using the Chesapeake Bay Program Partnership Watershed Model P5.3.2, which did not include stream bed and bank TSS loads as a separate load source. Rather, the stream loads were included implicitly into the upland load sources. The Phase 6 Chesapeake Bay Program Model provides a separate load source for stream bed and bank loads.

3.2.2 In-stream Sources

Although channel bed and bank erosion occurs naturally as streams work to maintain a state of dynamic equilibrium, excessive erosion can occur due to increased stream discharge and velocity. Increased stream discharge is often associated with development and agricultural activities that increase runoff and encroach on riparian buffers within the watershed. Channel erosion can deliver excessive pollutants, such as sediment and phosphorus, downstream, where water quality can be impacted and important habitat for fish spawning and benthic invertebrates can be smothered. Excessive erosion can also threaten the stability of nearby built infrastructure. The Biological Stressor Identification Analysis (BSID; MDE, 2015) for the Port Tobacco River watershed has determined that biological communities in this watershed are likely degraded due to sediment and in-stream habitat related stressors, as well as water quality. These stressors often result from altered hydrology and increased runoff from impervious area, specifically from channel erosion and subsequent elevated suspended sediment transport through the watershed. Thus, suspended sediment was identified as a probable cause and confirmed the Category 5 listing for total suspended sediment as an impairing substance in this watershed.

Erosion data collected during the Port Tobacco River Watershed Assessment can help understand the degree of stream erosion occurring within the watershed. Approximately 8 miles of streams were assessed and characterized for the Watershed Assessment in 2014 (Charles County, 2015). The goal of the assessment was to identify and prioritize restoration activities, therefore the walked stream reaches were selected based on several factors, including their proximity to impervious surfaces and poor Maryland Biological Stream Survey (MBSS) biological scores, in an attempt to locate streams in poor condition that would be good candidates for restoration. Data collected during the stream assessment included stream physical habitat condition assessment and an inventory of infrastructure and environmental features. Areas of stream bed and bank erosion were documented, with GPS location, photograph, and data including a severity score for each segment of erosion. Additionally, pipe outfall locations were recorded and the severity of outfall channel erosion was assessed.

3.2.2.1 Stream Erosion and Pipe Outfalls

The field survey identified 90 actively eroding sites throughout the study area totaling 5.1 miles in length for both right and left banks combined. The stream erosion process was identified as widening for 81% of sites, headcutting for 11%, and downcutting for 8% of sites. While collecting stream erosion data, field crews also attempted to determine the leading possible cause of erosion at each site. These potential causes included: upstream channelization, an upstream road crossing, bends at steep slopes in the stream channel, upstream land use changes, livestock near or in the stream, pipe outfalls and other causes. Throughout the watershed, the most commonly described possible causes for erosion was land use change upstream (41%), followed by bend at steep slope (37%). Only two sites were classified as an immediate threat to infrastructure.

Table 7: Erosion and Pipe Outfall Inventory and Severity (Charles County, 2015)

Potential Problems	Total	Very Severe	Severe	Moderate	Low	Minor
Erosion (5.1 miles)	90	3	25	45	15	2
Pipe Outfall	32	1	1	4	4	22

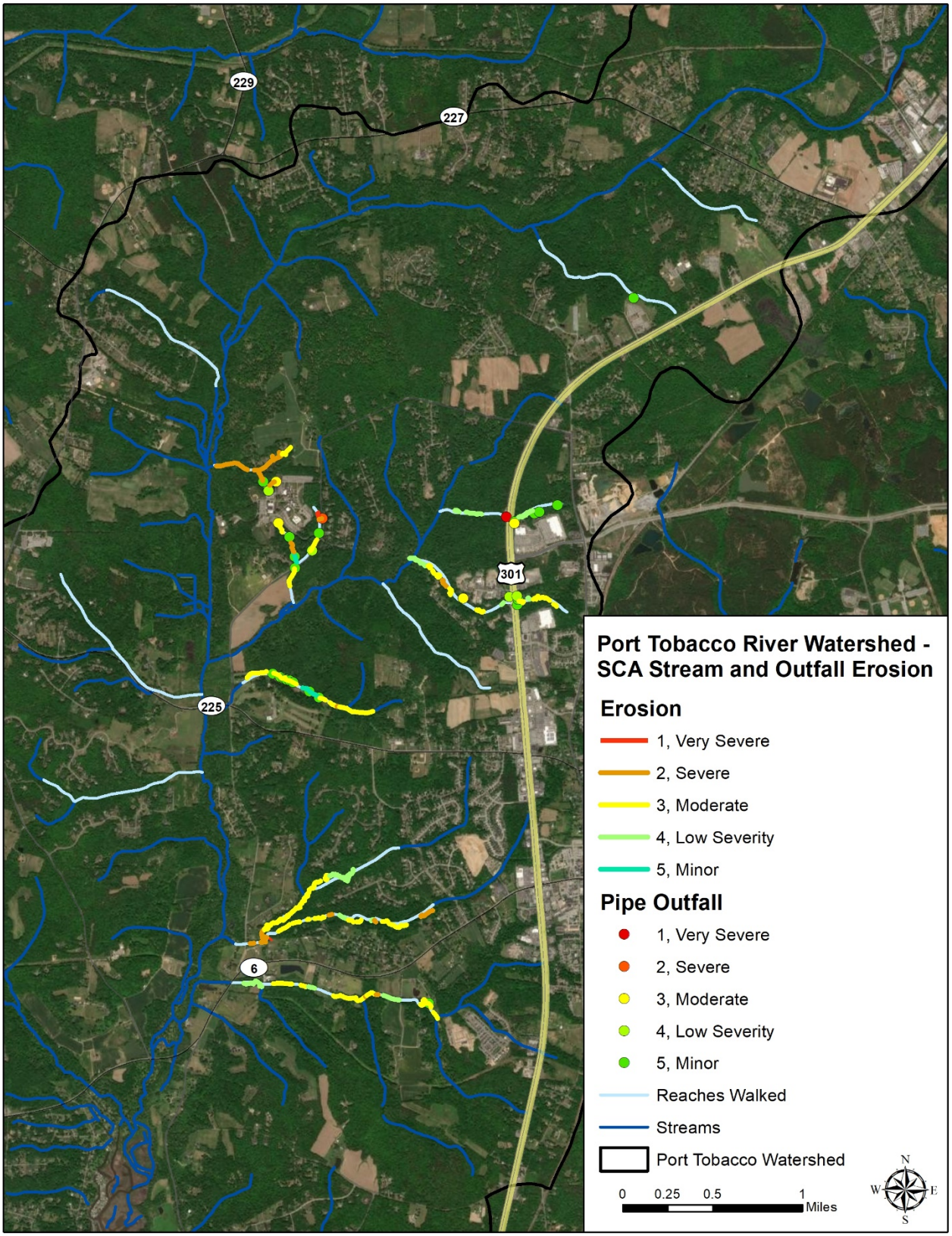

Figure 6. Locations of Stream Bed and Bank and Outfall Erosion (Charles County, 2015)

3.2.2.2 Habitat Assessment Results

Habitat assessments were conducted on each individual perennial reach walked during the stream assessment, and included evaluation of benthic macroinvertebrate habitat (substrate), fish habitat, embeddedness, sediment deposition, bank condition, and riparian vegetation (Figure 7). In general, conditions were in the marginal and poor categories. Riparian vegetation, however, was found to be primarily in the optimal and suboptimal categories. While only a portion of the watershed's streams were assessed, conditions of poor benthic and fish habitat align with data presented in the BSID, along with poor and marginal scores for bank condition, sediment deposition, and embeddedness, indicating that the stream degradation is related to sediment pollution.

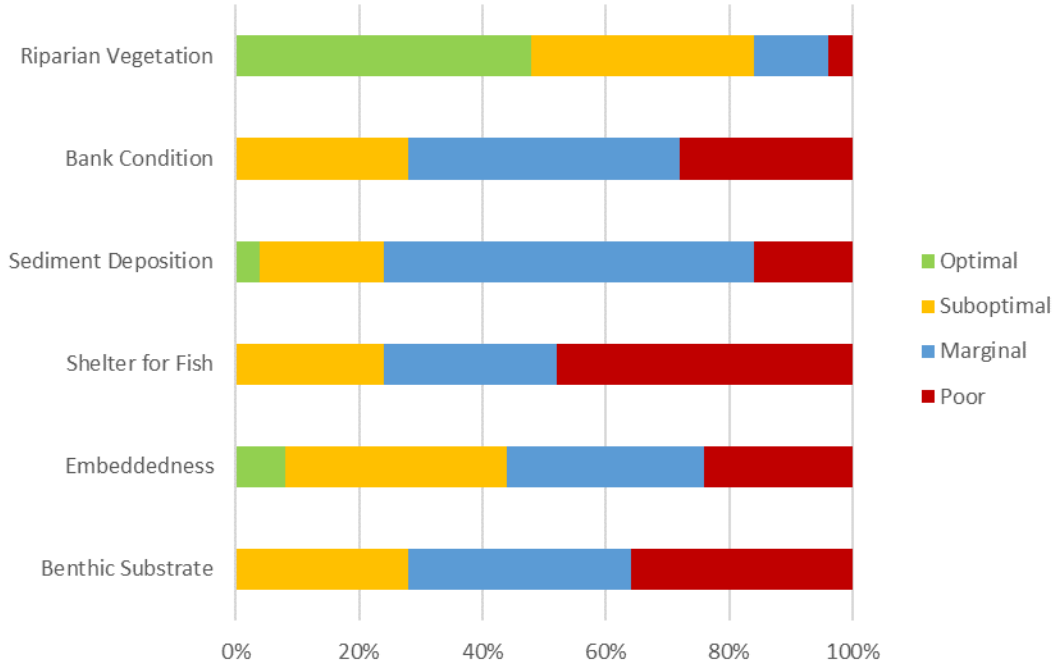

Figure 7. Habitat Assessment Results (Charles County, 2015)

While this assessment only captured the condition of a subset of the stream reaches within the watershed, and specifically prioritized those streams that may be in the worse condition (near high density of impervious cover, poor MBSS scores, etc.), this data gives an indication of the general condition of the streams throughout the watershed and shows that stream bed and bank erosion is present and negatively affecting stream habitat.

3.3 Anticipated Growth

Future urban sector growth and the anticipated increase in urban loads that may result are expected to be controlled by two elements: stormwater management to the maximum extent practicable (MEP) that is required with new development, and anticipated "Accounting for Growth" policies. This restoration plan is developed to treat the reduction required from the initial baseline year load, calibrated to the current Bay model. Based on coordination with MDE, TMDL restoration planning should focus on the untreated and undertreated areas associated with the urban footprint at the time of the TMDL baseline. Future load and loads potentially added to the urban sector since the baseline year to present, are not accounted for here as they are addressed under other programs.

3.3.1 Estimates of Future Growth

As stated in the MDE guidance document General Guidance for Developing a Stormwater Wasteload Allocation (SW-WLA) Implementation Plan, Section 1.h. (MDE, 2014b):

New urban areas that have been developed since TMDL allocations were set imply loads beyond the original SW-WLA (i.e., additional urban footprint within a watershed). This can confound the process of accounting for load reductions to meet the allocations. MDE is working to develop methods to deal with this issue. However, MDE is also recommending that within the SW-WLA implementation plans, local jurisdictions estimate this potential new urban load as the next step in a longer-term process to address the issue.

The Charles County Comprehensive Plan was finalized July 2016 (Charles County, 2016a) and has an emphasis on balancing growth while also protecting the environment and natural resources of the County. The next update of the plan is due by 2026. Charles County is the fastest growing county in Maryland, with the population of the County growing 22% between 2000 and 2010. The Plan predicts, however, that changes set forth in the Plan, including downzoning and increasing the size of the Priority Preservation Areas, will result in a slowed annual growth rate close to 1% or less of growth. This growth rate would result in approximately 37,000 new residents for the County to 2040 (Charles County, 2016a).

The Development District is a designated area that the County intends to focus development. This area includes Waldorf, White Plains, Saint Charles, Bryans Road and Indian Head. The 2016 plan reduces the Development District by 30,011 acres, and instead places this area in a Watershed Conservation District.

The Watershed Conservation District (WCD) primarily consists of the Mattawoman Creek watershed, however, it also includes 1,160 acres of the Port Tobacco River watershed on the eastern end of the district. The Port Tobacco River watershed area will be largely removed from the Priority Funding Area (PFA) designation, with the exception of one planned school site. The WCD consists of undevelopable land due to the presence of steep slopes and wetlands, however it also includes transitional lands between the steep slopes which had been assigned a development density of one unit per ten acres. The updated zoning now allows one unit per twenty acres.

Further development within the Development District (White Plains) and outside of the District (La Plata, Port Tobacco) is expected. Charles County continues to utilize strategies such as promoting low impact development and implementing stormwater BMPs for water quality treatment. However, increased urban stormwater related loads will inevitably occur as growth continues.

3.3.2 Offsetting Sediment Loads from Future Growth

Growth and development is expected to occur throughout Charles County, and depending on when and where this growth occurs, pollutant loading from urban stormwater sources may also increase. It is anticipated that new development will make use of environmentally sensitive design (ESD) stormwater treatment according to MDE's Stormwater Regulations.

Maryland's 2007 Stormwater Management Act went into effect in October of 2007, with resulting changes to COMAR and the 2000 Maryland Stormwater Design Manual in May of 2009. The most significant changes relative to watershed planning are in regard to implementation of ESD. The 2007 Act defines ESD as "using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development

on water resources." As such, Charles County has updated Article 8 of the County Code to incorporate the requirements for ESD. Charles County finalized the *Charles County Stormwater Management Ordinance* to incorporate criteria specific to the County that are not addressed within the Maryland Design Manual (Charles County, 2010).

Anticipated "Accounting for Growth" policies will address the residual load (TN: 50%, TP: 40%, TSS: 10%, and bacteria: 30%) that is potentially uncontrolled by development-based stormwater controls. As required by the State's Watershed Implementation Plan (Bay Restoration Plan) Maryland is developing an Accounting for Growth (AFG) policy that will address the expected increase in the State's pollution load from increases in population growth and new development. While not currently a fully formed policy, the State's plan, as of the *Final Report of the Workgroup on Accounting for Growth in Maryland* (August 2013) focuses on two elements: 1) the strategic allotment of nutrients loads to large wastewater treatment plants, upgraded to the best available technology; and 2) the requirement that all other new loads must be offset by securing pollution credits.

4 Management Measures (EPA Planning Criteria C)

Best management practices (BMPs) are either already implemented or are planned for implementation to achieve and maintain the Port Tobacco River local TMDL sediment load reductions. This section describes the types of BMPs and management measures being implemented in the watershed. Load reductions that result from these measures are discussed in the following section, Section 5: Expected Load Reductions.

4.1 Modeling Approach

Pollutant load modeling for the Port Tobacco River watershed was determined using Chesapeake Assessment Scenario Tool (CAST), which calculates pollutant loads and reductions calibrated to the Chesapeake Bay Program Partnership Watershed Model (CBP WM Phase 6). CAST, created by the Chesapeake Bay Program, is a web-based pollutant load estimating tool that streamlines environmental planning. Using CAST, the sediment loads are translated from the values derived by the Bay model version 5.3.2 that was used in the development of the TMDL and calibrated to the Phase 6 model, making them compatible with current methods following MDE recommendations. The 2009 Phase 6 calibrated baseline load was determined to be 13,488,638 lbs/year. Applying the 34% required reduction results in a reduction goal of 4,586,137 lbs/yr.

Each BMP provides a reduction for nitrogen, phosphorus, and sediment, along with other pollutants. Users select a specific geographical area and then add BMPs to apply to that area. CAST builds the scenario and calculates estimates of nitrogen, phosphorus, and sediment loads. Local TMDL baseline loads were calculated in CAST by modeling all BMPs installed prior to the 2009 baseline year on top of baseline land use background loads. This ensures that the same set of baseline BMPs are used throughout future progress and planned scenarios.

CAST estimates of load reductions for point and nonpoint sources include: agriculture, urban, forest, and septic loading. Load reductions are not tied to any single BMP, but rather to a suite of BMPs working in concert to treat the loads. CAST calculates reductions from all BMPs as a group, much like a treatment train. Reductions are processed in order, with land use change BMPs first, load reduction BMPs next, and

BMPs with individual effectiveness values at the end. The overall amount of load reduction can vary depending on which BMPs are implemented.

CAST provides loads at two different scales: edge of a small stream (EOS) and delivered to the tidal portion of the Chesapeake Bay (EOT). Delivered loads show reductions based on in-stream processes, such as nutrient uptake by algae or other aquatic life. Local TMDLs are generally modeled at the EOS with a focus on upland and freshwater instream sources without accounting for downstream processes and delivery to tidal and Chesapeake Bay segments. This TMDL plan focuses on reducing loads from upland and headwater sources, therefore EOS estimates are more appropriate and were used for all of the modeling analyses.

4.1.1 Stream Bed and Bank Disaggregation

The Phase 6 Chesapeake Bay Program Model provides a separate load source for stream bed and bank (STB) loads, while the P5.3.2 model included these stream loads implicitly into the upland load sources. The stream bed and bank load includes loads from agriculture, natural, MS4, and non-regulated developed land areas, and therefore needs to be disaggregated for a single source sector, like MS4s.

The stream bed and bank load was disaggregated using calculations provided by the Chesapeake Bay Program using the same principals used by CAST to calculate the total stream bed and bank load. The calculation for TSS is:

TSS STB load = ((Scenario EOS without STB TSS / CAL EOS without STB TSS) * STB base TSS) + (4/3 * Scenario Impervious TSS)

Where:
EOS = edge-of-stream
STB = stream bed and bank load source
TSS = total suspended solids
CAL = calibration average

This equation is used to calculate the stream bed and bank load for a given scenario outside of CAST. Load reductions associated with stream restoration practices are applied directly to the stream bed and bank loads in CAST. As a result, stream restoration practices are modeled in a spreadsheet outside of CAST and the calculated load reductions are subtracted from the disaggregated stream bed and bank load to determine the total disaggregated stream bed and bank load for a given scenario (i.e. baseline, progress, planned).

4.2 Best Management Practices

Many stormwater BMPs address both water quantity and quality, however, some BMPs are more effective at reducing sediment than others. The stormwater practices listed below keep the focus on “green technology” to reduce the impacts of stormwater runoff from impervious surfaces. These BMPs were selected specifically for three reasons: 1) effectiveness for water quality improvement, 2) willingness among the public to adopt, and 3) implementable in multiple facility types without limitations by zoning or other controls.

The recommended practices are also consistent with those proposed in the County’s Phase II WIP for the Chesapeake Bay TMDL and in the County’s comprehensive watershed planning efforts. Exceptions to this

are dry ponds which include dry detention ponds and dry extended detention ponds. These practices are no longer considered for future implementation; however, there are many existing facilities that are still actively treating runoff throughout the County so they are described here as well. The practices include:

- **Bioretention** — An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. Rain gardens may be engineered to perform as a bioretention.
- **Bioswales** — An open channel conveyance that functions similarly to bioretention. Unlike other open channel designs, there is additional treatment through filter media and infiltration into the soil.
- **Dry Detention Ponds** — Depressions or basins created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow. These devices are designed to improve quality of stormwater using features such as swirl concentrators, grit chambers, oil barriers, baffles, micropools, and absorbent pads to remove sediments, nutrients, metals, organic chemicals, or oil and grease from urban runoff.
- **Dry Extended Detention Ponds** — Depressions created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. They are similar in construction and function to dry detention basins, except that the duration of detention of stormwater is designed to be longer, allowing additional wet sedimentation to improve treatment effectiveness.
- **Impervious Surface Reduction** — Reducing impervious surfaces to promote infiltration and percolation of runoff storm water. Disconnection of rooftop and non-rooftop runoff, rainwater harvesting (e.g., rain barrels), and sheetflow to conservation areas are examples of impervious surface reduction.
- **Infiltration** — A depression or trench to form a shallow basin where sediment is trapped and stormwater infiltrates into the soil. No underdrains are associated with infiltration basins and trenches, because by definition these systems provide complete infiltration. Design specifications require infiltration basins and trenches to be built in good soil; they are not constructed on poor soils, such as C and D soil types. Yearly inspections to determine if the basin or trench is still infiltrating runoff are planned. Dry wells, infiltration basins, infiltration trenches, and landscaped infiltration are all examples of this practice type.
- **Outfall Enhancement with Step Pool Storm Conveyance (SPSC)** — The SPSC is designed to stabilize outfalls and provide water quality treatment through pool, subsurface flow, and vegetative uptake. The retrofits promote infiltration and reduce stormwater velocities. This strategy is modeled in CAST as bioswales.
- **Stream Restoration** — Stream restoration is used to restore the stream ecosystem by restoring the natural hydrology and landscape of a stream, help improve habitat and water quality conditions in degraded streams.
- **Stormwater Retrofits** — Stormwater retrofits may include converting dry ponds, dry extended detention ponds, or wet extended detention ponds into wet pond structures, wetlands, infiltration basins, or decommissioning the pond entirely to install SPSC (step pool storm conveyance).
- **Urban Filtering** — Practices that capture and temporarily store runoff and pass it through a filter bed of either sand or an organic media. There are various sand filter designs, such as above ground, below ground, perimeter, etc. An organic media filter uses another medium besides sand

to enhance pollutant removal for many compounds due to the increased cation exchange capacity achieved by increasing the organic matter. These systems require yearly inspection and maintenance to receive pollutant reduction credit.

- **Tree Plantings** — Tree planting can occur on pervious areas and/or in riparian buffers, and involves planting trees at a rate that would produce a forest-like condition over time. The intent of the planting is to eventually convert the area to forest. If the trees are planted as part of the urban landscape, with no intention to covert the area to forest, then this would not count as urban tree planting
- **Vegetated Open Channels** — Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils.
- **Wet ponds or wetlands** — A water impoundment structure that intercepts stormwater runoff then releases it at a specified flow rate. These structures retain a permanent pool and usually have retention times sufficient to allow settlement of some portion of the intercepted sediments and attached pollutants. Until 2002 in Maryland, these practices were generally designed to meet water quantity, not water quality objectives. There is little or no vegetation within the pooled area nor are outfalls directed through vegetated areas prior to open water release. Nitrogen reduction is minimal, but phosphorus and sediment are reduced.

The measured effectiveness for each of these practices may be found in Table 8.

Table 8: Typical Sediment Reduction from Stormwater BMPs

BMP	Sediment Reduction
Bioretention A/B soils, no underdrain	90%
Bioretention C/D soils	55%
Bioswales	80%
Dry Detention Ponds	10%
Dry Extended Detention Ponds	60%
Impervious Surface Reduction*	-
Infiltration	95%
SPSC**	80%
Stream Restoration	248 lbs/linear ft
Filtering Practices	80%
Tree Plantings*	-
Vegetated Open Channels A/B soils	70%
Wet Ponds or Wetlands	60%

Sources: Chesapeake Assessment Scenario Tool (CAST) documentation
* Calculated as a land use change to a lower loading land use
**Outfall enhancement with SPSC modeled as bioswales in CAST

Along with the structural BMPs listed above, treatment will also be provided through non-structural measures. These are treatments that rely on programs that continue throughout the year and are repeated annually. The County maintains a database of street sweeping and inlet cleaning locations, along with pounds removed for each area swept or vacuumed.

- **Inlet Cleaning** — Storm drain cleanout practice ranks among the oldest practices used by communities for a variety of purposes to provide a clean and healthy environment, and more

recently to comply with their NPDES stormwater permits. Sediment reduction credit is based on the mass of material collected, at the rate of 1 lb TSS per pound of material removed (CAST, 2019).

- **Street sweeping** — For full credit by MDE, street sweeping should occur twice a month or 26 times a year on urban streets. Charles County currently conducts street sweeping throughout the County, however not at the frequency required to claim sediment removal. At this time, the County does not plan on expanding their street sweeping program in the Port Tobacco River watershed. Sediment reduction credit is based on the street area swept and sediment removal efficiency varies depending on the frequency swept.

5 Expected Load Reductions (EPA Planning Criteria B)

WLAs in the sediment TMDL were developed using the Chesapeake Bay Program Watershed Model Phase 5.3.2 (CBP WM P5.3.2) watershed model. Currently, CAST is using a computational framework that is compatible with an updated version of the model: CBP WM P6. Because the TMDL was developed under an older version of the model, the TMDL WLA needed to be translated into a CAST-compatible target load. In order to do this, the 2009 baseline sediment load was re-calculated in CAST by modeling BMPs installed prior to, and including, the 2009 baseline year BMPs in the Port Tobacco River watershed. BMPs are entered at the land-river segment scale in CAST. Stream bed and bank loads in CAST were disaggregated to the County's MS4 load sources to derive the stream loads allocated to the County's urban stormwater sector. The required reduction percent assigned to the Charles County Phase I MS4 source (34%) in the local TMDL was then applied to the new baseline load to calculate required sediment reduction. The required sediment reduction was then subtracted from the new baseline load to calculate the CAST-compatible target TMDL WLA. Sediment loads required for the Port Tobacco River Charles County Phase I MS4 source are shown in Table 9.

Table 9: Sediment Loads Required for the Port Tobacco River Local TMDL Charles County Phase I MS4 Source

2009 Baseline Load (lbs/yr)	Required Reduction %	Required Reductions (lbs/yr)	TMDL Load Allocation (lbs/yr)
13,488,638	34.0%	4,586,137	8,902,501

5.1 2019 Progress – Actual Implementation

Charles County maintains an extensive geodatabase of stormwater urban BMP facilities and water quality improvement projects (WQIP). BMP implementation through fiscal year 2019 in the Port Tobacco River watershed include homeowner practices including rainwater harvesting, disconnection of rooftop runoff, sheetflow to conservation, and education practices, resulting in a total of 0.16 acres restored. Street sweeping and inlet cleaning occurred within the watershed, however street sweeping does not occur at the frequency required to get sediment reduction credit. Shoreline restoration practices were also implemented along the Port Tobacco River, however these practices are excluded from progress modeling. This is because the TMDL was calculated at the edge of stream scale to address sediment loads to the tributary streams rather than the tidal portion of the mainstem Port Tobacco River where the stabilization projects occurred. FY2019 Progress results are shown in Table 10.

Table 10: 2019 Progress Reductions Achieved

Baseline Load and TMDL WLA	TSS-EOS lbs/yr
2009 Baseline Scenario Load	13,488,638
Required Percent Reduction	34.0%
Required Reduction	4,586,137
Local TMDL SW-WLA	8,902,501
2019 Progress Results	**TSS-EOS lbs/yr**
2019 Progress Scenario Load	13,417,490
2019 Progress Reduction Achieved	71,148
2019 Percent Reduction Achieved	0.5%

5.2 Planned Implementation

Table 11 presents planned levels of implementation by BMP type. This level of implementation is expected to achieve the loads required in the local TMDL by 2035. A list of completed and programmed projects is included in Appendix A.

The County's geodatabase lists several planned projects in the Port Tobacco River watershed, including a submerged gravel wetland (Warren Drive), a pocket pond (Wilton Court), and two stream restoration projects.

Due to the limited number and extent of currently planned projects, a suite of possible BMPs types was examined to help achieve the required load reduction (Table 11). Results from several studies were used to develop this potential list of BMPs. The Port Tobacco River Watershed Assessment (Charles County, 2015) identified priority stream reaches for restoration, as well as stormwater management facilities and tree planting projects. The Port Tobacco River Watershed NPDES: MS4 Retrofit Study (Vista, 2015) developed concept plans for many stormwater management facilities across the watershed. The county selected several projects from these studies to move forward with and several were determined to be unfeasible. Any remaining feasible sites with an adequate sediment removal efficiency were selected as potential projects for planning purposes.

Acreage treated by additional stormwater BMP practices such as bioretention, bioswale, infiltration, and created wetland were estimated as necessary to achieve the required load reduction. BMP types with the highest sediment removal efficiencies were prioritized (Table 8).

Figure 8 shows baseline and progress loads (green bars) and planned loads (yellow bars) compared to milestone goal loads (red bars and red line). This comparison shows that the baseline load will be treated to the required TMDL allocated load with current and future BMP implementation.

Table 11: Restoration BMP Implementation – Planned 2025 and Planned 2035 Implementation Levels for the Port Tobacco River Watershed

BMP	Units	2020-2025 Planned Restoration	2025 – 2035 Planned Restoration	Total Restoration
Bioretention	acre	0	6	6
Infiltration	acre	0	110	110
Inlet Cleaning*	lbs removed	13,474	13,474	13,474
Swale	acre	0	533	533
Tree Planting	acre	0	10	10
Urban Stream Restoration	linear feet	2,786	12,738	15,524
Wet Ponds or Wetlands	acre	273	47	320

*Inlet Cleaning is an annual practice. Pounds of material removed reported here is the yearly average of FY16 through FY19. A similar rate of future implementation is anticipated.

Table 12: 2035 Planned Reductions

Baseline Load and TMDL WLA	TSS-EOS lbs/yr
2009 Baseline Scenario Load	13,488,638
Required Percent Reduction	34.0%
Required Reduction	4,586,137
Local TMDL SW-WLA	8,902,501
2035 Planned Results	**TSS-EOS lbs/yr**
2035 Planned Load	8,709,370
2035 Planned Reduction Achieved	4,779,268
2035 Percent Reduction Achieved	35.4%

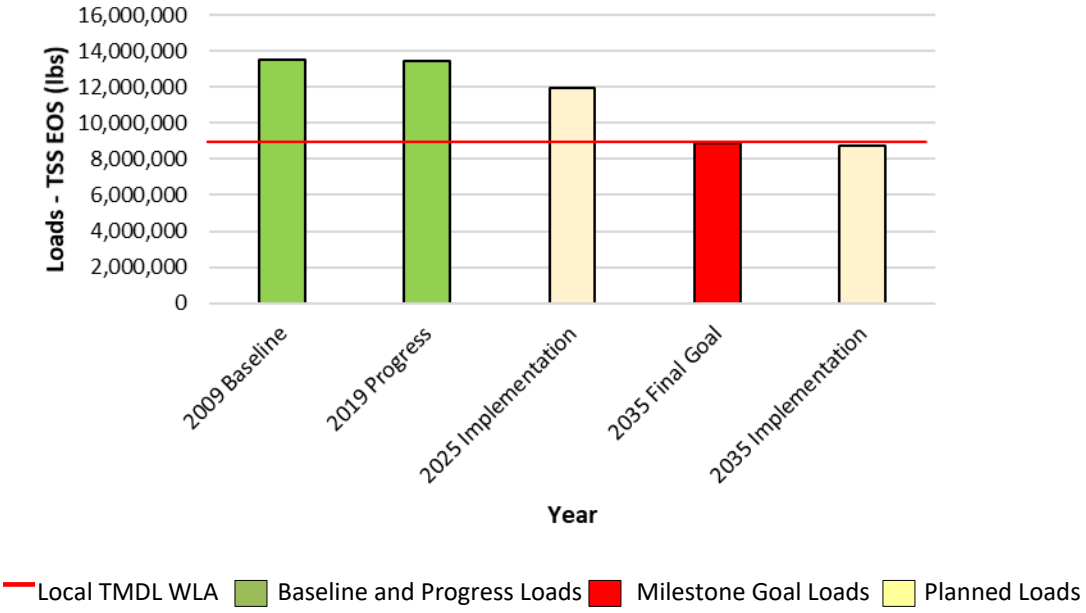

Figure 8: Progress and Planned Reductions in the Port Tobacco River Watershed

6 Technical and Financial Assistance Needs (EPA Planning Criteria D)

Technical Needs

Technical assistance to meet the reductions and goals of a TMDL takes on many forms including MDE assistance to local governments, state and local partner assistance to both MDE and municipalities, and technical consultants contracted to provide support across a wide variety of service areas related to BMP planning and implementation.

MDE has and will provide technical assistance to local governments through training, outreach and tools, including recommendations on ordinance improvements, technical review and assistance for implementation of BMPs at the local level, and identification of potential financial resources for implementation (MDE, 2014b).

Charles County Planning and Growth Management contracts with consultants through several contract vehicles including open-end task based assignments and full delivery contracts, to provide a variety of technical services. These services, provided by planners, engineers, environmental scientists and geographic information system (GIS) specialists, include watershed assessment and management, stream monitoring, stormwater planning and design, stream restoration design, outfall enhancement, and environmental permitting, among others. The County itself has complementary staff in the Department of Planning and Growth Management and other County departments to manage contracts, provide review and approval of planning and design work, conduct assessments, and develop and administer planning and progress tracking tools.

Technical assistance for Public Participation and Education and for Monitoring will also be necessary to fully implement and track progress towards meeting the goals of the local TMDL. These elements are discussed in sections 7 and 10 of this plan.

Financial Needs

The total projected cost to implement the County's Capital Improvement Program (CIP) projects described in this plan for the Port Tobacco River watershed is approximately $24,769,415. Table 13 includes a summary of funding needs per BMP type. Project costs are inclusive of all project elements and include design, obtaining land right of way (ROW), and construction. The costs are presented based on restoration planning periods out to FY2035. The total cost of the suite of BMPs necessary to meet the TMDL was calculated and then divided proportionally across the milestone periods.

Several sources were used to calculate the cost estimates for each BMP type. Implementation cost of completed projects in the County's geodatabase were used to calculate average cost of stream restoration. King and Hagan (2011) was referenced to calculate costs for other BMP types and projects lacking site-specific cost estimates.

Non-structural BMP costs for inlet cleaning are based on implementation cost records in the County's geodatabase. Operating costs do not include the purchase and maintenance of inlet cleaning equipment. Annual costs for inlet cleaning reflect continuation of the current rate of implementation of these practices. The annual costs were extrapolated out for the number of years in each planning period in the table below.

Table 13: Port Tobacco River Watershed Cost Over Milestone Periods

Project type	FY2020-FY2025 Planned	FY2025-FY2030 Planned	FY2030-FY2035 Planned	Total Cost
Bioretention	-	$274,523	$274,523	$549,045
Created Wetland	-	$128,500	$128,500	$257,000
Infiltration Practices	-	$1,427,625	$1,427,625	$2,855,250
Inlet Cleaning*	$145,553	$145,553	$145,553	$436,658
Submerged Gravel Wetland	$736,000	$60,456	$60,456	$856,912
Swale	-	$1,246,809	$1,246,809	$2,493,618
Tree Planting	-	$58,423	$58,423	$116,847
Urban Stream Restoration	$4,146,727	$6,394,476	$6,394,476	$16,935,679
Wet Pond	$268,405	-	-	$268,405
Total	**$5,296,685**	**$9,736,365**	**$9,736,365**	**$24,769,414**

*Inlet Cleaning is an annual practice, cost presented here is total cost for each 5 year period.

6.1 Funding Sources

A major source of funding for the implementation of local stormwater management plans through stormwater management practices and stream and wetland restoration activities is the County's Watershed Protection and Restoration Program fee. To comply with forthcoming requirements of the Phase I NPDES MS4 permit, and to support restoration efforts towards reducing pollutant loads required for both the Chesapeake Bay TMDL and local TMDLs throughout Maryland, the State Legislature passed a

law in 2012 (House Bill 987) mandating that Maryland's 10 largest jurisdictions (those with Phase I MS4 permits), including Charles County, develop a Watershed Protection and Restoration Program (WPRP) and establish a Stormwater Remediation Fee. To comply with the State legislation, Charles County passed legislation in 2013, Bill 2013-11.

In 2015, the Maryland Legislature passed Senate Bill 863 (Watershed Protection and Restoration Programs – Revisions) which repealed House Bill 987 (Stormwater Management – Watershed Protection and Restoration Program). Senate Bill 863 removed the *requirement* that jurisdictions adopt the Stormwater Remediation Fee but did still allow for the jurisdictions to adopt and collect the fee. As a replacement of the stormwater remediation fee requirement, jurisdictions are now to develop Financial Assurance Plans (FAPs), due initially on July 1, 2016, and subsequently every two years, that describe how stormwater runoff will be treated and paid for over the next five years to meet TMDL and impervious surface treatment requirements. Charles County's initial FAP was approved by County Commissioners on June 28, 2016. The most recent update to the County's FAP will be submitted with their annual NPDES report in December 2020.

The County's Watershed Protection and Restoration Program fee is assessed to Charles County property owners with improved lots and is included as a separate line item on the owner's real property tax bill. The fee is structured to provide sufficient funding for projects to meet the pollutant load reduction required by the Chesapeake Bay TMDL, EPA approved individual TMDLs with a SW-WLA and to meet the impervious surface management requirements as well as other stormwater obligations set forth in the County's NPDES MS4 Permit.

To supplement the Watershed Protection and Restoration Program Fund, Charles County actively pursues grant funding from Federal, State and non-governmental organizations (NGOs) to leverage funding for its restoration projects.

7 Public Participation / Education (EPA Planning Criteria E)

7.1 County Outreach Efforts

The County held a public meeting on in May 2016 to present the progress of the watershed assessments, which were initiated in 2014 and completed in 2017. The goals and methods of the assessments were presented, along with preliminary results of the watersheds assessments that had been completed at that point, including the Port Tobacco River watershed assessment. Maps and copies of the planning documents were present for participants to review in person. Individuals who completed the field assessments were present to answer questions and to describe assessment results from any specific location that a property owner or interested individual might be concerned about. In addition to providing a level of understanding to the public, the County uses the presentations as an opportunity to receive input and comment on restoration efforts.

The County also took the May 2016 meeting as an opportunity to disseminate information on the development of the County's Restoration Plan, specifically the requirements of the Bay and Local TMDLs, impervious restoration goals, planned projects to meet these goals, and associated costs to the County to implement the planned projects. The meeting solicited feedback from the public. Questions and answer sessions followed each of the presentations.

Part 4.E.3 of the County's NPDES MS4 permit outlines requirements for public involvement in the development of TMDL restoration plans. Watershed Assessment and Restoration Plan reports were posted to the County's Planning and Growth Management website for a 30-day public review and comment period. Comments received were taken into consideration and modifications to the assessments and Restoration Plan were made where appropriate. The final documents are posted on the County's website at: https://www.charlescountymd.gov/government/planning-and-growth-management-publications/plans-and-studies/-folder-537.

The Port Tobacco River Conservancy (PTRC) is a local watershed group that strives to restore and protect the Port Tobacco River watershed. They have helped implement many projects through partnering with the State of Maryland, Charles County, the Town of La Plata, and the Chesapeake Bay trust. Projects include wetland restoration, stormwater management projects such as rain garden and constructed wetlands, tree plantings, livestock fencing, and stream and river cleanups. Involvement and collaboration with citizen groups such as the PTRC is crucial in the success of this Plan and the restoration and protection of the watershed.

8 Implementation Schedule and Milestones (EPA Planning Criteria F&G)

This section presents the target loads and the activities required to achieve those targets based on 2025 and 2030 interim, and 2035 final loads and implementation targets.

8.1 Loading Allocations and Milestone Targets

Planning loads for 2025 and final planning loads for 2035 for the Port Tobacco River watershed are presented in Table 14 below. As mentioned in Section 5: Expected Load Reductions (b) (see Tables 10 and 11), progress is already underway with the implementation of strategies throughout the watershed. The 2035 Planned Load is less than the TMDL Allocated load.

Table 14: Port Tobacco River Planning and Target Loads (EOS)

Load	Sediment Load (lbs/year)
2009 Baseline Load	13,488,638
2019 Progress Load	13,417,490
2025 Progress Load	11,914,017
2030 Progress Load	10,311,694
2035 Planned Load	8,709,370
2030 TMDL Allocated Load	8,902,501
Percent Reduction between 2009 Baseline and 2035 Loads	35.4%

8.2 Implementation Milestones

To meet the loading allocations and milestones outlined in the previous section, implementation of programs and BMPs must keep pace and meet planned implementation targets. Table 15 details the implementation for each tracked BMP with the associated unit of measure. The 2019 data reflects existing

BMPs while the FY2020-2025, FY2025-2030, and FY2030-2035 values reflect the planned implementation for those years. A list of programmed projects is included in Appendix A.

The 2035 planned management strategies incorporate CIP stormwater retrofits, stream restoration, and inlet cleaning annual practices. Feasibility studies of the planned strategies may reveal that some existing structures identified for retrofitting or enhancement may not be feasible candidates for future projects and may be eliminated from consideration. The County will take an adaptive management approach and will reevaluate treatment needs as feasibility studies progress. The County will continue to track the overall effectiveness of the various BMP strategies and will adapt the suite of solutions based on the results. In addition, new technologies are continuously evaluated to determine if the new technologies allow more efficient or effective pollution control.

Table 15: Port Tobacco River Watershed Planning Milestones for Implementation

BMP	Unit	FY2019 Restora-tion	FY2020-FY2025 Planned	FY2025-FY2030 Planned	FY2030-FY2035 Planned	Total Implemen-tation
Bioretention	acre	0	0	3.1	3.1	6.2
Conservation Landscaping	acre	0.05	0	0	0	0.05
Created Wetland	acre	0	0	19.6	19.6	39.2
Impervious Surface Reduction	acre	0.16	0	0	0	0.16
Infiltration Practices	acre	0	0	55	55	110
Inlet Cleaning*	lbs removed	13,474	13,474	13,474	13,474	13,474
Submerged Gravel Wetland	acre	0	238.1	3.7	3.7	245.5
Swale	acre	0	0	287.8	287.8	575.6
Tree Planting	acre	1.0	0	5.2	5.2	11.4
Urban Stream Restoration	linear feet	0	2,786	6,369	6,369	15,524
Wet Pond	acre	0	34.9	0	0	34.9

*Inlet Cleaning is an annual practice. Pounds of material removed reported here are representative of only one year within each milestone period.

9 Load Reduction Evaluation Criteria (EPA Planning Criteria H)

Adaptive management is a critical component of achieving the WLAs required by the Port Tobacco River watershed TMDL. As presented in section 8 of this plan the County has established implementation and load reduction targets at specific intervals between current progress and the 2035 end date to provide interim planning targets and to serve as a vehicle for assessing progress toward the load reduction targets. The interim milestone dates are 2025, 2030, and 2035.

Feasibility studies of the planned strategies may reveal that some existing structures or sites identified for retrofitting or enhancement may not be feasible candidates for future projects and may be eliminated from consideration. Since many restoration projects will need to be done on private property, lack of approval by private property owners may also impact the number and types of projects that can be

accomplished. The County will take an adaptive management approach and will reevaluate treatment needs as feasibility studies progress. The County will continue to track the overall effectiveness of the various BMP strategies and will adapt the suite of solutions based on the results. New technologies are continuously evaluated to determine if the new technologies allow more efficient or effective pollution control. The County will also continue to monitor changes in regulations and policy that could impact the program.

Progress will be measured through three approaches: tracking implementation of management measures, estimating load reductions through modeling, and tracking overall program success through long term monitoring. Planning targets will be re-evaluated against progress and revised to ensure that Charles County is on track to meet established goals. Progress assessments are completed annually and reported to MDE with the County's annual report.

9.1 Tracking Implementation of Management Measures

Implementation will be measured by determining whether the targets for implementation shown in Table 15 are maintained according to the milestone schedule presented. Charles County manages a comprehensive system for adding and tracking projects and accounting for new programs. New BMPs constructed through new development and redevelopment projects are entered into the County's BMP database and NPDES MS4 geodatabase as they come on-line. Charles County Department of Planning and Growth Management (PGM) is responsible for implementing and tracking Water Quality Improvement Projects (WQIP; i.e., restoration and retrofit projects and programs). Additional internal County groups including Public Works, who are responsible for maintenance efforts (i.e., street sweeping and inlet cleaning), report back to PGM.

Annual NPDES Reporting

As a requirement of the NPDES permit described in Section 2.3.4, the County must submit on or before the anniversary date of the current permit a progress report demonstrating implementation of the NPDES stormwater program based on the fiscal year. If the County's annual report does not demonstrate compliance with their permit and show progress toward meeting WLAs, the County must implement BMP and program modifications within 12 months.

The annual report includes the following – items in bold font directly relate to elements of the load reduction evaluation criteria:

a. The status of implementing the components of the stormwater management program that are established as permit conditions including:
    i. Source Identification
    ii. Stormwater Management
    iii. Erosion and Sediment Control
    iv. Illicit Discharge Detection and Elimination
    v. Litter and Floatables
    vi. Property Management and Maintenance
    vii. Public Education
    viii. Watershed Assessment
    ix. Restoration Plans
    x. TMDL Compliance
    xi. Assessment of Controls; and,

xii. Program Funding

b. A narrative summary describing the results and analyses of data, including monitoring data that is accumulated throughout the reporting year

c. Expenditures for the reporting period and the proposed budget for the upcoming year

d. A summary describing the number and nature of enforcement actions, inspections, and public education programs

e. The identification of water quality improvements and documentation of attainment and/or progress toward attainment of benchmarks and applicable WLAs developed under EPA approved TMDLs; and,

f. The identification of proposed changes to the County's program when WLAs are not being met

g. The County is required to complete a database containing the following information:

i. Storm drain system mapping
ii. Urban BMP locations
iii. Impervious surfaces
iv. Water quality improvement project locations
v. Monitoring site locations
vi. Chemical monitoring results
vii. Pollutant load reductions
viii. Biological and habitat monitoring
ix. Illicit discharge detection and elimination activities
x. Erosion and sediment control, and **stormwater program information**
xi. Grading permit information
xii. Fiscal analyses – cost of NPDES related implementation

Elements of the database, following MDE's, current schema (version 1.2, May 2017) include feature classes and associated tables that store and report to MDE the County's restoration projects. MDE and the Bay Program use the data for larger scale Bay modeling and TMDL compliance tracking. The relevant database features include:

- AltBMPLine - stream restoration, shoreline restoration, outfalls
- AltBMPPoint – septic system practices (pump-out, upgrades, connections)
- AltBMPPoly – tree planting, street sweeping, inlet cleaning, impervious removal
- RestBMP – stormwater BMPs (SPSC, bioretention, wet ponds etc.)

Financial Assurance Plan Reporting

The County's Financial Assurance Plan (FAP) outlines the County's financial ability to meet its local and Chesapeake Bay TMDL obligations and is another mechanism of reporting to MDE. The FAP demonstrates the County's ability to fund projects which will reduce pollutants of concern and make measureable progress towards improving water quality. Charles County's first FAP was submitted to MDE in June of 2016, and an updated version was submitted in October of 2019.

9.2 Estimating Load Reductions

The County performs modeling annually to evaluate load reductions and progress towards meeting SW-WLA goals. The load reductions are reported in the County's NPDES annual report, as described above. Modeled baseline and current loads are reported in the NPDES geodatabase following MDE's schema in the 'LocalStormwaterWatershedAssessment' table. The progress assessments contribute to constant re-evaluation of management plans, and adapting responses accordingly as technologies and efficiencies

change, programs mature, credit trading is enacted, and regulations are put in place. The County will model load reductions for the Port Tobacco River watershed using CAST or other tools developed by the County or MDE to maintain consistency with the model framework used to develop the plan and initial progress loads.

10 Tracking Overall Program Success through Monitoring (EPA Planning Criteria I)

Overall program success will be evaluated using trends identified through the long term monitoring program. TMDL compliance status will be evaluated to determine if the Restoration Plan needs to be updated. If it is found during the evaluation of BMP implementation and load reductions that the milestone targets are no longer being met, a revision of the plan may be necessary. Official monitoring for Integrated Report assessments and impairment status is the responsibility of the State; however, the County has planned and on-going monitoring programs that supplement the State's efforts.

To determine the specific parameters to be monitored for tracking progress, one must understand the approach used for the initial listing. In 2002, the State began listing biological impairments on the Integrated Report, at the 8-digit scale, based on a percentage of stream miles degraded and whether they differ significantly from a reference condition watershed (<10% stream miles degraded). The biological listing is based on Benthic and Fish Indices of Biotic Integrity (BIBI/FIBI) results from wadeable streams from assessments conducted by the Maryland Department of Natural Resources (MDNR) Maryland Biological Stream Survey (MBSS). The Port Tobacco River watershed was listed for biological community impairment in 2012.

MDE then utilized its Biological Stressor Identification (BSID) process to identify the probable or most likely causes of poor biological conditions. For sediment specifically, the BSID identified 'natural sediment conditions exacerbated by anthropogenic sources in the Coastal Plain physiographic region have resulted in altered habitat heterogeneity and subsequent elevated suspended sediment in the watershed, which are in turn the probable causes of impacts to biological communities'.

Based on the results of the BSID, MDE replaced the biological impairment listing with a listing for total suspended solids (TSS) in 2016. The 2018 integrated report lists 'Habitat Evaluation' as the indicator, and 'Anthropogenic Land Use Changes' as the source. It is noted that the *Decision Methodology for Solids for the April 2002 Water Quality Inventory (updated in February of 2012)*[1], makes a specific distinction between two different, although related 'sediment' impairment types in free flowing streams:

1. **TSS**: The first type is an impact to water clarity with impairment due to TSS using turbidity measured in Nephelometer Turbidity Units (NTUs). Although numeric criteria have not been established in Maryland for TSS, MDE uses a threshold for turbidity, a measurement of water clarity, of a maximum of 150 NTUs and maximum monthly average of 50 NTU as stated in Maryland COMAR regulations (26.08.02.03-3). Turbidity also may not exceed levels detrimental to aquatic life in Use I designated waters.
2. **Sedimentation / siltation**: The second type is an impact related to erosional and depositional impacts in wadeable streams. The measures used are biocriteria and the criteria for Use I streams

[1] http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Documents/Assessment_Methodologies/AM_Solids_2012.pdf

(the protection of aquatic life and growth and propagation of fish (other than trout) and other aquatic life).

In all likelihood both types of impairment, water clarity and sedimentation, are factors in the Port Tobacco River watershed and both should be incorporated into monitoring programs to track changes in the watershed condition over time. Charles County's Watershed Protection and Restoration Program (WPRP) has several planned and on-going monitoring programs that target measures of water clarity and sedimentation and BMP effectiveness. These programs are described here.

Countywide Biological Monitoring

Under the County's forthcoming NPDES MS4 permit, it is expected that Charles County will be required to develop a biological monitoring program to aid MDE in evaluating the effectiveness of BMP implementation, as well as further biological stressor identification analyses (BSID) and Integrated Report analysis of watersheds throughout the State. This additional data will help further understand the water quality and biological conditions of the State and will provide data that MDE could use to delist TMDLs. All permittees will be required to use the Maryland Biological Stream Survey (MBSS) methods. This consistency will allow for Statewide analysis.

Under this new permit item, Charles County is expected to sample a minimum of 25 randomly selected sites per year. All 8-digit watersheds within the County must be sampled at least once every year. Sampling includes collecting a benthic macroinvertebrate sample, *in situ* water quality data including temperature, dissolved oxygen, pH, turbidity, and conductivity, and habitat assessment data. Habitat assessments include scoring several parameters related to sediment pollution, such as bar formation, embeddedness, epifaunal substrate condition, erosion severity, and instream habitat condition. Field personnel must be certified by the MBSS Benthic Macroinvertebrate and Physical Habitat Assessment Certification.

Best Management Practices Inspection and Maintenance

The requirement of monitoring of restoration activities, including stream restoration, is often outlined in the US Army Corps of Engineers permit terms. Monitoring of several criteria related to flow classification, vertical and lateral stability assessment, habitat assessment, vegetative and invasive species cover are often specified in the permit and monitoring is usually required for 5 years after construction is complete. This monitoring ensures that the goals of the project are being met and provides an opportunity to identify issues related to stability, hydrology, and/or biology. The County also conducts routine 5-year verification and maintenance inspections of all BMPs.

Structural stormwater management projects, such as wet ponds and bioretention facilities, require routine verification inspections to ensure the continued effectiveness of these facilities. Both the State and County SWM Codes require maintenance inspections be performed on all SWM practices during the first year of operation and every 3 years thereafter. These inspections and the subsequent maintenance ensure that the BMPs are in good condition and functioning as they were designed.

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Appendix A: Port Tobacco River Watershed Planned Project List

Appendix A
Port Tobacco River Watershed Sediment Restoration Plan
Port Tobacco River Watershed Planned Project List

Stormwater BMPs				
Project Name	**BMP Type**	**Impervious (acres)**	**Drainage Area (acres)**	**Implementation Cost**
Warren Drive	Submerged Gravel Wetland	12.66	238.14	$736,000
Wilton Court	Pocket Pond	9.79	34.88	$268,405
PT-SW-4 Lakeview Drive	Swale	8.85	127.84	$389,400
PT-SW-5 Channing Street	Swale	5.19	71.64	$228,467
PT-SW-6 Marshall Corner Road	Swale	17.70	137.32	$778,928
PT-SW-7 Park Ave	Swale	4.84	54.83	$212,904
PT-SW-9 Mt Carmel Road	Swale	14.79	141.29	$650,919
PT-SW-10 North Campus	Bioretention	0.46	0.94	$85,905
PTRC- 9 Pheasant Farms	Created Wetland	5.48	39.13	$257,000
PTRC-13 Eller Street	Wet Swale	3.38	42.73	$233,000
McDonough High School	Submerged Gravel Wetland	4.63	7.43	$120,912
McDonough High School	Bioretention	2.48	5.18	$463,140
N/A	Infiltration Practices	45.0	110.0	$2,855,250
Tree Plantings				
Project Name	**BMP Type**	**Planting Area (acres)**	**Implementation Cost**	
PT-TP-4 Valley Road	Riparian Tree Planting	10.41	$116,847	
Stream Restorations				
Project Name	**BMP Type**	**Restoration Length (feet)**	**Implementation Cost**	
College of Southern MD	Stream Restoration	1,106	$1,164,776	
Port Tobacco River	Stream Restoration	680	$1,977,951	
Locust Grove	Stream Restoration	1,000	$1,004,000	
PT-SR-1 CSM North	Stream Restoration	4,240	$4,256,960	
PT-SR-4 Walmart Stream	Stream Restoration	170	$170,680	
PT-SR-5 Hawthorne Country Club	Stream Restoration	3,190	$3,202,760	
PT-SR-6 Valley Road	Stream Restoration	3,976	$3,991,904	
PT-SR-7 Valley Road tributary	Stream Restoration	418	$419,672	
PT-SR-8 Mudd Farm Lane	Stream Restoration	744	$746,976	
Inlet Cleaning				
Project Name	**BMP Type**	**Material Removed Per Year (lbs)**	**Yearly Cost**	**Total Cost 2020-2035**
n/a - Yearly Implementation	Inlet/Storm Drain Cleaning	13,474	$29,111	$436,658
		Total Cost		**$24,769,414**

Appendix B: Public Comment Period Documentation

The Port Tobacco Watershed Sediment TMDL Restoration Plan was presented to the public at the October 5, 2020 Charles County Planning Commission meeting. The presentation can be viewed here:

http://www.charlescounty.org/apps/mediacenter/public/inquiryEvent.jsp?&idnum=2060

The 30-day public comment period began on October 5, 2020. No comments were received.

APG Media of Chesapeake, LLC
P.O. Box 600
29088 Airpark Drive
Easton, MD 21601

09/25/20
2919235

CERTIFICATE OF PUBLICATION

STATE OF : MARYLAND
COUNTY OF: Charles County

This is to certify that the annexed legal advertisement has been published in the publications and insertions listed below. "PH - October 5th- Port Tobacco River..." **was published in the:**

Southern Maryland News - Maryland Independent for the following dates

09/25/20

James F. Normandin
President & Publisher

PUBLIC NOTICE

Port Tobacco River Sediment Total Maximum Daily Load (TMDL) Restoration Plan

Notice is hereby given that the Department of Planning and Growth Management will brief the Charles County Planning Commission on October 5, 2020 at 6:00 p.m. regarding the Port Tobacco River Sediment Total Maximum Daily Load (TMDL) Restoration Plan. The purpose of this briefing is to facilitate the 30-day public comment period required by the County's Stormwater Discharge Permit; therefore, the Planning Commission will not be acting on this item.

The Restoration Plan addresses the Stormwater Waste Load Allocation (WLA) established for sediment by the "TMDL of Sediment in the Non-Tidal Port Tobacco River Watershed, Charles County, Maryland," which was approved by the U.S. Environmental Protection Agency on October 11, 2019. The draft Restoration Plan will be posted on the Planning Commission BoardDocs webpage at http://www.CharlesCountyMD.gov/Government/BoardDocs prior to the meeting.

A 30-day public comment period will open after the meeting and will close on November 5, 2020. Citizens wishing to make written comments are encouraged to listen to the public meeting and/or review the plan online. Comments may be mailed to: Charles County Dept. of Planning and Growth Management, Planning Division, 200 Baltimore Street, La Plata, MD 20646, Attn: Karen Wiggen; or by e-mail to WiggenK@CharlesCountyMD.gov. Please note that the Planning Commission will not be collecting public comment on this item.

The meeting will be held remotely via video teleconference. Persons wanting more information may call 301-645-0692. The meeting is open to the public.

Due to COVID19, and in lieu of public appearance: Citizens can watch via CCGTV on cable access channels, Comcast: 95 and Verizon FIOS: 10, view online at https://www.charlescountymd.gov/our-county/ccgtv-live-stream, or use a call-in number to listen to the Public Hearing at 301-645-0500.

BY ORDER OF THE CHARLES COUNTY PLANNING COMMISSION

Wayne Magoon, Chair

In the event the meeting is canceled due to events beyond the County's control, all items scheduled to be considered at the meeting will be rescheduled to a later date.

Charles County Government is an Equal Opportunity Employer

2919235 IN 9/25/2020

Monday, October 5, 2020
Charles County Planning Commission - Virtual

6:00 p.m.
This agenda is tentative and subject to change without notice.

1. CALL TO ORDER

1.01 (information)

2. APPROVAL OF THE AGENDA: no public comments

2.01 Slideshow

3. APPROVAL OF MINUTES: no public comments

4. CHAIRPERSON'S COMMENTS: no public comments

5. PERSONAL APPEARANCES (items not on the agenda): PUBLIC COMMENTS

5.01 Personal Appearances

6. PUBLIC HEARING: PUBLIC COMMENTS

6.01 ZTA #19-154, Single-Family Attached Residential Standards

7. PUBLIC MEETING: PUBLIC COMMENTS

7.01 Parklands Neighborhood, SDP-200035

7.02 SDP-200005 - 7Eleven @ 2355 Crain Highway - APF Findings

8. WORK SESSIONS: No Public Comments

9. UNFINISHED BUSINESS: No Public Comments

10. NEW BUSINESS: No Public Comments

10.01 Port Tobacco River Sediment Total Maximum Daily Load (TMDL) Restoration Plan

10.02 2019 Planning Commission Annual Report

11. DIRECTOR'S REPORT: No Public Comments

12. ADJOURNMENT

13. VIRTUAL MEETING INFORMATION

13.01 (information)

14. Signed Minutes

14.01 Signed October 5, 2020 Planning Commission Minutes

In the event that the notified meeting is cancelled due to inclement weather or acts of nature beyond the control of the County, all items scheduled to be discussed or heard at the meeting shall be rescheduled.
PORTIONS OF THIS MEETING MAY BE IN CLOSED SESSION
NOTE: Agenda items that cannot be completed by 10:30 p.m. may be continued to a subsequent meeting.

PLANNING COMMISSION MEETING

Minutes of October 5, 2020 6:00 p.m.
Teleconference
La Plata, Maryland 20646

The Charles County Planning Commission held its regularly scheduled meeting virtually via Microsoft Teams on Monday, October 5, 2020 at 6:00 p.m.

The following persons were present:
Wayne Magoon, Chairman
William Murray, Vice Chair
Rick Viohl, Secretary
Dawud Abdur-Rahman
Robin Barnes
Angela Sherard
Kevin Wedding
Elizabeth Theobalds, Deputy County Attorney
James Campbell, Planning Director
Charles Rice, Assistant Chief of Planning
Heather Kelley, Program Manager
Kirby Blass, Planner III
Beth Groth, Planner III
Kelly Palmer, Planner III
Kyle Redden, Planner II
Karen Wiggen, Planner III
Ben Yeckley, Planner III
Melissa Hively, Clerk

1. **Call to Order:**

The Chair called the virtual meeting to order at 6:03 p.m. with seven (7) members in attendance.

2. **Approval of the Agenda:**

A **MOTION** was made by Mr. Murray to adjust and approve the agenda so that the Port Tobacco River Sediment Total Maximum Daily Load (TMDL) Restoration Plan was heard before the Public Hearing, which was **SECONDED** by Mr. Barnes. The vote was unanimous, and the **MOTION** passed.

3. **Approval of the Minutes:**

None

4. Chairman's Comments:

Mr. Magoon thanked Staff for their efforts concerning virtual meetings and thanked the public for their participation.

5. Personal Appearances:

None

6. New Business:

1. Port Tobacco River Sediment Total Maximum Daily Load (TMDL) Restoration Plan

Staff and project consultants presented a briefing on the proposed Restoration Plan. After the presentation, the Planning Commission asked several questions. The purpose of this briefing was to facilitate the 30-day public comment period required by the County's Stormwater Discharge Permit; therefore, there was no action for the Planning Commission to take on this item. The public was instructed to submit comment to the Department of Planning and Growth Management by November 5, 2020.

2. 2019 Planning Commission Annual Report

Discussion below.

7. Public Hearings:

ZTA #19-154, Single-Family Attached Residential Standards

Staff presented a brief overview of the proposed Zoning Text Amendment.

For the public hearing, one (1) member of the public voiced comments on the proposed updates.

A **MOTION** was made by Mr. Barnes to hold the record open for two (2) weeks, which was **SECONDED** by Ms. Sherard. The vote was unanimous, and the **MOTION** passed.

The record shall remain open until 4:30 p.m. on Tuesday, October 20, 2020. All comments are to be submitted to the Clerk for the Planning Commission.

8. Public Meeting:

1. Parklands Neighborhood, SDP-200035

Staff presented a brief overview of the proposed Site Development Plan. After the presentation, the Planning Commission asked several questions. Next, the Applicant answered several additional questions. A **MOTION** was made by Mr. Barnes to approve the Site Development Plan with the findings and recommendations included in the Staff Report, which was **SECONDED** by Mr. Wedding. The vote was unanimous, and the **MOTION** passed.

2. **SDP-200005, 7-Eleven at 2355 Crain Highway - Adequate Public Facilities Findings**

   Staff presented an overview of the Adequate Public Facilities Findings. After the presentation, the Planning Commission asked several questions. Next, the Applicant answered several additional questions. A **MOTION** was made by Mr. Barnes to issue a finding of adequate public facilities and to adopt and incorporate the Adequate Public Facilities Findings as presented in the Staff Report, which was **SECONDED** by Mr. Wedding. The vote was five (5) in favor to one (1) against, and the **MOTION** passed. Mr. Magoon, as chair, did not vote as his vote would not have affected the outcome of the vote.

9. New Business (Continued):

2019 Planning Commission Annual Report

Staff presented an overview of the proposed annual report. After the staff presentation, the Planning Commission asked several questions and requested that several minor changes be made to the annual report. A **MOTION** was made by Mr. Murray, and **SECONDED** by Mr. Barnes, to adopt the 2019 Planning Commission Annual Report with the requested changes. The vote was unanimous, and the **MOTION** passed.

10. Work Session:

None

11. Unfinished Business:

None

12. Director's Report:

Mr. Campbell provided a brief overview of upcoming items.

13. Adjournment:

The meeting adjourned by consensus at 8:39 p.m.

Wayne Magoon (Jan 5, 2021 10:40 EST)

Wayne Magoon, Chairman

Melissa Hively (Jan 5, 2021 10:43 EST)

Melissa Hively, Clerk