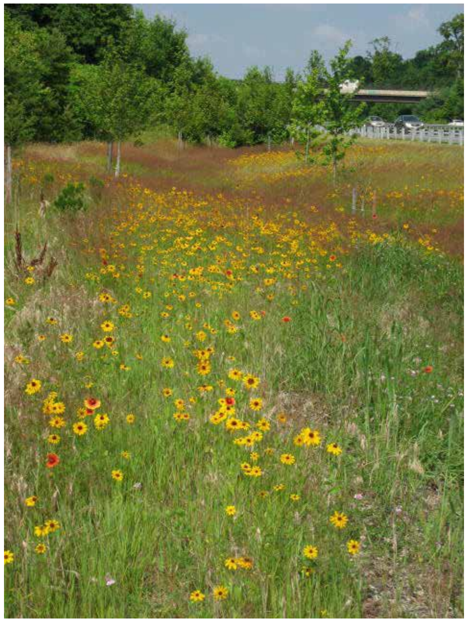
MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

Marsh Run Watershed Sediment TMDL Implementation Plan

September 29, 2020



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MARSH RUN WATERSHED SEDIMENT TMDL IMPLEMENTATION PLAN

A. WATER QUALITY STANDARDS AND DESIGNATED USES

Total Maximum Daily Loads (TMDLs) focus on offsetting the impacts of pollutants to waterway designated uses. The Federal Clean Water Act (CWA) established requirements for each state to develop programs to address water pollution including:

- Establishment of water quality standards (WQSs);
- Implementation of water quality monitoring programs;
- Identification and reporting of impaired waters; and
- Development of maximum allowable pollutant loads that when met and not exceeded will restore WQSs to impaired waters, called TMDL documents.

WQSs are based on the concept of designating and maintaining specifically defined uses for each waterbody. **Table 1** lists the designated uses for waterways in the State of Maryland. TMDLs are based on these uses.

One means for the United States Environmental Protection Agency (EPA) to enforce these standards is through the National Pollutant Discharge Elimination System (NPDES) program, which regulates discharges from point sources. The Maryland Department of the Environment (MDE) is the delegated authority to issue NPDES discharge permits within Maryland and to develop WQSs for Maryland including the water quality criteria that define the parameters to ensure designated uses are met.

Table 1: Designated Uses in Maryland

	Use Classes							
Designated Uses	**I**	**I-P**	**II**	**II-P**	**III**	**III-P**	**IV**	**IV-P**
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	✓	✓	✓	✓	✓	✓	✓	✓
Industrial Water Supply	✓	✓	✓	✓	✓	✓	✓	✓
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			✓	✓				
Seasonal Deep-Water Fish and Shellfish Use			✓	✓				
Seasonal Deep-Channel Refuge Use			✓	✓				
Growth and Propagation of Trout					✓	✓		
Capable of Supporting Adult Trout for a Put and Take Fishery							✓	✓
Public Water Supply		✓		✓		✓		✓

Source: http://www.mde.maryland.gov/programs/water/TMDL/WaterQualityStandards/Pages/wqs_designated_uses.aspx

MS4 Permit Requirements

The Maryland Department of Transportation State Highway Administration (MDOT SHA) Municipal Separate Storm Sewer System (MS4) Permit requires coordination with county MS4 jurisdictions concerning watershed assessments and development of a coordinated TMDL implementation plan for each watershed that MDOT SHA has a wasteload allocation (WLA). Requirements from the MDOT SHA MS4 Permit specific to watershed assessments and coordinated TMDL implementation plans include *Part IV.E.1.* and *Part IV.E.2.b.*, copied below.

Watershed Assessments (Permit Part IV.E.1.)

SHA shall coordinate watershed assessments with surrounding jurisdictions, which shall include, but not be limited to the evaluation of available State and county watershed assessments, SHA data, visual watershed inspections targeting SHA rights-of-way and facilities, and approved stormwater WLAs to:

- *Determine current water quality conditions;*
- *Include the results of visual inspections targeting SHA rights-of-way and facilities conducted in areas identified as priority for restoration;*
- *Identify and rank water quality problems for restoration associated with SHA rights-of-way and facilities;*
- *Using the watershed assessments established under section a. above to achieve water quality goals by identifying all structural and nonstructural water quality improvement projects to be implemented; and*
- *Specify pollutant load reduction benchmarks and deadlines that demonstrate progress toward meeting all applicable stormwater WLAs.*

Coordinated TMDL Implementation Plans (Permit Part IV.E.2.b.)

Within one year of permit issuance, a coordinated TMDL implementation plan shall be submitted to MDE for approval that addresses all EPA approved stormwater WLAs (prior to the effective date of the permit) and requirements of Part VI.A., Chesapeake Bay Restoration by 2025 for SHA's storm sewer system. Both specific WLAs and aggregate WLAs which SHA is a part of shall be addressed in the TMDL implementation plans. Any subsequent stormwater WLAs for SHA's storm sewer system shall be addressed by the coordinated TMDL implementation plan within one year of EPA approval. Upon approval by MDE, this implementation plan will be enforceable under this permit. As part of the coordinated TMDL implementation plan, SHA shall:

- *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;*
- *Provide detailed cost estimates for individual projects, programs, controls, and plan implementation;*
- *Evaluate and track the implementation of the coordinated implementation plan through monitoring or modeling to document the progress toward meeting established benchmarks, deadlines, and stormwater WLAs; and*

- *Develop an ongoing, iterative process that continuously implements structural and nonstructural restoration projects, program enhancements, new and additional programs, and alternative BMPs where EPA approved TMDL stormwater WLAs are not being met according to the benchmarks and deadlines established as part of the SHA's watershed assessments*.

B. WATERSHED ASSESSMENT COORDINATION

According to the United States Geological Survey (USGS) (2016):

> *A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. The word watershed is sometimes used interchangeably with drainage basin or catchment. The watershed consists of surface water--lakes, streams, reservoirs, and wetlands--and all the underlying ground water. Larger watersheds contain many smaller watersheds. Watersheds are important because the streamflow and the water quality of a river are affected by things, human-induced or not, happening in the land area "above" the river-outflow point.*

The 8-digit scale is the most common management scale for watersheds across the State, and therefore is the scale at which most of Maryland's local TMDLs are developed. See **Figure 1** for an illustration of the 8-digit watersheds in Maryland with Marsh Run highlighted.

Figure 1: Maryland 8-digit Watershed Example

County Watershed Assessments

Each MS4 county performs detailed assessments of local watersheds as a part of its MS4 permit requirements. These assessments determine current water quality conditions and include visual inspections; the identification and ranking of water quality problems for restoration; the prioritization and ranking of structural and non-structural improvement projects; and the setting of pollutant reduction benchmarks and deadlines that demonstrate progress toward meeting applicable WQSs. MDOT SHA is not required to duplicate this effort, but is required to coordinate with the MS4 jurisdictions to obtain and review watershed assessments. Relying on assessments performed by other jurisdictions avoids redundant analysis and places the responsibility for developing the assessments with the jurisdictions that have a close connection to local communities and watershed groups.

Watershed assessment evaluations conducted by MDOT SHA focus on issues that MDOT SHA can improve through practices targeting MDOT SHA right-of-way (ROW) or infrastructure. This information is used to determine priority areas for best management practices (BMP) implementation and to identify potential project sites or partnership project opportunities. Summaries of these evaluations are included under **Section F**. MDOT SHA watershed assessment evaluations focus on the following:

- Impacts to MDOT SHA infrastructure such as failing outfalls and downstream channels;
- Older developed areas with little stormwater management (SWM) and available opportunities to install retrofits;
- Degraded streams;
- Priority watershed issues such as improvements within a drinking water reservoir, special protection areas, or Tier II catchments;
- Identification of areas most in need of restoration;
- Description of preferred structural and non-structural BMPs to use within the watershed;
- Potential project sites for BMPs; and
- In watersheds with Polychlorinated Biphenyl (PCB) TMDLs, identifying locations of any known PCB sources.

In addition to using information from the county watershed assessments, MDOT SHA also undertakes other activities to identify potential project sites and prioritize BMP implementation including:

- Coordination meetings with each of the MS4 counties to discuss potential partnerships with the mutual goal of improving water quality;
- Visual watershed inspections as described below; and
- Maximizing existing impervious treatment within new roadway projects (practical design initiative).

C. VISUAL INSPECTIONS TARGETING MDOT SHA ROW

MDOT SHA methodically reviews each watershed for potential restoration projects within MDOT SHA ROW to meet the load reductions for current pollutant WLAs. Each watershed is assessed using a grid system in conjunction with detailed corridor assessments. The watershed review process includes two phases to visually inspect each watershed and identify all structural and non-structural water quality improvement projects to be implemented.

Desktop Evaluation

Phase one is a desktop evaluation of the watershed using available county watershed assessments and MDOT SHA data. MDOT SHA has created a grid system of 1.5-mile square cells to track the progress of the visual ROW inspections, allowing prioritized areas to be targeted first. With this grid system, many spatial data sets are reviewed to determine the most effective use of each potential restoration site. The sites are documented geographically and stored in Geographic Information System (GIS). Viable sites are prioritized based on cost-effectiveness and those located within watersheds with the most pollutant reduction needs move forward to the second phase, which is to perform field investigations. Data reviewed includes:

- Aerial imagery;
- Street view mapping;
- Environmental features delineations such as critical area boundary, wetlands buffers, floodplain limits;
- County data such as utilities, storm drain systems, contour and topographic mapping;
- MDOT SHA ROW boundaries;

- Current MDOT SHA stormwater control and restoration practice locations; and
- Drainage area boundaries.

Figure 6, located in **Section F**, illustrates the 1.5-mile grid system for the Non-Tidal West River watershed.

Field Investigations

Phase two is a field investigation of each viable site resulting from the watershed desktop evaluation. MDOT SHA inspects and assesses each site in the field to identify and document existing site conditions, water quality opportunities, and constraints. This information is used to determine potential restoration BMP types as well as estimated restoration credit quantities.

MDOT SHA will continue to prioritize visual inspections in the highest need watersheds. **Figure 2** is an example field investigation summary map that documents observations. A standardized field inspection form is used.

D. BENCHMARKS AND DETAILED COSTS

Benchmarks and deadlines demonstrating progress toward meeting all applicable stormwater WLAs are provided in **Section F**. It contains generalized cost information that includes an overall estimated cost to implement the proposed practices. Detailed costs for specific construction projects are available on MDOT SHA's website (www.roads.maryland.gov) under the Contractors Information Center.

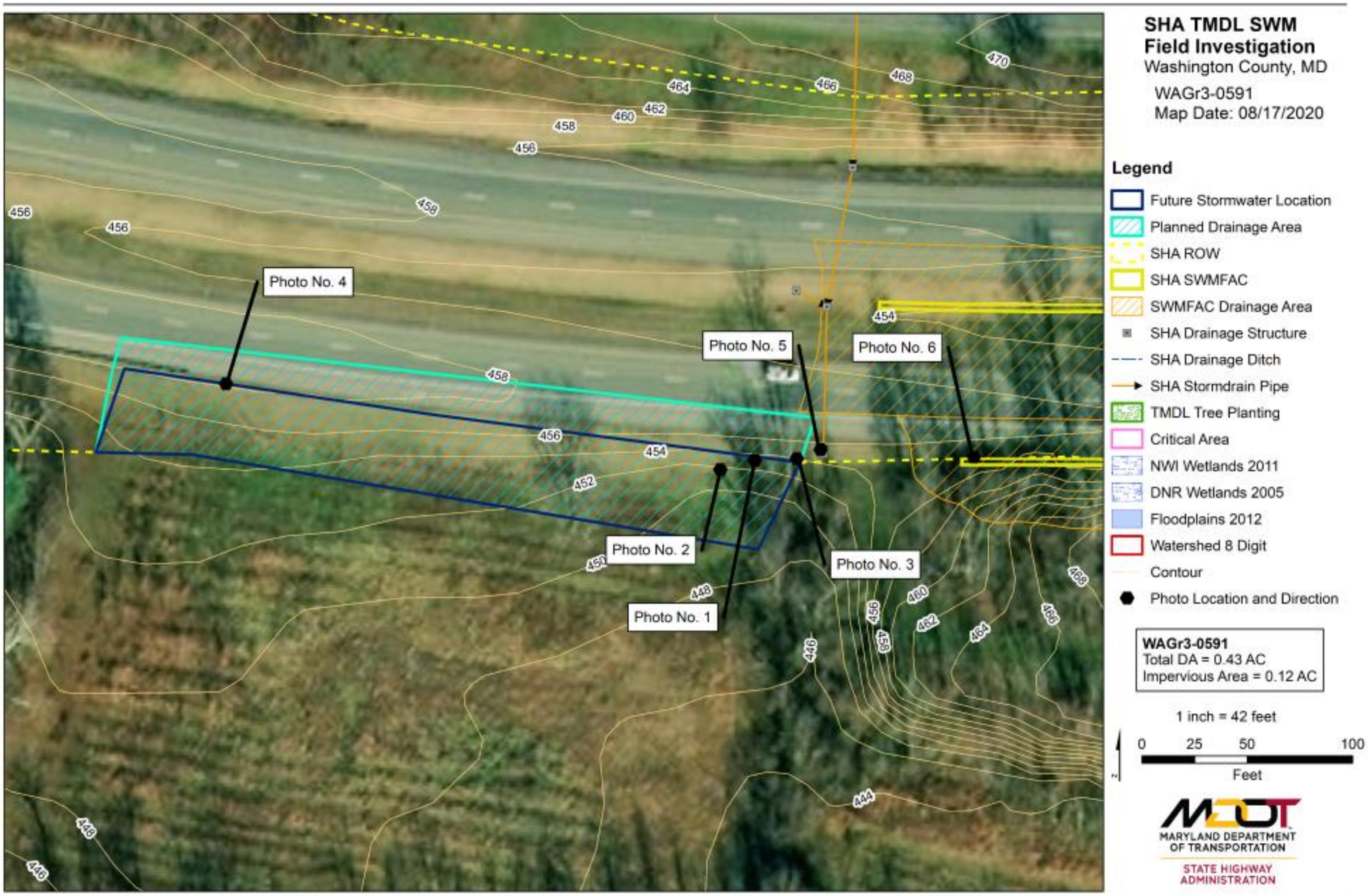


Figure 2: Example Field Investigation Summary Map

E. POLLUTION REDUCTION STRATEGIES

E.1. MDOT SHA TMDL Responsibilities

TMDLs define the maximum pollutant loading that can be discharged to a waterbody and still meet water quality criteria for maintaining designated uses. **Figure 3** illustrates the concept of maximum loading. The green area on the bar depicts the maximum load that maintains a healthy water environment for the pollutant under consideration. When this load is exceeded, the waterway is considered impaired as illustrated by the red portion of the bar. The example waterway needs restoration through implementation of practices to reduce the pollutant loading to or below the TMDL.

Generally, the formula for a TMDL is:

$$TMDL = \sum WLA + \sum LA + MOS$$

Where:

TMDL = total maximum daily load
WLA = wasteload allocation for point sources;
LA = load allocation for non-point sources; and
MOS = margin of safety.

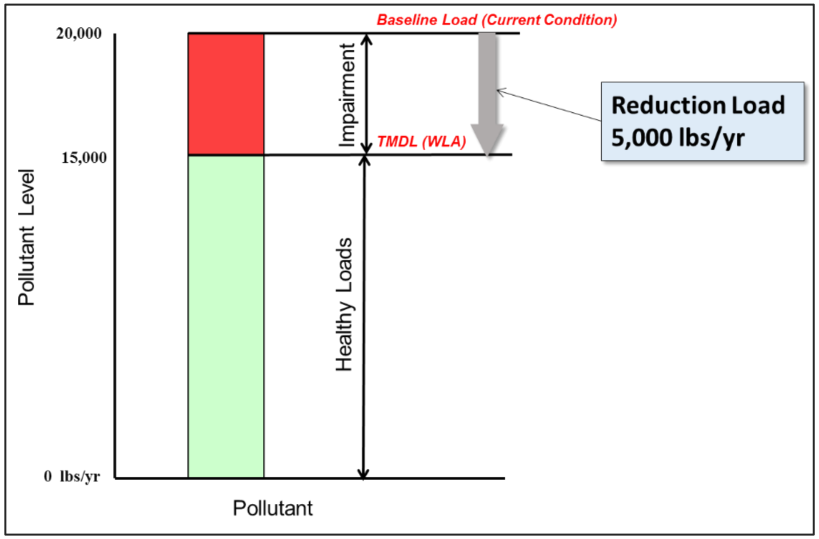


Figure 3: Example Wasteload and Reduction Requirement

Modeling Parameters

MDE requires that pollutant modeling follow the guidance in MDE's *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (MDE, 2014); if other methods are employed, they must be approved by MDE. MDOT SHA developed a restoration modeling protocol that describes the methods used for modeling pollutant load reductions for local TMDLs with MDOT SHA responsibility. This protocol was originally submitted to MDE as Appendix E in the 2016 MDOT SHA MS4 annual report. Updates to this protocol will be periodically implemented and resubmitted for MDE consideration. The most recent updated restoration modeling protocol was submitted in the 2019 Annual Report as Appendix D.

Different modeling methods are used depending upon the pollutants and current reduction practices in use. Brief descriptions of modeling methods are included in the following section, but the *MDOT SHA Restoration Modeling Protocol* (MDOT SHA, 2019) should be consulted for a more detailed explanation.

Aggregated Loads

WLAs may be assigned to each MS4 jurisdiction separately or as an aggregated WLA for all urban stormwater MS4 permittees that combines them into one required allocation and reduction target. The modeling approach developed by MDOT SHA uses MDOT SHA data (both impervious and pervious land as well as BMPs built before the TMDL baseline year, also known as baseline BMPs) to calculate baseline loads and calibrated reduction targets. Following this approach, disaggregation is done for each TMDL.

Available Reduction Practices

MDOT SHA reserves the right to implement new BMPs, activities, and other practices that are not currently available to achieve local TMDL load reduction requirements. MDOT SHA will modify reduction strategies as necessary based on new, approved treatment guidance and will include revised strategies in updates to this implementation plan. MDOT SHA is over programming restoration projects to plan for projects that may drop out of consideration or not make it through to final construction due to site design limitations or any other situation that may result in removing the project from the plan.

E.2. Sediment Pollution Reduction Strategy

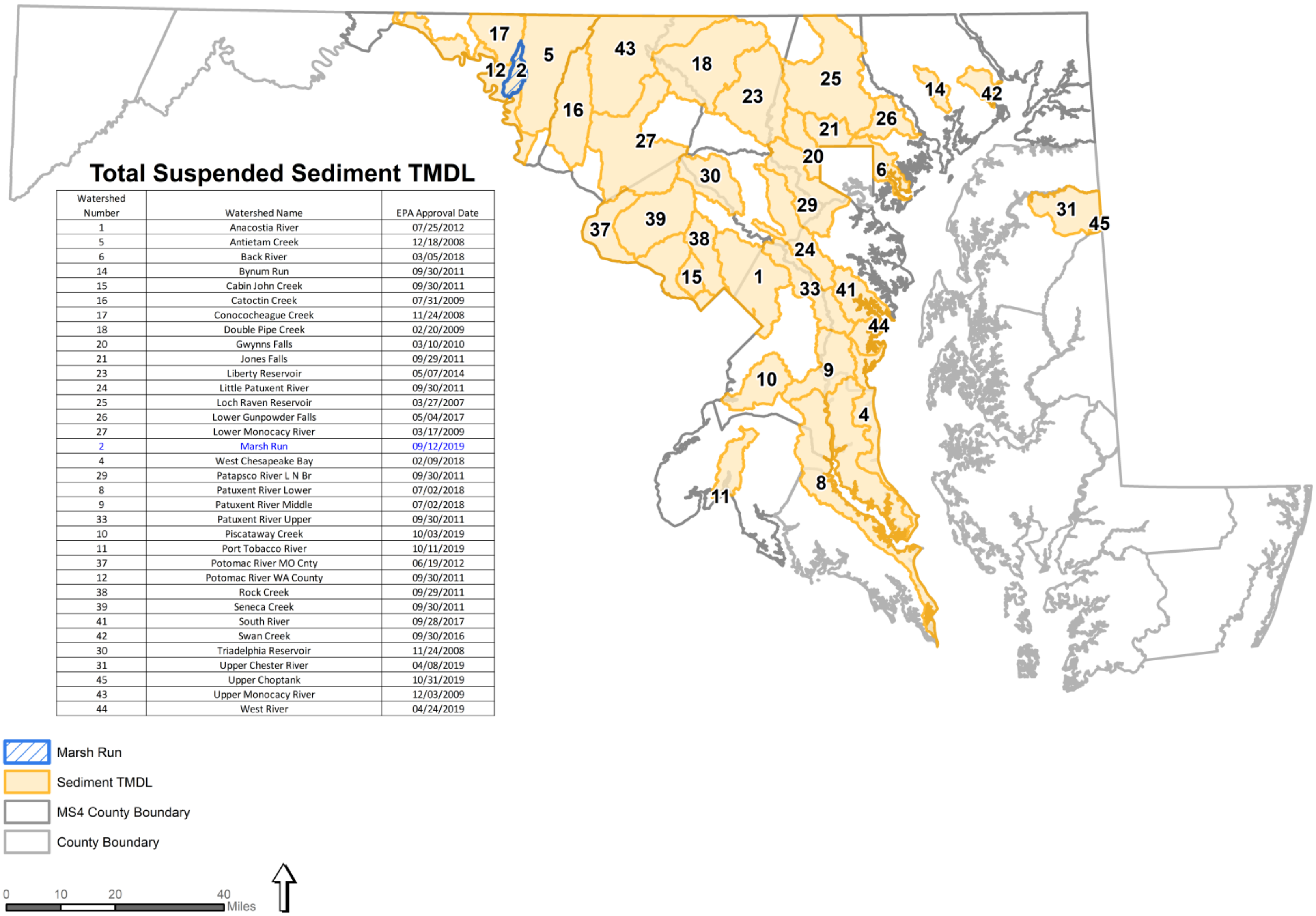
E.2.a. Sediment TMDLs Affecting MDOT SHA

There are many EPA-approved sediment TMDLs within Maryland and **Figure 4** is a map showing MDOT SHA sediment TMDL responsibilities by watershed. The following is a list of TMDL documents for sediment with MDOT SHA responsibility that are addressed in this plan:

- *Total Maximum Daily Load of Sediment in the Marsh Run Watershed, Washington County, Maryland, approved by EPA on September 12, 2019.*

In **Table 2,** the MDOT SHA reduction target for the Marsh Run Watershed sediment TMDL is 59 percent, or 160,414 lbs./yr. The watershed can safely receive 111,474 pounds of sediment by MDOT SHA on a yearly basis without being considered impaired. MDOT SHA's reduction target is found by multiplying the MDOT SHA baseline load by the MDOT SHA reduction target percentage. The MDOT SHA WLA is found by subtracting the MDOT SHA baseline load by the MDOT SHA reduction target load. The projected reduction load achieved is found by modeling the sediment load reduction that will be experienced by the construction of current and future BMPs in the Marsh Run watershed. These BMPs are either currently under construction or are planned to be constructed in the future. It is estimated that these BMPs will reduce sediment loading by 160,414 pounds to the watershed. To account for adaptive management, MDOT SHA has planned excess BMPs in the future to treat 115% of the required pollutant load. This treatment buffer will allow MDOT SHA to achieve the reduction targets even if some planned BMPs may be eliminated prior to construction. For this watershed, the implementation of BMPs required to treat 115% of the sediment reduction target results in significantly over treating for phosphorus. The planned BMPs and associated reductions are discussed in **Section F.5** of this plan. It is estimated that the planned BMPs will reduce sediment loading to the watershed by 184,475 pounds.

Three dates are shown in **Table 2**: the EPA approval date, the baseline year set by MDE, and the Target Year. The baseline year published on the MDE Data Center will be used for MDOT SHA's implementation plan modeling. This usually correlates to the time period when monitoring data was collected for MDE's TMDL analysis. The Target Year is the year MDOT SHA proposes to meet the WLA.



Total Suspended Sediment TMDL

Watershed Number	Watershed Name	EPA Approval Date
1	Anacostia River	07/25/2012
5	Antietam Creek	12/18/2008
6	Back River	03/05/2018
14	Bynum Run	09/30/2011
15	Cabin John Creek	09/30/2011
16	Catoctin Creek	07/31/2009
17	Conococheague Creek	11/24/2008
18	Double Pipe Creek	02/20/2009
20	Gwynns Falls	03/10/2010
21	Jones Falls	09/29/2011
23	Liberty Reservoir	05/07/2014
24	Little Patuxent River	09/30/2011
25	Loch Raven Reservoir	03/27/2007
26	Lower Gunpowder Falls	05/04/2017
27	Lower Monocacy River	03/17/2009
2	Marsh Run	09/12/2019
4	West Chesapeake Bay	02/09/2018
29	Patapsco River L N Br	09/30/2011
8	Patuxent River Lower	07/02/2018
9	Patuxent River Middle	07/02/2018
33	Patuxent River Upper	09/30/2011
10	Piscataway Creek	10/03/2019
11	Port Tobacco River	10/11/2019
37	Potomac River MO Cnty	06/19/2012
12	Potomac River WA County	09/30/2011
38	Rock Creek	09/29/2011
39	Seneca Creek	09/30/2011
41	South River	09/28/2017
42	Swan Creek	09/30/2016
30	Triadelphia Reservoir	11/24/2008
31	Upper Chester River	04/08/2019
45	Upper Choptank	10/31/2019
43	Upper Monocacy River	12/03/2009
44	West River	04/24/2019

Figure 4: MDOT SHA Sediment TMDL Responsibilities in Local Watersheds

Table 2: MDOT SHA Marsh Run Watershed Sediment Modeling Results

Watershed Name	Watershed Number	County	Pollutant	EPA Approval Date	Baseline Year	Unit	MDOT SHA Baseline Load	MDOT SHA % Reduction Target	MDOT SHA Reduction Target	MDOT SHA Proposed 2020 Interim Reduction Load	% 2020 Reduction Relative to Reduction Target	MDOT SHA Proposed 2025 Interim Reduction Load	% 2025 Reduction Relative to Reduction Target	MDOT SHA Target Year Reduction Load	% Target Year Reduction Relative to Reduction Target	Target Year
Marsh Run	02140503	WA	Sediment	09/12/19	2009	Lbs./ yr.	271,888	59.0%	160,414	19,640	12.2%	19,640	12.2%	160,414	100.0%	2035

E.2.b. Sediment Sources

Discussions in the TMDL concerning sediment sources focus on types of land use with information derived from the Chesapeake Bay Program Watershed Model (CBPWM). Cropland and regulated urban lands tend to be the most significant sources, followed by other agricultural uses and wastewater sources. Specific sources of each pollutant that could be useful for targeting controls are not included in the TMDL, but MDOT SHA researched a number of other references and determined sources beyond land uses that are summarized in **Table 3**. Sources of sediment include surface erosion from construction sites and cropland as well as stream erosion from high flows during storm events.

MDOT SHA Loading Sources

MDOT SHA-owned land is a small portion of each of the TMDL watersheds and it consists of relatively uniform land uses including roadways and roadside vegetation. In urbanized areas, the MDOT SHA ROW may extend to include sidewalks and portions of driveways. There are also parking areas associated with MDOT SHA land such as park and ride facilities, office complexes, and maintenance facilities.

Of the land uses in **Table 3**, MDOT SHA is a contributor of sediments mostly through urban and natural sources.

Table 3: Nutrient and Sediment Sources from Various References

Land Use	Nutrient Sources	Sediment Sources
Agriculture	Chemical Fertilizer Manure	Soil Erosion
Urban	Pet Waste Lawn Fertilizer Parking Lot, Roof, and Street Runoff	Construction Erosion Parking Lot, Roof, and Street Runoff
Wastewater	Municipal Industrial Failed Septic Systems CSO/ SSO Leaking Sewers	
Natural	Atmospheric Deposition	Stream Erosion Shoreline Erosion

References used to develop this table are MDE, 2014; EPA, 2010; Hoos et al., 2000; and Schueler, 2011.

E.2.c. Sediment Reduction Strategies

To date, MDOT SHA has used a variety of structural, non-structural, and alternative BMPs in an effort to reduce sediment in the watersheds that have a corresponding TMDL. However, MDOT SHA understands that load reduction activities cannot be limited to just BMP implementation as opportunities to build new BMPs are limited. The use of nutrient credit trading will also be explored as a tool in reaching load reduction targets. When MDOT SHA partners on projects with other MS4 jurisdictions, load splitting can be used as a means to achieve WLA reductions.

BMP Implementation

As a requirement under the MS4 Permit, MDOT SHA must complete the implementation of restoration efforts for 20 percent of its impervious surface area. MDOT SHA has an extensive program to plan, design, and construct BMPs that offset untreated impervious surfaces in MDOT SHA ROW.

MDOT SHA intends to build these BMPs used for impervious restoration in watersheds that have a TMDL where possible. One of the major challenges with using a strategy of building BMPs to meet WLAs is that there can be a lack of feasible ROW for BMP placement opportunities. There are instances where MDOT SHA roadway encompasses a majority of the area in the ROW leaving very little land to construct BMPs. The visual watershed inspection process has indicated areas where BMP placement is possible and where it is not feasible due to utility relocation, land purchases, site access problems, and a host of other issues. Therefore, MDOT SHA is continually seeking new opportunities and partnerships to install BMPs.

Nutrient Credit Trading

In an effort to meet the MDOT SHA WLA in watersheds with limited BMP placement opportunities, MDOT SHA may explore the possibility of nutrient credit trading. It is expected that MS4 jurisdictions will have the ability to purchase pounds of phosphorus, nitrogen, and sediment in a quantity that will allow them to reach their intended WLA. To date no trading partnerships have been pursued. If and when MDOT SHA focuses on trading to meet the sediment WLA in this watershed it will be noted in the Annual Report.

TMDL End Date

Currently, MDOT SHA models BMP implementation for restoration practices that can be placed in the watershed based on the visual watershed inspection process. MDOT SHA’s current assessment will reach the reduction target by 2035. MDOT SHA will continue assessing this potential and will adjust the end date as needed. After MDOT SHA has evaluated the building of all of the possible BMPs found during the “MDOT SHA Visual Inventory of ROW” detailed in section F.3. of this plan to meet its 59 percent sediment reduction requirement, MDOT SHA will explore the possibility of nutrient credit trading or partnerships, which cannot be modeled at this time. Also, future changes to current BMP removal rates or efficiencies will be reviewed to determine impacts to our anticipated Marsh Run sediment WLA end date.

F. MARSH RUN WATERSHED

F.1. Watershed Description

The Marsh Run watershed (MD 8-digit Basin Code: 02140503) encompasses approximately 21 square miles (13,430 acres) of total drainage area entirely within Washington County, Maryland. The watershed includes one major tributary, Saint James Run (MDE, 2019).

The Marsh Run watershed's tributary Saint James Run (mainstem only) is designated as Use Class IV-P – Recreational Trout Waters and Public Water Supply, the Marsh Run and all other tributaries are designated as Use Class I-P – Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply (MDE, 2019).

On the 2018 MDE 303(d) List the following impairments were listed for the Marsh Run watershed (MDE, 2018):

- Sulfates; and
- Total Suspended Solids (TSS).

There are 19 centerline miles of MDOT SHA roadway located within the Marsh Run watershed. The associated ROW encompasses 218 acres, of which 94 acres are impervious.

As indicated on the map in **Figure 5** there is one MDOT SHA facility within the Marsh Run watershed.

F.2. MDOT SHA TMDLs within the Marsh Run Watershed

MDOT SHA is included in the sediment TMDL (MDE, 2019), with a reduction requirement of 59.0 percent, as shown in **Table 2**.

F.3. MDOT SHA Visual Inspection of ROW

The MS4 Permit requires MDOT SHA to perform visual assessments. **Section C** describes the MDOT SHA visual assessment process. Preliminary evaluations for each grid and/or major state route corridor within the watershed have been conducted including both desktop and field evaluations. The grid-system used for the Marsh Run watershed is shown in **Figure 6** which illustrates that 14 grid cells have been reviewed, encompassing portions of six state route corridors. Potential BMP sites identified as part of the visual inspections follow:

Structural Stormwater Controls

Preliminary evaluation identified 23 locations as potential new structural stormwater SW control locations. Further analysis of these locations resulted in:

- Eight sites constructed or under contract.
- Six additional sites deemed potentially viable for new structural SW controls and pending further analysis, may be candidates for future restoration opportunities.
- Nine sites deemed not viable for new structural SW controls and have been removed from consideration.

Tree Planting

Preliminary evaluation identified 41 locations as potential tree planting locations. Further analysis of these locations resulted in:

- Ten sites constructed or under contract.

- Twelve additional sites deemed potentially viable tree planting and pending further analysis, may be candidates for future restoration opportunities.

- One sites deemed not viable for tree planting and have been removed from consideration.

Stream Restoration

Preliminary evaluation identified one site as potential stream restoration locations. Further analysis of this location resulted in:

- One additional site deemed potentially viable for stream restoration and pending further analysis may be a candidate for future restoration opportunities.

Grass Swale Rehabilitation

No grass swale sites were identified within this watershed for potential restoration.

Outfall Stabilization

No outfall stabilization sites were identified within this watershed for potential restoration.

Retrofit of Existing Structural SW Controls

Preliminary evaluation identified two existing structural SW controls as potential retrofits. Further analysis of these locations resulted in:

- One site constructed or under contract.

- One retrofit site deemed potentially viable for retrofit and pending further analysis may be a candidate for future restoration opportunities.

Impervious Area Removal

Preliminary evaluation identified one site potential for impervious area removal. Further analysis of this location resulted in:

- One additional site deemed potentially viable for impervious area removal and pending further analysis, may be a candidate for future restoration opportunities.

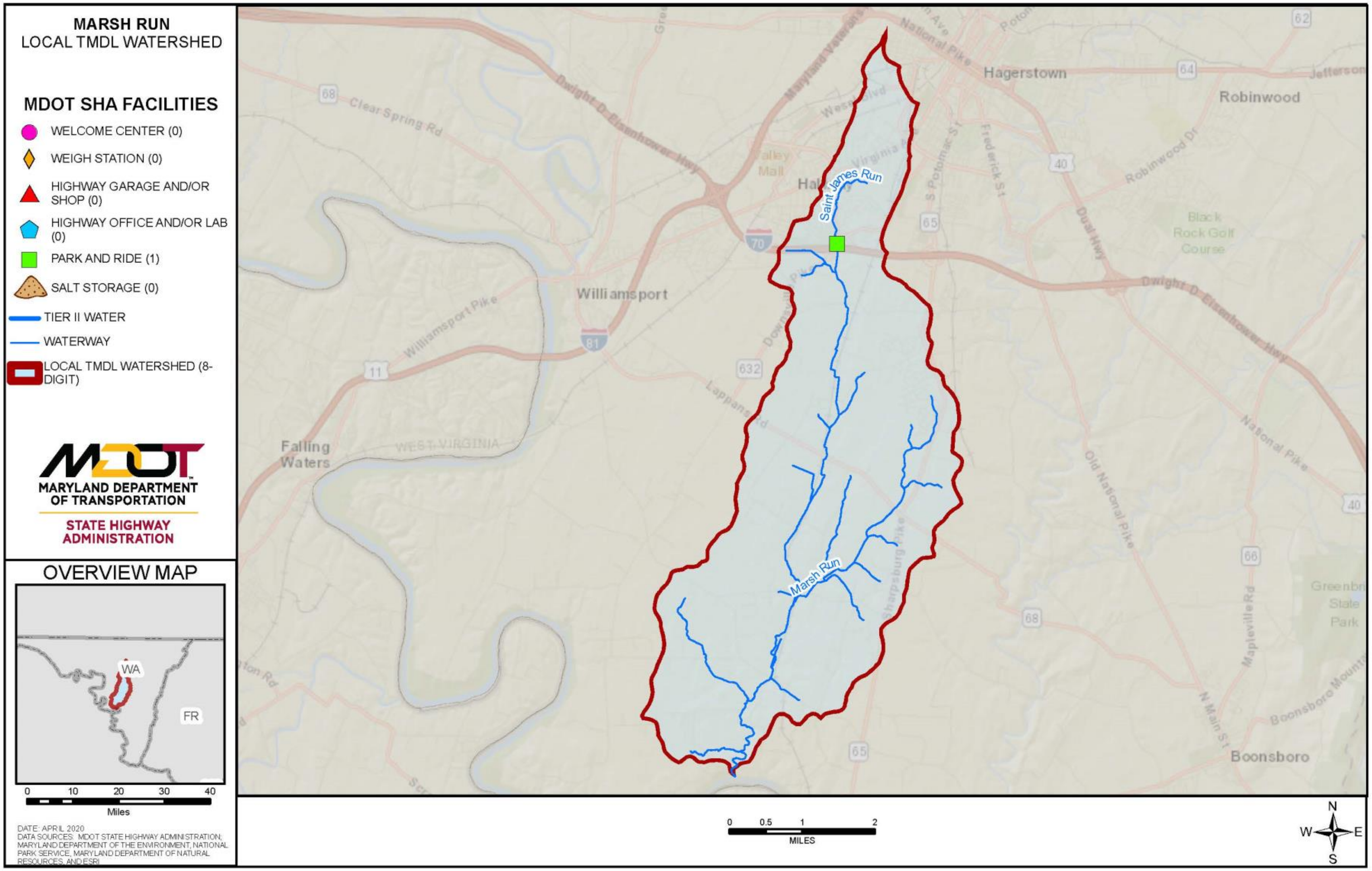


Figure 5: MDOT SHA Facilities within Marsh Run Watershed

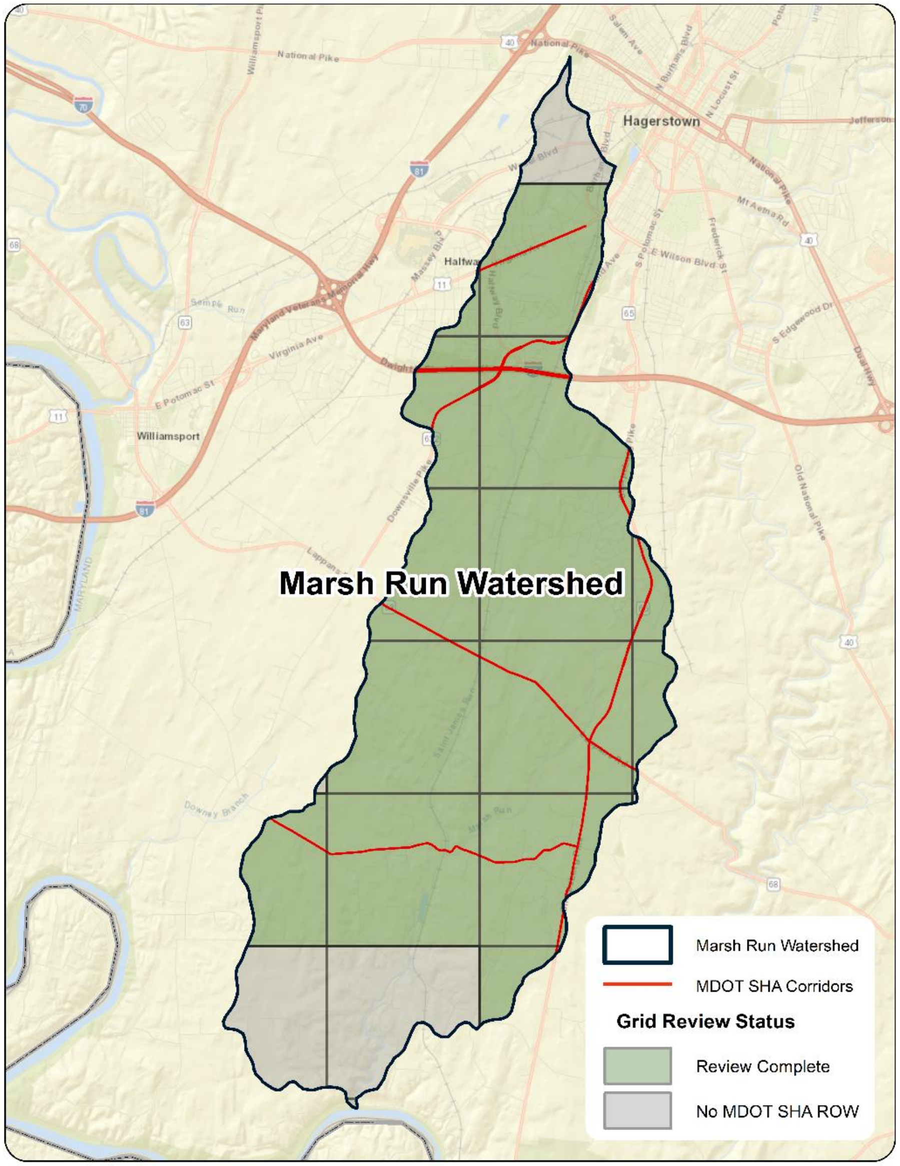


Figure 6: Marsh Run Site Search Grids

F.4. Summary of County Assessment Review

According to the most recent Washington County NPDES MS4 Annual Report, a watershed restoration plan has not been completed for Marsh Run (WC-DEM, 2019). The MDE TMDL document is briefly summarized below.

The Marsh Run watershed is located entirely within Washington County, Maryland bordering Pennsylvania to the north and the Potomac River, Virginia, and West Virginia to the south. There are no "high quality" or Tier II stream segments within the watershed (MDE, 2019).

The soils within the Marsh Run watershed are predominately rated as Hydrologic Group B (82 percent), indicating moderate infiltration rates and low runoff potential. The remainder of soils are rated; Hydrologic Group C (10 percent), Group D (7 percent), and Group A (1 percent) (MDE, 2019).

Land use within the watershed is as follows: forest (21.3 percent), pasture (11.0 percent), crop (39.9 percent), unregulated urban (3.5 percent), regulated urban (23.9 percent) and water (0.2 percent). Unregulated urban is developed land that is not regulated by NPDES permit. The urban land is primarily located in the northernmost portion of the watershed (MDE, 2019).

The baseline load of TSS in the watershed is approximately 10,817 tons per year, 70.8 percent of which is from crop land use, 12.4 percent from developed regulated urban land use, 10.9 percent from pasture land use, 4 percent from forest land use, and 1.2 percent from unregulated urban. Harvested forest, animal feeding operations, nursery make up less than one percent of contributions each (MDE, 2019).

F.5. MDOT SHA Pollutant Reduction Strategies

Marsh Run is listed for sediment with a TMDL baseline year of 2009. **Table 2** presents the reduction requirements for the Marsh Run watershed sediment TMDL along with the Target Year for achieving the reductions. MDOT SHA is over programming restoration projects to treat 115 percent of the required sediment load as an adaptive management strategy. This treatment buffer will allow MDOT SHA to achieve the reduction target even if some planned projects are eliminated prior to construction due to site design limitations or any other situation that may result in removing the project from the plan.

Proposed practices to meet sediment reduction in the Marsh Run watershed are shown in **Table 4**. Projected sediment reductions using these practices are 184,475 lbs./yr. which is a 115 percent of the reduction target. These practices are described in **Section E.2.** Four timeframes are included in the tables below:

- BMPs implemented before the TMDL baseline. In this case, the baseline is 2009;
- BMPs implemented after the baseline through fiscal year 2020;
- BMPs implemented after fiscal year 2020 through fiscal year 2025; and
- BMPs to be implemented after fiscal year 2025 through the Target Year.

Estimated costs to design, construct, and implement BMPs within the Marsh Run watershed total $4,075,500. They are based on average cost per impervious acre treated derived from a cost history for each BMP type. See **Table 5** for a summary of estimated BMP costs.

Figure 7 shows a map of MDOT SHA watershed restoration strategies in the Marsh Run watershed. The practices shown only include those that are under design and constructed.

Table 4: Marsh Run Restoration Sediment BMP Implementation Strategy

BMP	Unit	Baseline BMPs (Built before 2009)	Restoration BMPs			
			2020	2025	Target Year[2]	Restoration Totals
New Stormwater	drainage area acres	22.9	10.4			10.4
Stormwater Retrofit	drainage area acres		4.2			4.2
Grass Swale	drainage area acres	9.2				
Tree Planting	acres of tree planting	0.8	25.7			25.7
Stream Restoration	linear feet				3,663.0	3,663.0
Pipe Cleaning[1]	dry tons		0.6			0.6
Street Sweeping[1]	acres swept		6.0			6.0
Annual Load Reductions	TSS EOS lbs./yr.	27,115.5	19,640.3		164,835.0	184,475.3

[1] *Pipe cleaning and street sweeping are annual practices. They are reflected only once for the year the annual reduction is achieved. Once achieved, this annual reduction will be sustained each year the load reduction is claimed.*

[2] *Refer to Table 2 for Target Year.*

Table 5: Marsh Run Restoration Implementation Cost[1]

BMP	2020	2025	Target Year[2]	Restoration Totals
New Stormwater	$405,000			$405,000
Stormwater Retrofit	$391,000			$391,000
Tree Planting	$868,000			$868,000
Stream Restoration			$2,410,000	$2,410,000
Pipe Cleaning	$500			$500
Street Sweeping	$1,000			$1,000
			Total Restoration Cost	$4,075,500

[1] *Costs do not include maintenance, inspection, or remediation for built BMPs. Costs for operational BMPs (pipe cleaning and street sweeping) are annual costs that are incurred each year to sustain load reductions.*

[2] *Refer to Table 2 for Target Year.*

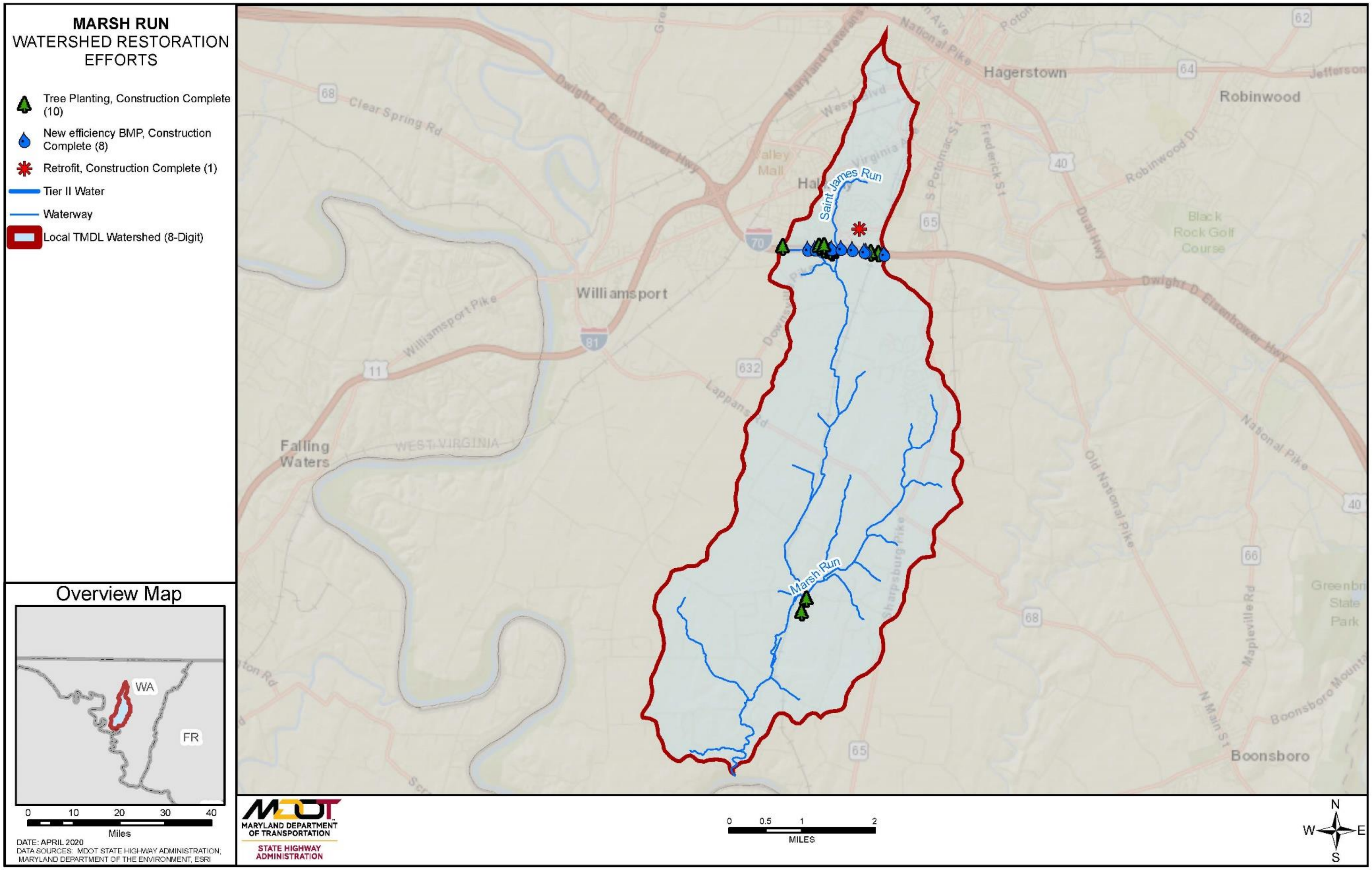


Figure 7: MDOT SHA Programmed Restoration Strategies within the Marsh Run Watershed

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Marsh Run
County Name	Washington
Date	09/29/2020

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	95
Pervious Acres in Implementation Baseline Year	125

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	59.0%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2020 Q2**	**Target Year**			**2035**	
					2009	Progress Reductions				Future Reductions				
							Reductions achieved between 2009 and 2020 Q2				Planned reductions from 2020 Q2 to 2035			
							TN	TP	TSS		TN	TP	TSS	
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2020 Q2	lbs/year	lbs/year	lbs/year	BMPs planned for installation from 2020 Q2 to 2035	lbs/year	lbs/year	lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acres Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acres Treated										-
		Bioswales	Cumulative	Impervious Acres Treated		3.5			9,038.8					3.5
				Pervious Acres Treated		6.9								6.9
		Grass Swales	Cumulative	Impervious Acres Treated	3.5									3.5
				Pervious Acres Treated	5.8									5.8
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acres Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated		3.2			2,594.8					3.2
				Pervious Acres Treated		0.9								0.9
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	2.2									2.2
				Pervious Acres Treated	1.3									1.3
	Stormwater Treatment (ST) Practices	**Non-Specified ST**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acres Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	1.1									1.1
				Pervious Acres Treated	0.5									0.5
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acres Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acres Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acres Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	5.3									5.3
				Pervious Acres Treated	12.7									12.7

Alternative Practice	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		6.0			279.2					6.0
		Pipe Cleaning	Annual **	Dry tons removed		0.6			168.7					0.6
		Inlet Cleaning	Annual **	Dry tons removed										-
		Impervious Urban Surface Elimination	Cumulative	Impervious Acres converted to pervious										-
		Urban Tree Planting	Cumulative	Acres planted on pervious	0.8	25.7			7,558.8					25.7
		Urban Stream Restoration	Cumulative	Linear feet restored						3,663.0			164,835.0	3,663.0
		Outfall Stabilization	Cumulative	Linear feet										-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**19,640**	**TOTAL**	**0**	**0**	**164,835**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		271,888

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	252,248

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	87,413

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	59.0%

From top of worksheet

Target Load

TN	TP	TSS
0	0	111,474

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction %

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2020 Quarter 2 progress reductions which are defined as reductions achieved between baseline year and December, 31, 2019.

ABBREVIATIONS

AA-DPW	Anne Arundel County, Department of Public Works
BMP	Best Management Practice
CA	Chesapeake Bay Critical Area
CBPWM	Chesapeake Bay Program Watershed Model
CWA	Clean Water Act
DNR	Maryland Department of Natural Resources
EPA	United States Environmental Protection Agency
ESD	Environmental Site Design
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
LA	Load Allocations
lbs	Pounds (weight)
LF	Linear Feet
MD	Maryland
MDE	Maryland Department of the Environment
MDOT SHA	Maryland Department of Transportation State Highway Administration
MOS	Margin of Safety
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
OED	Office of Environmental Design (MDOT SHA)
PCB	Polychlorinated Biphenyl
ROW	Right-of-Way
SCA	Stream Corridor Assessment
SW	Stormwater
SWM	Stormwater Management
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
tPCB	Total Polychlorinated Biphenyl
TSS	Total Suspended Solids
USGS	United States Geological Survey
WLA	Wasteload Allocation
WPD	Water Programs Division (MDOT SHA)
WQSs	Water Quality Standards
yr	Year

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