

Baltimore City's Implementation Plan

Non-tidal Baltimore Harbor Sediment TMDL



BALTIMORE CITY
**DEPARTMENT OF
PUBLIC WORKS**

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Appendix: TMDL Implementation Progress and Planning (TIPP) Report

ACRONYMS

AS – Ammonia Screening

BH – Baltimore Harbor

BIBI – Benthic index of biotic integrity

BMP – Best Management Practice

DO – Dissolved oxygen

DPW –Department of Public Works

EPA – U.S. Environmental Protection Agency

ESC – Erosion and sediment control

ESD – Environmental Site Design

FAP – Financial Assurance Plan

FIBI – Fish index of biotic integrity

ISR – Impervious surface restoration

LA – Load Allocation

lbs – Pounds

LU/LC - Land use / land cover

MDE – Maryland Department of the Environment

MD DNR – Maryland Department of Natural Resources

mg / L - milligrams per liter

MS4 – Municipal Separate Storm Sewer System

NDPES – National Pollution Discharge Elimination System

SIS – Stream Impact Sampling

TIPP – TMDL Implementation Planning and Progress

TMDL – Total Maximum Daily Load

TSS – Total suspended solids

WLA – Waste Load Allocation

WSA – Watershed Assessment

DEFINITIONS

Best Management Practices (BMP): The practice or combination of practices that are determined to be the most effective, practicable means of preventing or reducing the amount of pollution generated by point and nonpoint sources to a level compatible with water quality goals. BMPs are defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States.

Nonpoint Source: Diffuse sources of pollution that are not otherwise channeled through a point source in the environment. These sources may be large or small, but they are generally numerous throughout a watershed. Nonpoint Sources include urban, agricultural, or industrial areas, roads, highways, construction sites, recreational boating activities, and habitat degradation. Nonpoint Source pollution occurs year-round when rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes, and coastal waters.

Permittee: Any permittee or co-permittee of a stormwater permit.

Point Source: Any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture.

Total Maximum Daily Load (TMDL): A TMDL for a given pollutant and waterbody is composed of the sum of individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background conditions. In addition, the TMDL must include a margin of safety (MOS) to account for uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

TMDL Target: Quantitative value used to measure whether the applicable water quality standard is being attained.

Wasteload allocation (WLA): The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution

Executive Summary

On January 27, 2022, the United States Environmental Protection Agency (EPA) approved the sediment Total Maximum Daily Load (TMDL) in the non-tidal portion of the Baltimore Harbor watershed. The TMDL was established to address impairments of water quality as identified on Maryland's Section 303(d) List. The TMDL was based on a report developed by the Maryland Department of the Environment (MDE), entitled "*Total Maximum Daily Load of Sediment in the Baltimore Harbor Watershed, Baltimore City, Baltimore County, and Anne Arundel County, Maryland*". The baseline year for this TMDL is 2009.

This TMDL Implementation Plan (Plan) has been developed to present strategies to meet the waste load allocations (WLA) specifically for Baltimore City Phase I MS4 area, based on the MDE Technical Memo entitled "*Point Sources of Sediment in the Non-Tidal Baltimore Harbor Watershed*", dated December 2021. The Baltimore City Phase I Municipal Separate Storm Sewer System (MS4) permit area consists of the current 8-digit watershed boundaries, excluding the other properties regulated under National Pollutant Discharge Elimination System (NPDES) permits, like state and federal Phase II MS4 permits and industrial discharge permits.

This Plan was developed based on watershed conditions documented in a report entitled "*Baltimore Harbor Watershed Assessment*", issued by the Baltimore City Department of Public Works (DPW) in April 2019, plus previously submitted Baltimore City MS4 Annual Reports and a portfolio of programmatic, upland, and in-stream best management practices (BMPs) submitted in August 2019, then revised in April and May 2020, which was the basis of the stormwater restoration requirements listed in Part IV.E of the City's current MS4 permit. The MS4 permit is scheduled to expire in November 2026.

This TMDL was established to provide a level of sediment loading (lbs / year) that would ensure acceptable biological integrity in the watershed's streams, using a reference watershed approach and loadings results from the Phase 5.3.2 Chesapeake Bay Watershed Model (Bay Model). This Plan was developed using MDE's TMDL Implementation Planning and Progress (TIPP) tool, which includes a series of spreadsheets based on a different version of the Bay Model. Since the TIPP uses loading rates from a different version of the Bay Model, this Plan was developed using the metric of reduction (comparing baseline loads to reduced loads) instead of the WLA.

This Plan was developed to meet the criteria listed in Part IV.F.2 of the current MS4 permit. Additionally, this Plan includes information on funding strategies and accountability. Based on the TIPP results, Baltimore City will be able to achieve the TMDL reduction goal by the end of this current permit. Typically, the execution of a TMDL Implementation Plan would be pending MDE's approval of the implementation plan; however, the BMPs and milestones listed in this Plan align with the proposed activities planned to meet Part IV.E (Stormwater Restoration) of the current MS4 permit so the City has committed to proceed with executing this Plan using by the proposed milestones.

1 Introduction

On January 27, 2022, the United States Environmental Protection Agency (EPA) approved the sediment total maximum daily load (TMDL) for the Baltimore Harbor (BH) watershed. The TMDL was established to address impairments of water quality as identified on Maryland's Section 303(d) List. The TMDL was based on a report developed by the Maryland Department of the Environment (MDE), entitled "*Total Maximum Daily Load of Sediment in the Baltimore Harbor Watershed, Baltimore City, Baltimore County, and Anne Arundel County, Maryland*" (TMDL Report).

Since 1993, the City of Baltimore (City) has been regulated under a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permit. Part IV.F.2 of the current MS4 permit requires the Plan include the following elements

- A list of stormwater best management practices (BMPs), programmatic initiatives, or alternative control practices that will be implemented to reduce pollutants for the TMDL;
- A description of the City's analyses and methods, and how they are comparable with the Department's TMDL analyses; and
- Final implementation dates and benchmarks for meeting the TMDL's applicable stormwater waste load allocation (WLA).

This TMDL Implementation Plan (Plan) was developed to present strategies to meet the reduction goal (measured as the % reduction from baseline loads), specifically for the area regulated under the Baltimore City Phase I MS4 permit, as listed in the MDE Technical Memo entitled "*Point Sources of Sediment in the Non-Tidal Baltimore Harbor Watershed*", dated December 2021. Although the TMDL was issued in 2022, the baseline load is based on land use conditions and installed BMPs for the year 2009. Typically, the execution of the strategies would be pending MDE's approval of the implementation plan; however, the BMPs and milestones listed in this Plan align with the proposed activities planned to meet Part IV.E (Stormwater Restoration) of the current MS4 permit so the City will proceed with implementing the proposed strategies and schedule.

Table 1: Sediment TMDL Summary

Area	Baseline Load (tons / year)	WLA (tons / year)	Reduction
Baltimore Harbor Watershed	6,982	3,247*	53%
NPDES Regulated Stormwater	6,804	3,069	55%
Baltimore City Phase I MS4 Permit Area	2,109	886	58%

* Value indicates the TMDL which includes both WLAs from point sources and load allocations (LA) from non-point sources.

2 Background

Baltimore City issued a report entitled, “Baltimore Harbor Watershed Assessment” (BH-WSA) , dated April 2019. The BH-WSA provided an in-depth watershed characterization and identified priority area and water quality improvement strategies. The following sections are meant to only summarize portions of the WSA and identify any changes that may have occurred since 2019.

2.1 Regulated Stormwater Area

The BH watershed is one of five 8-digit state defined watersheds within Baltimore City, at the 8-digit scale, as shown in Figure 1. Although the watersheds traverse other counties, it is not considered as interjurisdiction for the City. The other four watersheds in the City have already been issued a sediment TMDL, as listed in Table 2.

Table 2 – Summary of Sediment TMDLs Issued for other City Watersheds

Watershed	Year Issued	Reduction
Back River	2018	75%
Gwynns Falls	2010	47%
Jones Falls	2011	26%
Patapsco River Lower North Branch	2011	25%

Baltimore’s public storm drain within the BH watershed consists of approximately 381 miles of pipes, 16,614 inlets and 491 outfalls. The majority of the outfalls discharge directly to tidal waterways. Approximately 57% of storm drain pipes within the BH watershed were installed prior to 1950 and are subject to degradation and groundwater infiltration. As a condition of previous MS4 permits, the Department of Public Work (DPW) delineated drainage areas associated with the outfalls of the City’s public storm drain system. The outfalls and associated drainage areas were submitted as part of the MS4 geodatabase to MDE.

The WSA had compared the current 8-digit watershed boundary provided by MDE with outfall drainage areas of the MS4 geodatabase. The differences in boundaries are shown in Figure 2 and are likely due to fact that the MS4 outfall drainage areas were developed based on Baltimore’s public storm drain system, not just topographic patterns. Baltimore City is working with MDE to determine how the proposed boundaries may be formerly adopted. For the purposes of this Plan, only the existing 8-digit watershed boundary will be used.

This Plan is based on the regulated stormwater area for the Phase I MS4 permit. It does not include any state or federal-owned properties, nor any properties currently permitted under an NPDES Industrial permit. These areas were designated separately by MDE and were assigned specific WLAs and reduction goals. The excluded areas are shown in Figure 3.

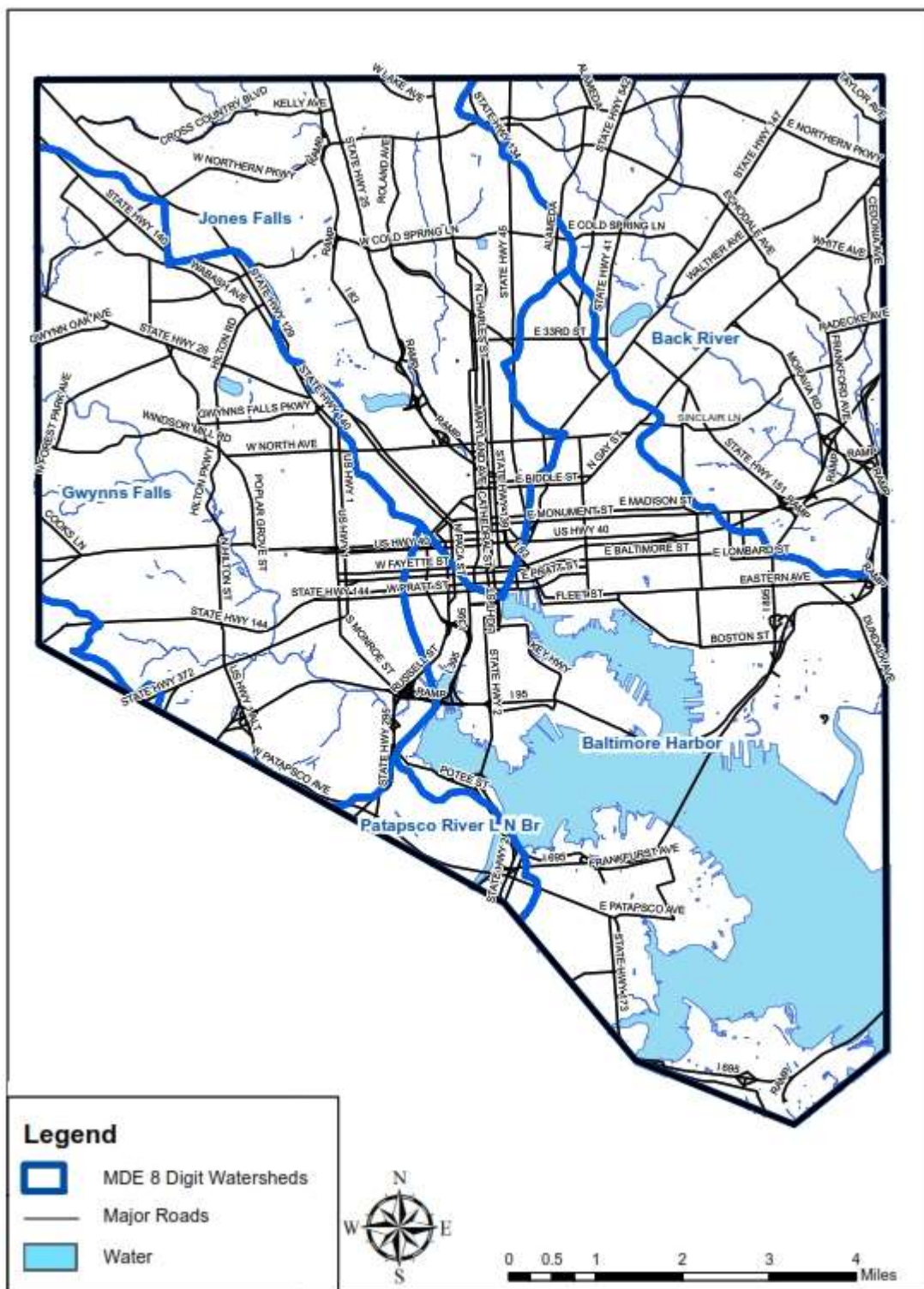


Figure 1: Baltimore City Watersheds (8-digit)

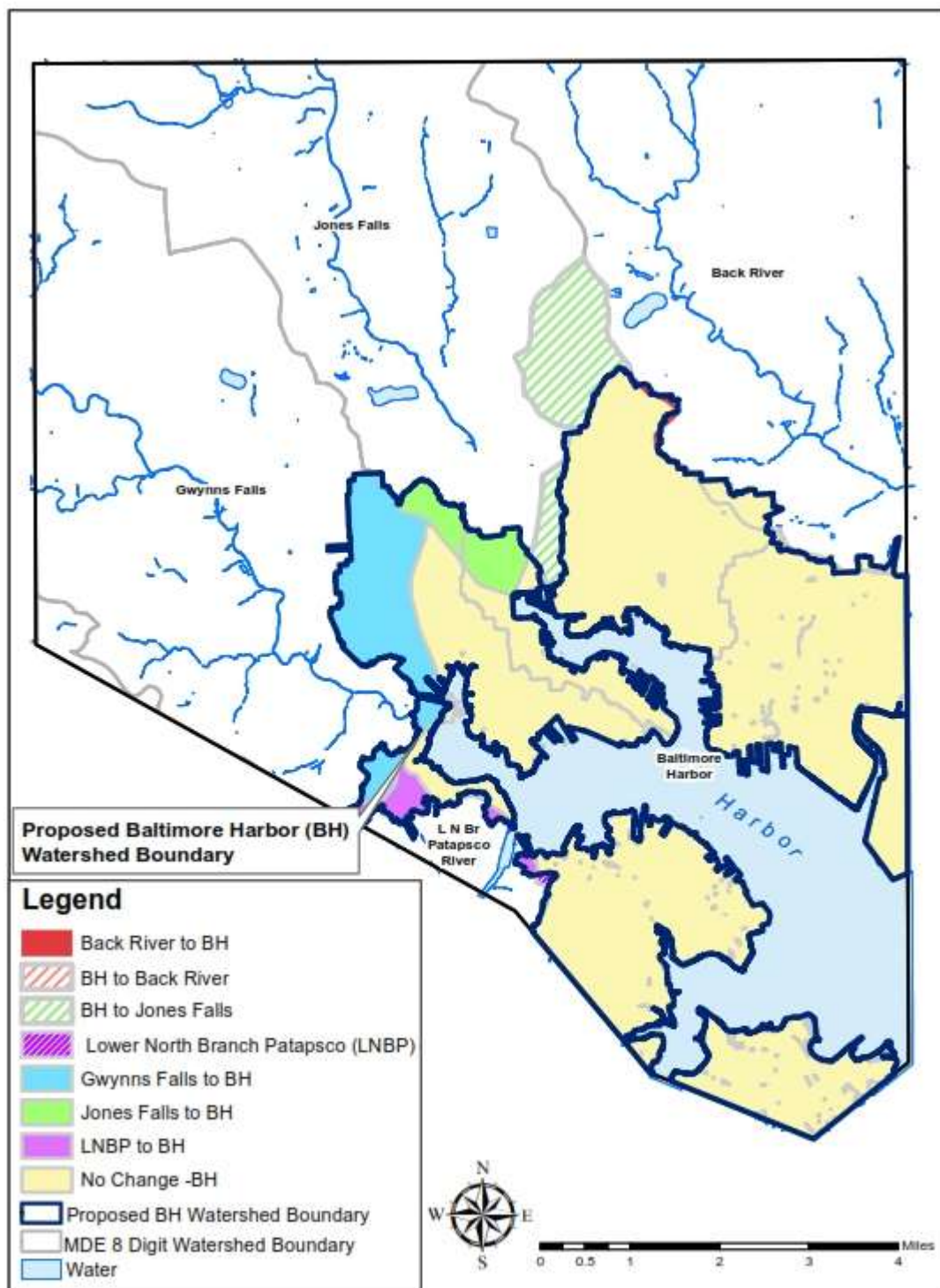


Figure 2: 8-digit Watershed Boundary Variation

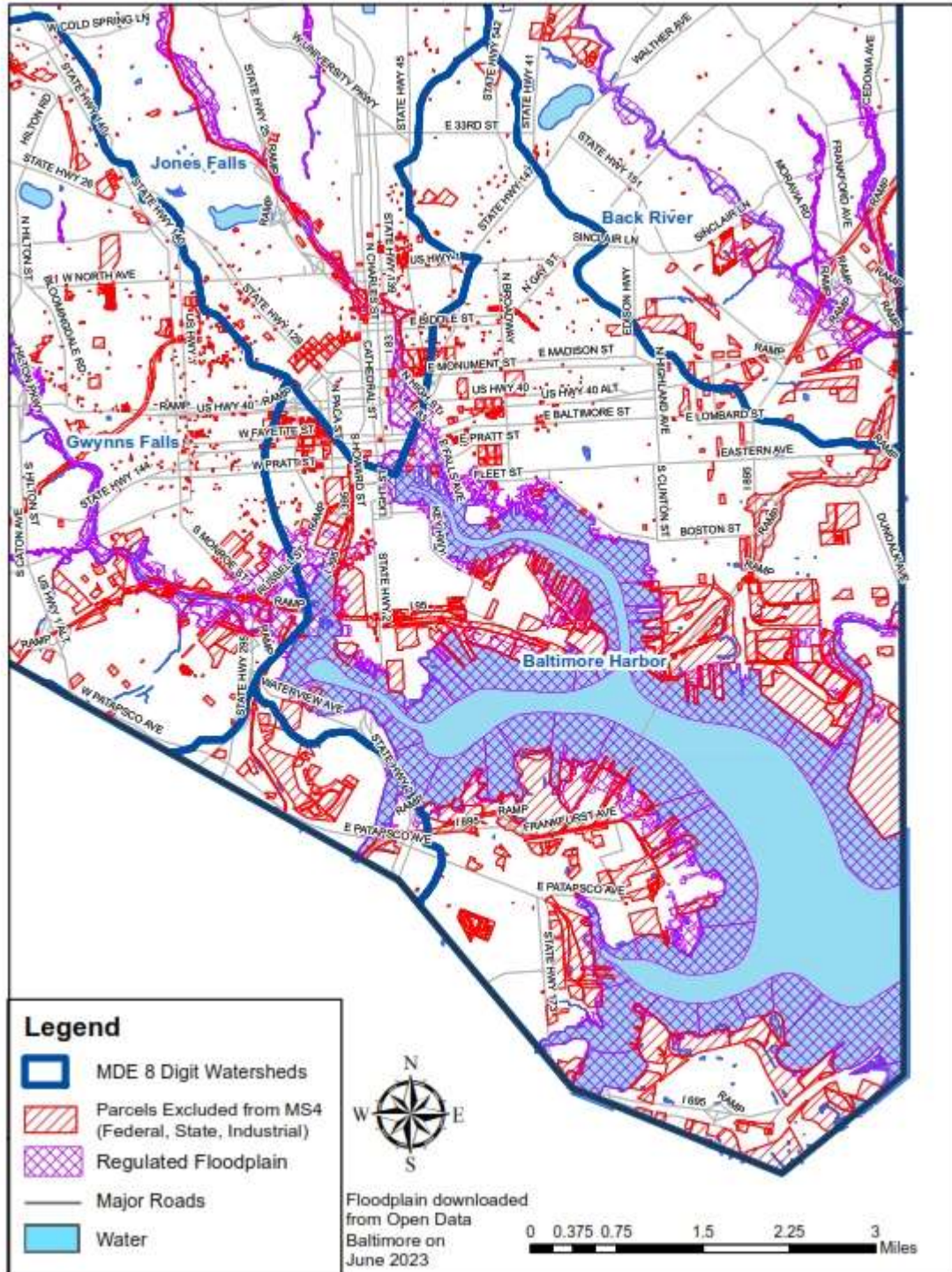


Figure 3: Areas Excluded from the Phase I MS4 Regulated Area

2.2 Non-tidal Surface Waters

Sediment loadings can be affected by altered hydrology and increased runoff (typically from land use / land cover changes), which can increase channel erosion and scouring. However, the BH watershed only has approximately 6.3 miles of stream and 200 acres of associated riparian buffer. Most of the historic waterways in the watershed were piped in the early 20th century to allow development and address public health concerns related to water-borne diseases. Figure 4 shows both the historic waterways compared to the current stream channels within the watersheds. None of the streams in the entire Baltimore Harbor watershed are designated as “high quality” or Tier II stream segments.

The sediment TMDL was based on biological assessments, summarized in MDE’s report, entitled “*Watershed Report for Biological Impairment of the Baltimore harbor Watershed in Baltimore City, Baltimore and Anne Arundel Counties Maryland: Biological Stressor Identification Analysis Results and Interpretation*” (*Biological Assessment*), dated March 2014. The report summarized MD Department of Natural Resource’s (MD DNR) assessment of the benthic and / or fish index of biotic integrity (BIBI, FIBI), following Maryland Biological Stream Sampling (MBSS) protocols. This sampling was conducted in 1995-1997 and 2000-2004 at twenty-eight (28) sampling sites. Twenty-one of those sites were ranked as poor to very poor (i.e. BIBI/ FIBI scores were significantly less than 3.0). Only one station (BALT-108-R-2001) was located within the City, near the head waters of Gorsuch Creek and it had a failing score.

Each spring, DPW performs biological and habitat assessments at both fixed and random stations throughout the City, following MBSS protocols. However, only one biological assessment had been conducted within the watershed within the last 10 years. The site was located near the headwater of Janney Run and the resultant BIBI score was less than 2.0.

Since the mid-1990’s, DPW has conducted two routine monitoring programs: Ammonia Screening (AS) and Stream Impact Sampling (SIS). Figure 4 shows the 15 fixed monitoring sites located within the watershed; only 7 AS sites and 2 SIS sites are located in the non-tidal portion of the watershed. Many of the non-tidal sites sample the base flow (historic streams) within the public storm drain system. All sampling results are posted on the City’s Open Baltimore website. The AS program measures dissolved oxygen (DO) levels which can impact biological integrity. Total suspended solid (TSS) measurements are a direct measurement of sediment loading. Sampling results of the non-tidal sites are summarized in Table 3.

Table 3: DPW Non-tidal Sampling Results for January 2010 to December 2023

Parameter	Number of Samples	Range
DO	685	0.34 to 13.36 mg / l
TSS	218	1 to 101 mg / l

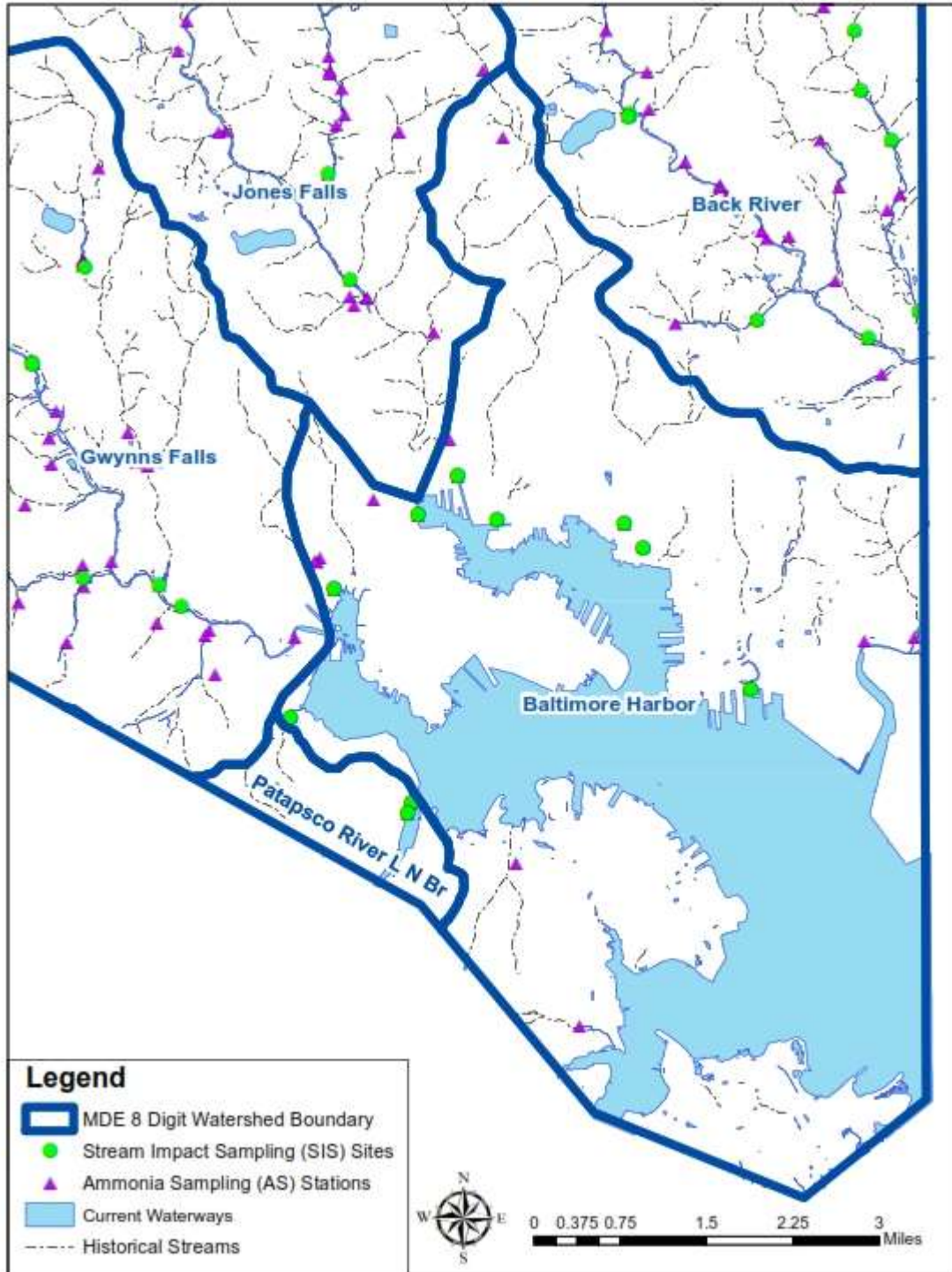


Figure 4 DPW Routine Monitoring Sampling Sites related to Current and Historic Waterways

2.3 Land Use / Land Cover

Figure 5 shows the major land use / land cover (LU/LC) designations used by the TIPP tool. The map is based on the Chesapeake Bay Program LU/LC georeferenced dataset for 2017 and 2018, consolidating the land use designations into 6 major terms (bold type), shown in Table 4.

Table 4 – LU/LC Designation Consolidation

Aggregate Impervious Roads Structures Other Impervious	Turf Bare Shore Cropland Barren Extractive Barren Natural Succession Barren Natural Succession Herbaceous Natural Succession Scrub/Shrub Pasture/Hay Barren Pasture/Hay Herbaceous Riverine Wetlands Barren Riverine Wetlands Herbaceous Riverine Wetlands Scrub/Shrub Suspended Succession Barren Suspended Succession Herbaceous Suspended Succession Scrub/Shrub Terrene Wetlands Barren Terrene Wetlands Herbaceous Terrene Wetlands Scrub/Shrub Tidal Wetlands Barren Tidal Wetlands Herbaceous Tidal Wetlands Scrub/Shrub Transitional Barren Turf Grass
Tree Canopy over Aggregate Impervious Tree Canopy Over Roads Tree Canopy Over Structures Tree Canopy Over Other Impervious	
Tree Canopy over Turf Riverine Wetlands Tree Canopy Terrene Wetlands Tree Canopy Tidal Wetlands Tree Canopy Tree Canopy Over Turf Grass Other Tree Canopy	
Forest – not included in TIPP Riverine Wetlands Forest Terrene Wetlands Forest Tidal Wetlands Forest	
Water – not included in TIPP Estuarine/Marine Lakes and Reservoirs Lotic Water (fresh) Riverine Ponds Terrene Ponds	

In order to estimate the LU/LC conditions for the baseline year 2009, the tree canopy areas from the Bay LU/LC dataset were reduced based on the tree planting effort for 2010 to 2017, previously reported to MDE in the Alternative BMP feature class tables of the MS4 geodatabase. Forest areas were not included in the TIPP because the TMDL assumed negligible sediment loading.

2.4 Land Disturbance Activities

Many of the development projects within the BH watershed are considered as redevelopment, so existing impervious area is either reduced or runoff is controlled by on-site BMPs. DPW has delegated authority for erosion and sediment control (ESC) plan review and has 10 employees dedicated to ESC inspections. In addition to the inspections of construction activities, DPW investigates complaints of ESC issues, received through the City's 3-1-1 non-emergency system.

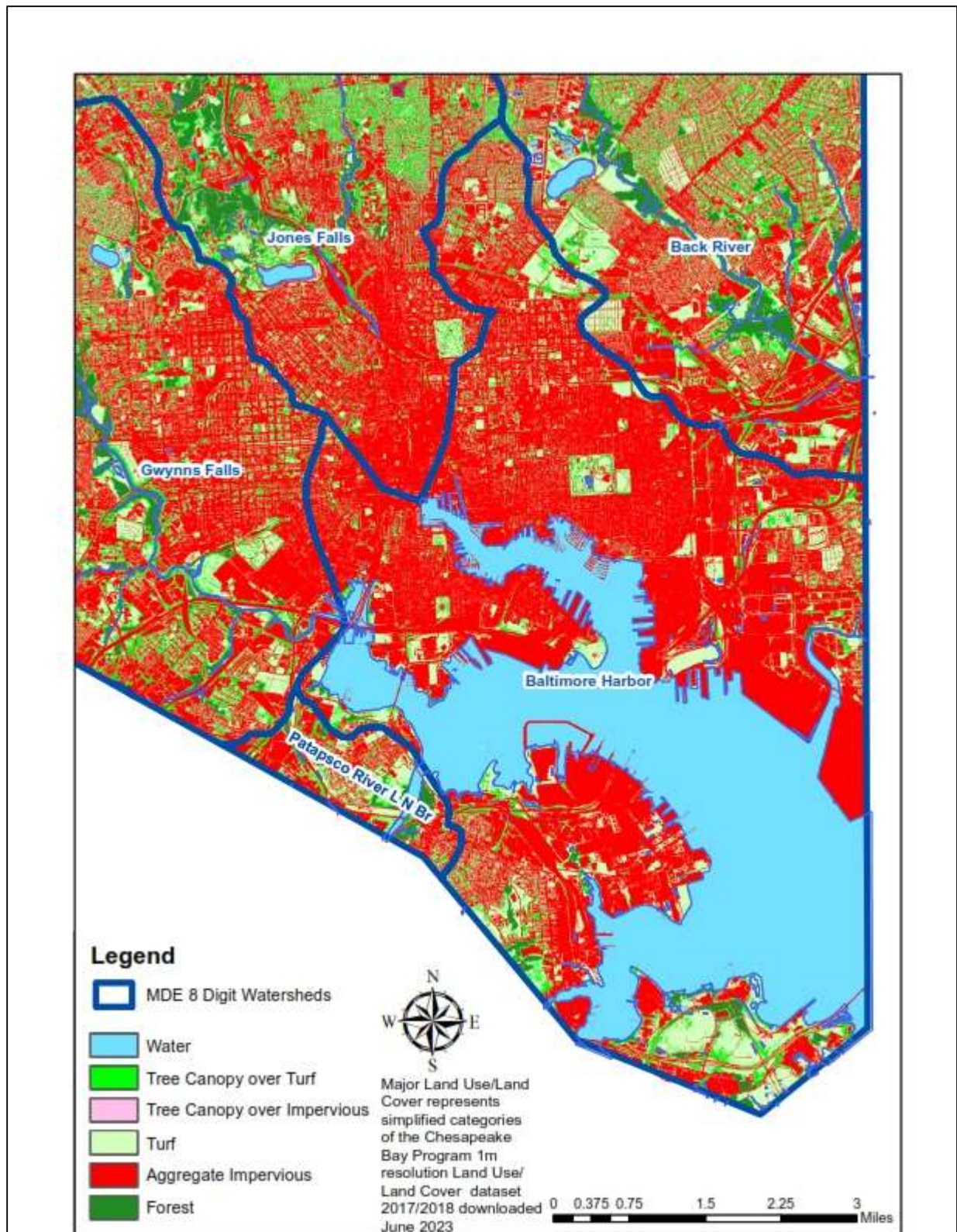


Figure 5 Land Use / Land Cover

3 Implementation Plan Development

In addition to sediment, the BH watershed is impaired by nutrients, bacteria, and PCBs. TMDLs have been established for these pollutants, as listed in Attachment A of the current MS4 permit. Nutrient TMDLs at the Chesapeake Bay scale have also been established. Implementation plans have already been submitted to MDE for each of these other TMDLs, though the non-tidal portion of the Baltimore Harbor watershed is only part of the Patapsco Mesohaline watershed for the local TMDLs and Bay TMDLs.

The current MS4 permit requires stormwater restoration, using a metric of equivalent impervious surface restoration (ISR). During negotiations for the current permit, DPW developed a portfolio of the practices to estimate the ISR, nutrient and sediment reductions that could be achieved within the 5-year permit period, in addition to continuing operations of street sweeping and storm drain cleaning from FY 2019, when the last permit expired. The estimations were based on MDE's guidance document entitled "*Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated: Guidance for the National Pollutant Discharge Elimination System Stormwater Permits*" (MS4 Accounting Guidance). This Plan was developed based on the portfolio of projects; no additional strategies were proposed.

3.1 TIPP Development

Loading and reduction scenarios were estimated using the TMDL Implementation Planning and Progress (TIPP) tool, developed by MDE to standardize the calculated estimates of pollutant load reductions for nutrient and sediment TMDLs at various points in the watershed planning process. The TIPP tool is based on the Chesapeake Bay Phase 6 CAST-2017d Watershed Model No Action (No BMP) scenario loading rates with disaggregated stream bed and bank loads at the 8-digit watershed scale. Attachment A includes the following TIPP report sections based on a milestone schedule:

- Summary: combination of tables summarizing the other report sections; the final table confirms the total % reduction
- Baseline: land use conditions and BMPs installed by the baseline year of 2009.
- Progress: land use conditions and BMPs installed at the end of the last permit (FY 2019)
- Implementation: planned efforts by Milestone 1 (2026), which is the end of the current MS4 permit

3.2 Best Management Practices

The City's ultra-urban setting consists of highly compacted soils, dense underground infrastructure and limited opportunities to intercept and treat stormwater runoff. Potential BMPs that could be applicable to the BH watershed were categorized into the five (5) categories shown in Table 5. Sediment reductions were primarily achieved by annual operations like street sweeping and storm drain cleaning. The size and type of stormwater BMPs were based on previous feasibility and siting studies, plus development trends for implementation. Some BMPs that are included in the 2021 Accounting Guidance and used towards ISR goals (like soil restoration) were not available to include in a sediment load reduction, though these BMPs are being implemented.

Table 5 Summary of Implementation Scenarios

Category	Baseline	Progress	Milestone	Total	Basis
Stream Restoration (LF)	0	0	175	175	Regenerative stormwater conveyance project already in design.
Street Sweeping (miles)	23,801	10,433	2,960	37,194	Progress is continuing operations required by permit plus quadrant sweeping. Milestone estimates % increase due to efficiency (same fleet).
Storm Drain Cleaning (lb)	0	374,080	560,671	934,751	Progress is continuing operations required by permit. Milestone estimates % increase due increased resources
Land Use Conversion (acres)	1,335	73	84	1,492	Milestone is based on Tree Baltimore data up to FY 2022, plus capital projects in design and estimated distribution of afforestation (portfolio) and development
Stormwater BMP (acres)	10.1	43.7	167.1	220.9	Milestone is capital projects in design, plus estimated distribution of new BMPs (portfolio) and development

3.3 Spatial Prioritization

Street sweeping routes extend throughout all public roads within the BH watershed. Storm drain cleaning operations are based on topography, population density, and historic choked inlet and dirty streets and alleys complaints. Land use conversions and stormwater BMPs include a mixture of development trends, volunteer restoration efforts, and DPW capital projects. About half of the DPW projects were already in design at the end of the last permit. DPW focused site selection for new stormwater BMPs focused on priority areas (Figures 6 to 9) that were developed in the BH-WSA. Potential BMPs (DPW capital projects) are shown in Figure 10. DPW tracks feasibility of each site as it relates to both BMP design criteria (applicability and design constraints) and access to the space.

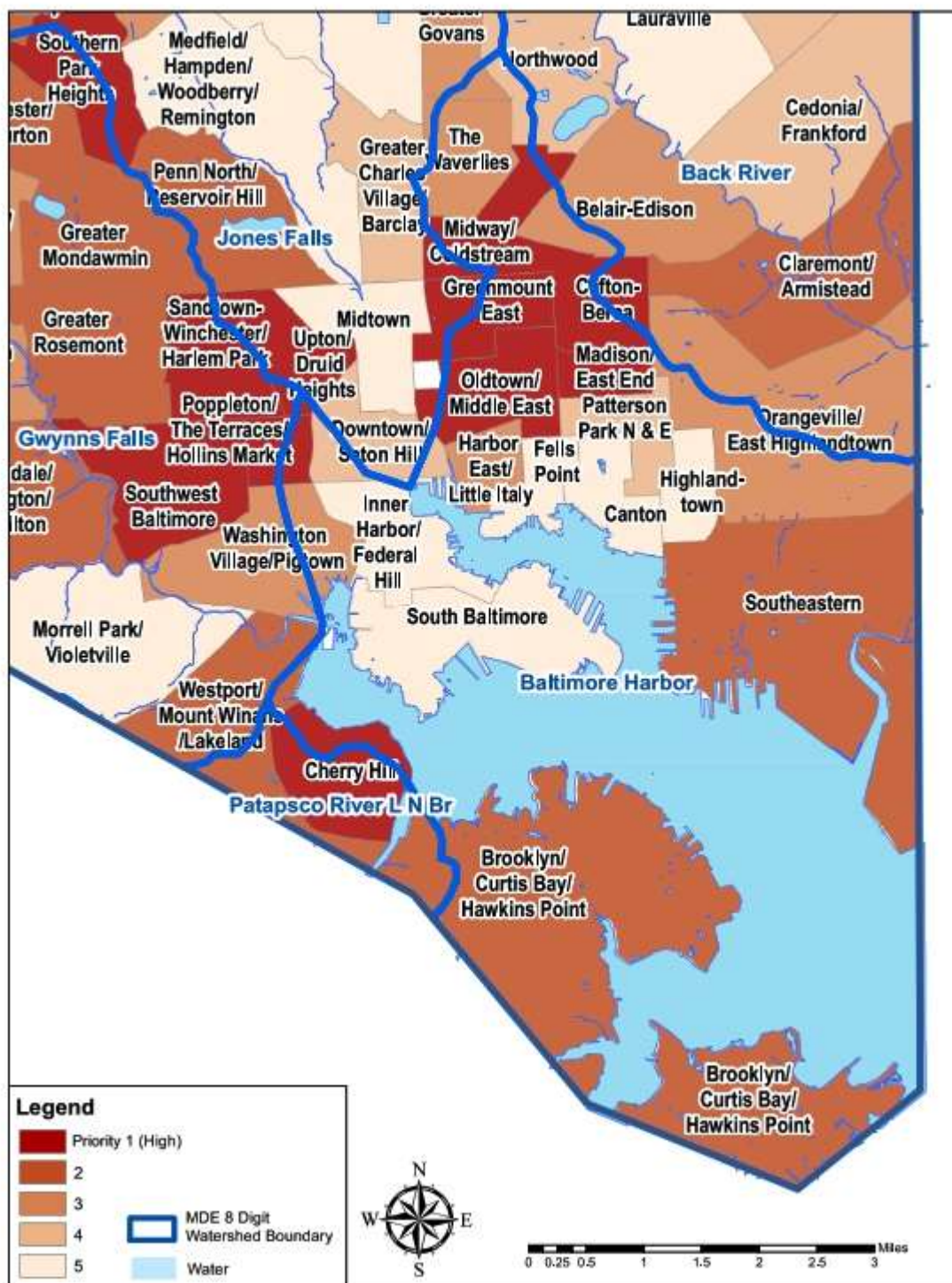


Figure 6 Prioritization Map based on Equity (Socio-Economic Factors)

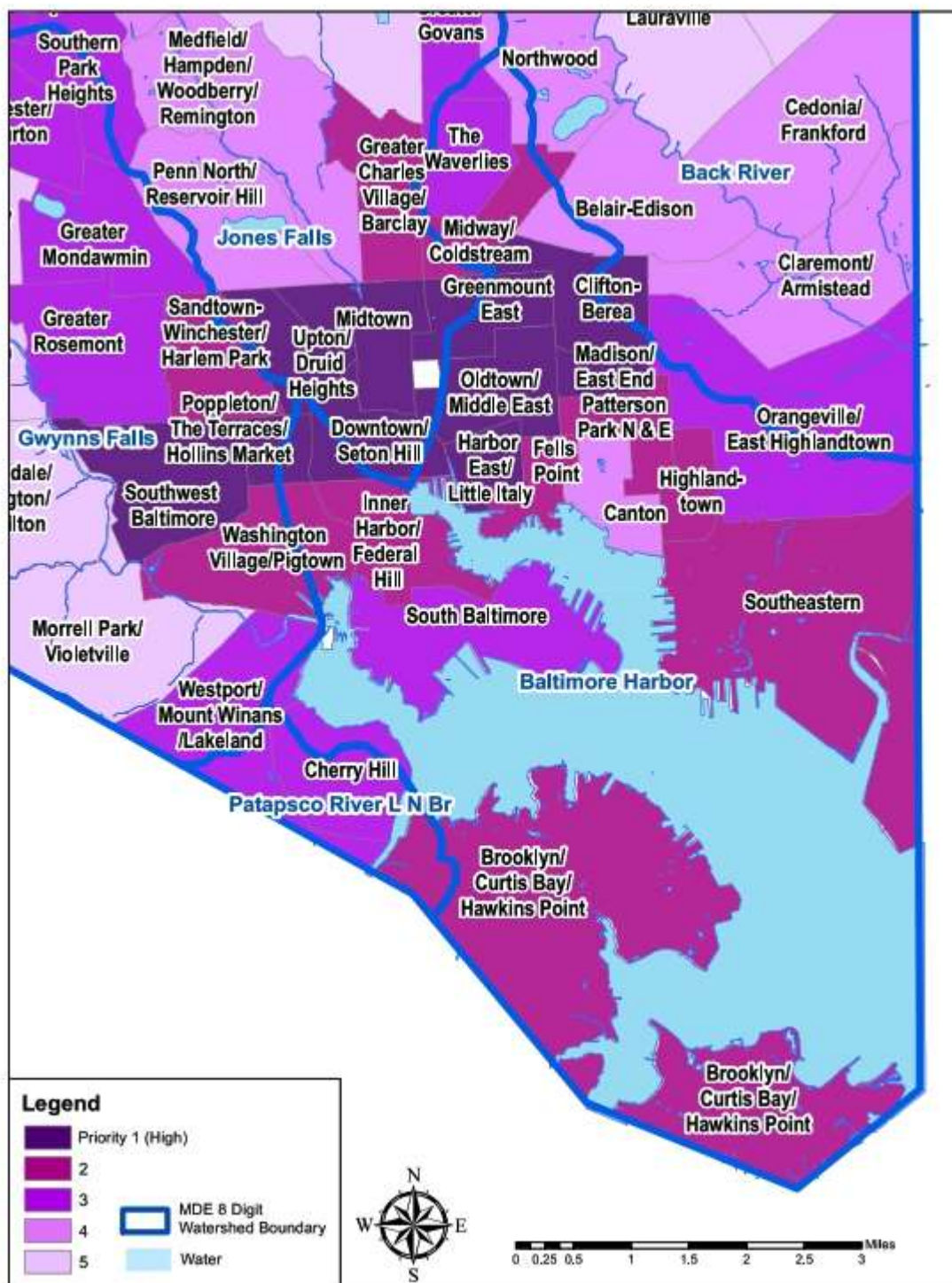


Figure 7 Prioritization Map based on Health Supportive Community Factors



Figure 8 Prioritization Map based on Physical Feasibility Factors for ESD Practices

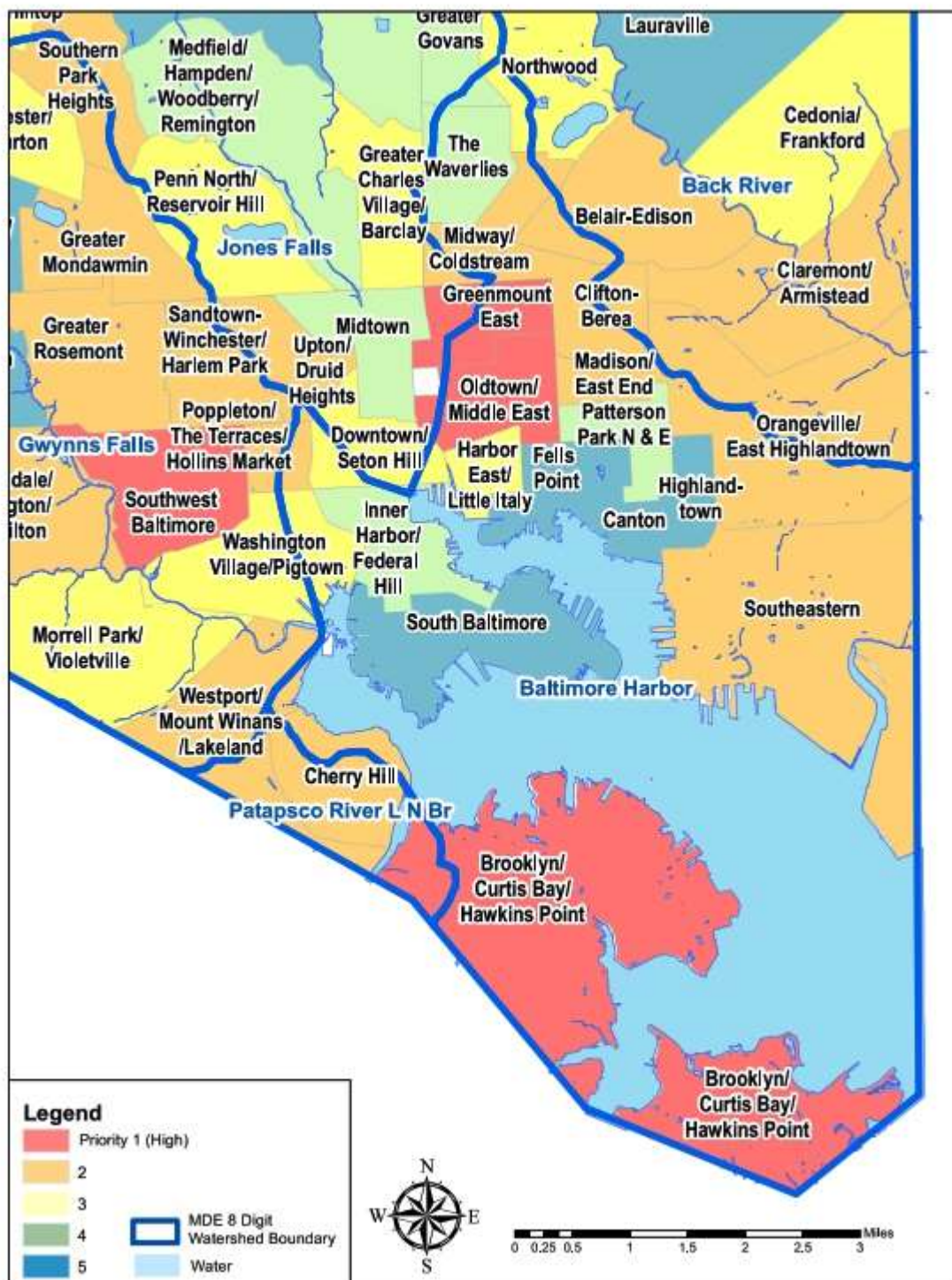
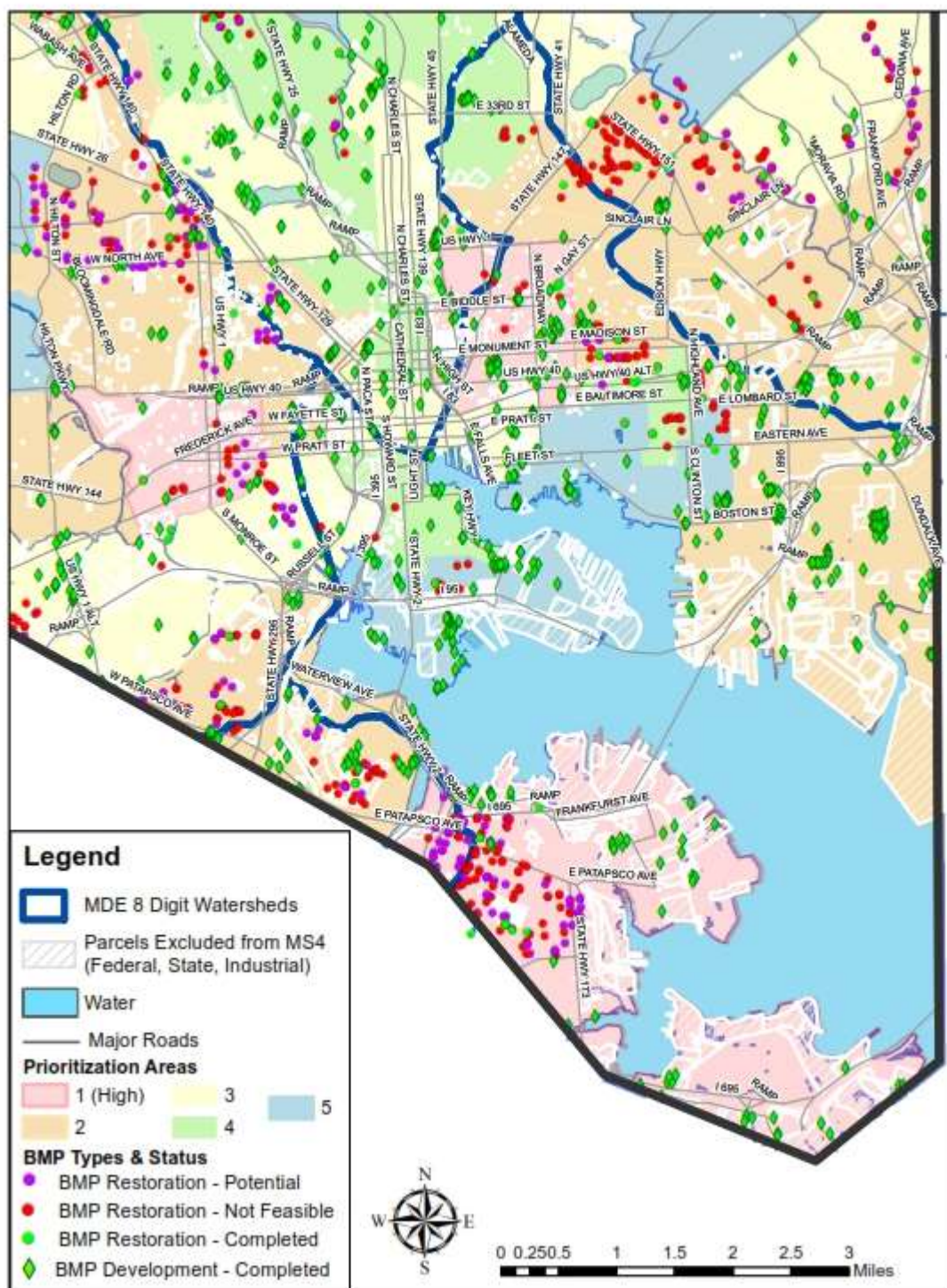


Figure 9: Composite Prioritization Map



3.4 TIPP Results

Table 8 summarizes the TIPP results and confirm that the TMDL will be met by the end of the current permit (2026). Since the TMDL and the TIPP tool used different versions of the Bay Model, so the estimated baseline loads were difference. The TIPP baseline load was almost 35% more than the baseline load estimated by the TMDL; however, the proposed BMPs were still able to achieve the required % load reduction.

Table 8- Summary of TIPP Results

Description	Sediment (lbs / year)
TMDL Baseline Loads	4,218,000
% Reduction Goal	58%
TIPP Baseline Load	5,698,937
TIPP Progress Load	3,347,104
TIPP Milestone Load	2,191,473
TIPP Load Reduction	3,507,464
TIPP % Reduction	61.55%

4 Funding Strategy

Every two years, the City is required to submit a financial assurance plan (FAP) with the MS4 Annual Report. The last FAP was issued in 2022 and included all activities that have been completed in compliance with the current MS4 permit and five-year projections for the implementation of its stormwater program and BMP necessary for meeting specific requirements of the permit. The City's stormwater utility is the main funding source for the City's stormwater operations, allowing for financing through utility bonds and state revolving load funds. Since this Plan demonstrated that the TMDL will be met by the end of the current permit by following the ISR strategy, the 2022 FAP may be referenced as the funding strategy for this Plan.

5 Accountability: Tracking and Reporting

Baltimore City is required to submit an annual report to MDE each December. Progress related to this Plan will be reported in the MS4 Annual Report as follows:

- Main Report: Narrative of implementation progress and any proposed changes to the Plan to meet the WLA;
- Appendix: TIPP reports where the Progress section used for this Plan will become the conditions for the Permit Load section. The Current Progress section will then show actual cumulative implementation since the end of the last permit.
- MS4 database: BMP implementation details and local TMDL progress

Proposed changes to the Plan may be based on new data sets, modification to the regulated stormwater areas, Bay Model updates, operations performance, development trends, or actual capital project implementation.

Appendix: TMDL Implementation Progress and Planning (TIPP) Report

1. SUMMARY

BASIC PROJECT INFORMATION

Populate blue cells below with basic project information. **All blue cells in this section are required for the tool to return results.**

Name of Implementation Plan	TMDL of Sediment in the Baltimore Harbor Watershed Baltimore City
Watershed Code - MD 8digit or Chesapeake Bay Segment	02130903
Watershed Name	Baltimore Harbor
County	Baltimore City
Baseline Year	2009
Reduction %	58
Impairment	TSS

Are you using specific land use information? (i.e. Impervious Road and Impervious NonRoad data)	No	Specific land use information can be found using reclassified land cover data located on MDE's TMDL Stormwater Implementation Resource webpage
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BASELINE YEAR

Baseline Year Summary

Type	EOS Load (lbs/yr)			EOT Load (lbs/yr)		
	TN	TP	TSS	TN	TP	TSS
Land Use	107,950.26	9,366.59	14,906,739.22	107,950.26	9,366.59	14,906,739.22
Load Reductions						
Septic BMPs	-	-	-	-	-	-
Alternative BMPs	10,546.28	2,009.16	8,677,237.43	10,546.28	2,009.16	8,677,237.43
Land Use Conversion	3,513.28	148.67	519,586.52	3,513.28	148.67	519,586.52
SW Management BMPs	39.38	5.28	10,977.95	39.38	5.28	10,977.95
TOTAL LOAD REDUCTION	14,098.94	2,163.12	9,207,801.90	14,098.94	2,163.12	9,207,801.90

PERMIT LOAD

Permit Load Summary

Type	EOS Load Reductions (lbs/yr)			EOT Load Reductions (lbs/yr)		
	TN	TP	TSS	TN	TP	TSS
Septic BMPs	-	-	-	-	-	-
Alternative BMPs	-	-	-	-	-	-
Land Use Conversion	-	-	-	-	-	-
SW Management BMPs	-	-	-	-	-	-
TOTAL LOAD REDUCTION	-	-	-	-	-	-

CURRENT PROGRESS

Current Progress Summary

Type	EOS Load Reductions (lbs/yr)			EOT Load Reductions (lbs/yr)		
	TN	TP	TSS	TN	TP	TSS
Septic BMPs	-	-	-	-	-	-
Alternative BMPs	3,339.43	593.97	2,295,887.43	3,339.43	593.97	2,295,887.43
Land Use Conversion	78.61	7.73	9,034.98	78.61	7.73	9,034.98
SW Management BMPs	181.58	23.53	46,911.01	181.58	23.53	46,911.01
TOTAL LOAD REDUCTIO	3,599.61	625.24	2,351,833.43	3,599.61	625.24	2,351,833.43

IMPLEMENTATION SCENARIO

Implementation Scenario summary

Type	EOS Load Reductions (lbs/yr)			EOT Load Reductions (lbs/yr)		
	TN	TP	TSS	TN	TP	TSS
Milestone 1						
Septic BMPs	-	-	-	-	-	-
Alternative BMPs	1,771.79	358.76	958,191.67	1,771.79	358.76	958,191.67
Land Use Conversion	219.89	1.08	42,891.58	219.89	1.08	42,891.58
SW Management BMPs	463.51	76.87	154,547.28	463.51	76.87	154,547.28
TOTAL LOAD REDUCTIO	2,455.18	436.72	1,155,630.53	2,455.18	436.72	1,155,630.53
Milestone 2						
Septic BMPs	-	-	-	-	-	-
Alternative BMPs	-	-	-	-	-	-
Land Use Conversion	-	-	-	-	-	-
SW Management BMPs	-	-	-	-	-	-
TOTAL LOAD REDUCTIO	-	-	-	-	-	-
Planned						
Septic BMPs	-	-	-	-	-	-
Alternative BMPs	-	-	-	-	-	-
Land Use Conversion	-	-	-	-	-	-
SW Management BMPs	-	-	-	-	-	-
TOTAL LOAD REDUCTIO	-	-	-	-	-	-

BMP Units

Summary of BMP units (#/acres/length)

Type	Baseline Year	Permit Load	Current Progress	Implementation	TOTAL	Units Treated
Septic BMPs	-	-	-	-	-	# of Systems
Shoreline Management	-	-	-	-	-	ft
Stream Restoration	-	-	-	175.00	175.00	ft
Street Sweeping	23,801.00	-	10,433.00	2,960.00	37,194.00	Lane Miles
Storm Drain Cleaning	-	-	374,080.00	560,671.00	934,751.00	lbs
Urban Nutrient Mgmt	-	-	-	-	-	Acres
Land Use Conversion	1,335.00	-	73.00	84.00	1,492.00	Acres
SW Management BMPs	10.10	-	43.70	167.10	220.90	Acres

SUMMARY

Overall plan summary for specified pollutant

EOS or EOT	EOS
Baseline	
Impairment Baseline Load	5,698,937.31 lbs/yr
Target Reduction %	58.00 %
Target Load	2,393,553.67 lbs/yr
Total Reduction Required	3,305,383.64 lbs/yr
Permit	
Total Permit Load	5,698,937.31 lbs/yr
Permit % Reduction	- %
Progress	
Total Progress Load	3,347,103.89 lbs/yr
Progress % Reduction	41.27 %
Implementation (Milestone 1)	
Total Load after Implementation	2,191,473.36 lbs/yr
Implementation % Reduction	61.55 %
Implementation (Milestone 1 + Milestone 2)	
Total Load after Implementation	2,191,473.36 lbs/yr
Implementation % Reduction	61.55 %
Implementation (Milestone 1 + Milestone 2 + Planned)	
Total Load after Implementation	2,191,473.36 lbs/yr
Implementation % Reduction	61.55 %

202,080.32

2. BASELINE YEAR

SUMMARY

Baseline EOS Load (lbs/yr)			Baseline EOT Load (lbs/yr)		
TN	TP	TSS	TN	TP	TSS
93,851.32	7,203.48	5,698,937.31	93,851.32	7,203.48	5,698,937.31

LAND USE

Populate blue cells below with baseline year land use information. Enter Aggregate Impervious information OR Impervious Road and Impervious NonRoad information, but not both. Cells will be grayed out based on specific or general land use selection.

Land Use (acres)		EOS Load (lbs/yr)			EOT Load (lbs/yr)		
Type	Amount	TN	TP	TSS	TN	TP	TSS
Aggregate Impervious	7,244.00	88,250.80	6,327.51	13,343,004.14	88,250.80	6,327.51	13,343,004.14
Impervious Road		-	-	-	-	-	-
Impervious NonRoad		-	-	-	-	-	-
Turf	2,621.00	19,699.46	3,039.08	1,563,735.08	19,699.46	3,039.08	1,563,735.08
Septic Systems		-	-	-	-	-	-
Total		107,950.26	9,366.59	14,906,739.22	107,950.26	9,366.59	14,906,739.22

SEPTIC BMPs

Populate blue cells below with baseline year septic BMP information. Please note that addition of septic loads is OPTIONAL.

BMP Short Name	BMP Description	# of Systems	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
			TN	TP	TSS	TN	TP	TSS
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
Total		-	-	-	-	-	-	-

ALTERNATIVE BMPs

Populate blue cells below with proposed alternative BMP information. It is recommended that Shoreline Managment and Stream Restoration load reductions be entered manually, however, default planning rates are available for planning purposes.

Please use the protocol methods outlined in the expert panels approved by CBP to determine load reductions outside of this tool.

SHORELINE MANAGEMENT

Type	Total Feet	EOT Load Reduction (lbs/yr)		
		TN	TP	TSS
Total	-	-	-	-

STREAM RESTORATION

Type	Total Feet	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
		TN	TP	TSS	TN	TP	TSS
					-	-	-
					-	-	-
Total	-	-	-	-	-	-	-

STREET SWEEPING

BMP Short Name	BMP Description	Lane Miles	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
			TN	TP	TSS	TN	TP	TSS
SCP1	Advanced Sweeping Technology - 2 pass/week	7,556.00	4,508.37	839.91	3,649,162.96	4,508.37	839.91	3,649,162.96
SCP2	Advanced Sweeping Technology - 1 pass/week	7,988.00	3,574.60	710.34	2,939,273.86	3,574.60	710.34	2,939,273.86
SCP3	Advanced Sweeping Technology - 1 pass/2 weeks	8,257.00	2,463.31	458.91	2,088,800.60	2,463.31	458.91	2,088,800.60
			-	-	-	-	-	-
			-	-	-	-	-	-
Total		23,801.00	10,546.28	2,009.16	8,677,237.43	10,546.28	2,009.16	8,677,237.43

STORM DRAIN CLEANING

User must indicate whether using default enrichment factors. If yes, leave TN and TP input cells blank.

Material	Nutrient Enrichment Factor			lbs	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
	Defaults?	TN	TP		TN	TP	TSS	TN	TP	TSS
					-	-	-	-	-	-
					-	-	-	-	-	-
Total				-	-	-	-	-	-	-

URBAN NUTRIENT MANAGEMENT

User must indicate whether or not the Fertilizer Act applies to the practice. In general, the Fertilizer Act applies to all practices implemented after 2014.

BMP Short Name	BMP Description	Fertilizer Act?	Treated Turf (acres)	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
				TN	TP	TSS	TN	TP	TSS
				-	-	-	-	-	-
				-	-	-	-	-	-
				-	-	-	-	-	-
Total			-	-	-	-	-	-	-

LAND USE CONVERSION BMPS

Populate blue cells below with baseline year land use conversion information. Only approved MDE BMPS will be accepted.

Land Use Conversion		Acres	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
Converting from	Converting to		TN	TP	TSS	TN	TP	TSS
Aggregate Impervious	Turf	391.00	1,824.64	(111.84)	486,920.51	1,824.64	(111.84)	486,920.51
Turf	Tree Canopy over Turf	944.00	1,688.64	260.51	32,666.01	1,688.64	260.51	32,666.01
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
Total		1,335.00	3,513.28	148.67	519,586.52	3,513.28	148.67	519,586.52

STORMWATER MANAGEMENT BMPS

Populate blue cells below with baseline year stormwater management BMP information. Enter Aggregate Impervious information OR Impervious Road and Impervious NonRoad information, but not both. Cells will be grayed out based on specific or non-specific land use selection. For RR/ST BMPS, users have two options: 1) Input applicable BMPS by type and use the BMP efficiency to determine the load reduction or 2) designate the BMP as an RR or ST practice and use the Pe treated to determine the load reduction. User must designate if a Floating Treatment Wetland is present.

BMP Short Name	BMP Description	Pe, if applicable	Floating Treatment Wetland?	Aggregate Impervious	Treated (acres)		Turf	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
					Impervious Road	Impervious NonRoad		TN	TP	TSS	TN	TP	TSS
BioRetUdCD	Bioretention/raingardens - C/D soils, underdrains	1.00	NO	1.85			1.12	7.74	1.31	2,241.69	7.74	1.31	2,241.69
Filter	Filtering Practices	1.00	NO	4.62			1.18	26.06	3.24	7,371.01	26.06	3.24	7,371.01
RR	Stormwater Performance Standard-Runoff Reduction	1.00	NO	0.20			-	1.46	0.12	275.96	1.46	0.12	275.96
ST	Stormwater Performance Standard-Stormwater Treatment	1.00	NO	0.71			0.42	4.13	0.61	1,089.29	4.13	0.61	1,089.29
								-	-	-	-	-	-
								-	-	-	-	-	-
								-	-	-	-	-	-
								-	-	-	-	-	-
								-	-	-	-	-	-
Total				7.38	-	-	2.72	39.38	5.28	10,977.95	39.38	5.28	10,977.95

4. CURRENT PROGRESS

Current Year:

2021

SUMMARY

Total EOS Load Reduction (lbs/yr)			Total EOT Load Reduction (lbs/yr)		
TN	TP	TSS	TN	TP	TSS
3,599.61	625.24	2,351,833.43	3,599.61	625.24	2,351,833.43

SEPTIC BMPs

Populate blue cells below with proposed septic BMP information. *Please note that addition of septic loads is OPTIONAL.*

BMP Short Name	BMP Description	# of Systems	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
			TN	TP	TSS	TN	TP	TSS
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
Total		-	-	-	-	-	-	-

ALTERNATIVE BMPs

Populate blue cells below with proposed alternative BMP information. It is recommended that Shoreline Managment and Stream Restoration load reductions be entered manually, however, default planning rates are available for planning purposes.
Please use the protocol methods outlined in the expert panels approved by CBP to determine load reductions outside of this tool.

SHORELINE MANAGEMENT

Type	Total Feet	EOT Load Reduction (lbs/yr)		
		TN	TP	TSS
Total	-	-	-	-

STREAM RESTORATION

Default?	Total Feet	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
		TN	TP	TSS	TN	TP	TSS
					-	-	-
					-	-	-
Total	-	-	-	-	-	-	-

STREET SWEEPING

BMP Short Name	BMP Description	Lane Miles	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
			TN	TP	TSS	TN	TP	TSS
SCP3	Advanced Sweeping Technology - 1 pass/2 weeks	6,525.00	1,946.61	362.65	1,650,650.83	1,946.61	362.65	1,650,650.83
SCP4	Advanced Sweeping Technology - 1 pass/4 weeks	3,908.00	582.94	130.32	539,247.10	582.94	130.32	539,247.10
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
Total		10,433.00	2,529.54	492.97	2,189,897.93	2,529.54	492.97	2,189,897.93

STORM DRAIN CLEANING

User must indicate whether using default enrichment factors. If yes, leave TN and TP input cells blank.

Material	Nutrient Enrichment Factor			lbs	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
	Defaults?	TN	TP		TN	TP	TSS	TN	TP	TSS
Organic	Yes			311,733.00	692.05	74.82	62,346.60	692.05	74.82	62,346.60
Inorganic	Yes			62,347.00	117.84	26.19	43,642.90	117.84	26.19	43,642.90
Total				374,080.00	809.88	101.00	105,989.50	809.88	101.00	105,989.50

URBAN NUTRIENT MANAGEMENT

User must indicate whether or not the Fertilizer Act applies to the practice. In general, the Fertilizer Act applies to all practices implemented after 2014.

BMP Short Name	BMP Description	Fertilizer Act?	Treated Turf (acres)	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
				TN	TP	TSS	TN	TP	TSS
				-	-	-	-	-	-
				-	-	-	-	-	-
				-	-	-	-	-	-
Total			-	-	-	-	-	-	-

LAND USE CONVERSION BMPs

Populate blue cells below with land use conversion information. Only approved MDE BMPs will be accepted.

Land Use Conversion		Acres	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
Converting from	Converting to		TN	TP	TSS	TN	TP	TSS
Aggregate Impervious	Tree Canopy over Aggregate Impervious	69.00	71.45	6.63	8,896.56	71.45	6.63	8,896.56
Turf	Tree Canopy over Turf	4.00	7.16	1.10	138.42	7.16	1.10	138.42
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
Total		73.00	78.61	7.73	9,034.98	78.61	7.73	9,034.98

STORMWATER MANAGEMENT BMPs

Populate blue cells below with stormwater management BMP information. Enter Aggregate Impervious information OR Impervious Road and Impervious NonRoad information, but not both. Cells will be grayed out based on specific or non-specific land use selection. For RR/ST BMPs, users have two options: 1) Input applicable BMPs by type and use the BMP efficiency to determine the load reduction or 2) designate the BMP as an RR or ST practice and use the Pe treated to determine the load reduction. User must designate if a Floating Treatment Wetland is present.

BMP Short Name	BMP Description	Pe, if applicable	Floating Treatment Wetland?	Treated (acres)				EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
				Aggregate Impervious	Impervious Road	Impervious NonRoad	Turf	TN	TP	TSS	TN	TP	TSS
BioRetUdCD	Bioretention/raingardens - C/D soils, underdrains		NO	9.67			3.84	36.67	5.80	11,056.41	36.67	5.80	11,056.41
Filter	Filtering Practices	1.00	NO	16.68			6.60	101.12	13.33	27,728.97	101.12	13.33	27,728.97
RR	Stormwater Performance Standard-Runoff Reduction	1.00	NO	4.64			1.43	40.21	3.99	7,044.12	40.21	3.99	7,044.12
ST	Stormwater Performance Standard-Stormwater Treatment	1.00	NO	0.84			-	3.58	0.40	1,081.51	3.58	0.40	1,081.51
								-	-	-	-	-	-
								-	-	-	-	-	-
								-	-	-	-	-	-
								-	-	-	-	-	-
								-	-	-	-	-	-
Total				31.83	-	-	11.87	181.58	23.53	46,911.01	181.58	23.53	46,911.01

5. IMPLEMENTATION SCENARIO

SUMMARY

Scenario	BMP type	Total EOS Load Reduction (lbs/yr)			Total EOT Load Reduction (lbs/yr)		
		TN	TP	TSS	TN	TP	TSS
Milestone 1	Septic	-	-	-	-	-	-
	Alternative	1,771.79	358.76	958,191.67	1,771.79	358.76	958,191.67
	Land Use Conversion	219.89	1.08	42,891.58	219.89	1.08	42,891.58
	Stormwater Management	463.51	76.87	154,547.28	463.51	76.87	154,547.28
Milestone 2	Septic	-	-	-	-	-	-
	Alternative	-	-	-	-	-	-
	Land Use Conversion	-	-	-	-	-	-
	Stormwater Management	-	-	-	-	-	-
Planned	Septic	-	-	-	-	-	-
	Alternative	-	-	-	-	-	-
	Land Use Conversion	-	-	-	-	-	-
	Stormwater Management	-	-	-	-	-	-
Total		2,455.18	436.72	1,155,630.53	2,455.18	436.72	1,155,630.53

If applicable, define each milestone designation below:

Milestone 1:	2026
Milestone 2:	
Planned:	

SEPTIC BMPs

Populate blue cells below with proposed septic BMP information. Record each BMP's proposed impementation period by indicating whether it is a Milestone 1, Milestone 2, or Planned BMP. Please note that addition of septic loads is OPTIONAL.

Scenario	BMP Short Name	BMP Description	# of Systems	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
				TN	TP	TSS	TN	TP	TSS
				-	-	-	-	-	-
				-	-	-	-	-	-
				-	-	-	-	-	-
Total			-	-	-	-	-	-	-

ALTERNATIVE BMPs

Populate blue cells below with proposed alternative BMP information. It is recommended that Shoreline Managment and Stream Restoration load reductions be entered manually, however, default planning rates are available for planning purposes. Record each BMP's proposed impementation period by indicating whether it is a Milestone 1, Milestone 2, or Planned BMP. Levels of planned annual BMPs should only reflect increases above the Progress Scenario.

SHORELINE MANAGEMENT

Scenario	Type	Total Feet	EOT Load Reduction (lbs/yr)		
			TN	TP	TSS
Total		-	-	-	-

STREAM RESTORATION

Scenario	Type	Total Feet	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
			TN	TP	TSS	TN	TP	TSS
Milestone 1	Default Planning	175.00	13.13	11.90	43,400.00	13.13	11.90	43,400.00
						-	-	-
						-	-	-
Total		175.00	13.13	11.90	43,400.00	13.13	11.90	43,400.00

STREET SWEEPING

Scenario	BMP Short Name	BMP Description	Lane Miles	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
				TN	TP	TSS	TN	TP	TSS
Milestone 1	SCP3	Advanced Sweeping Technology - 1 pass/2 weeks	1,478.00	440.93	82.15	373,894.55	440.93	82.15	373,894.55
Milestone 1	SCP4	Advanced Sweeping Technology - 1 pass/4 weeks	1,482.00	221.06	49.42	204,494.42	221.06	49.42	204,494.42
				-	-	-	-	-	-
			-	-	-	-	-	-	-
			-	-	-	-	-	-	-
Total			2,960.00	662.00	131.57	578,388.97	662.00	131.57	578,388.97

STORM DRAIN CLEANING

User must indicate whether using default enrichment factors. If yes, leave TN and TP input cells blank.

Scenario	Material	Nutrient Enrichment Factor			lbs	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
		Defaults?	TN	TP		TN	TP	TSS	TN	TP	TSS
Milestone 1	Organic	Yes			112,134.00	248.94	26.91	22,426.80	248.94	26.91	22,426.80
Milestone 1	Inorganic	Yes			448,537.00	847.73	188.39	313,975.90	847.73	188.39	313,975.90
					-	-	-	-	-	-	-
					-	-	-	-	-	-	-
Total					560,671.00	1,096.67	215.30	336,402.70	1,096.67	215.30	336,402.70

URBAN NUTRIENT MANAGEMENT

User must indicate whether or not the Fertilizer Act applies to the practice. In general, the Fertilizer Act applies to all practices implemented after 2014.

Scenario	BMP Short Name	BMP Description	Fertilizer Act?	Treated Turf (acres)	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
					TN	TP	TSS	TN	TP	TSS
					-	-	-	-	-	-
					-	-	-	-	-	-
					-	-	-	-	-	-
Total				-	-	-	-	-	-	-

LAND USE CONVERSION BMPs

Populate blue cells below with land use conversion information. Record each BMP's proposed impementation period by indicating whether it is a Milestone 1, Milestone 2, or Planned BMP. Only approved MDE BMPs will be accepted.

Scenario	Land Use Conversion		Acres	EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
	Converting from	Converting to		TN	TP	TSS	TN	TP	TSS
Milestone 1	Aggregate Impervious	Turf	31.00	144.66	(8.87)	38,604.95	144.66	(8.87)	38,604.95
Milestone 1	Aggregate Impervious	Tree Canopy over Aggregate Impervious	26.00	26.92	2.50	3,352.33	26.92	2.50	3,352.33
Milestone 1	Turf	Tree Canopy over Turf	27.00	48.30	7.45	934.30	48.30	7.45	934.30
			-	-	-	-	-	-	-
			-	-	-	-	-	-	-
			-	-	-	-	-	-	-
Total			84.00	219.89	1.08	42,891.58	219.89	1.08	42,891.58

STORMWATER MANAGEMENT BMPs

Populate blue cells below with stormwater management BMP information. Record each BMP's proposed impementation period by indicating whether it is a Milestone 1, Milestone 2, or Planned BMP. Cells will be grayed out based on specific or non-specific land use selection. For RR/ST BMPs, users have two options: 1) Input applicable BMPs by type and use the BMP efficiency to determine the load reduction or 2) designate the BMP as an RR or ST practice and use the Pe treated to determine the load reduction. User must designate if a Floating Treatment Wetland is present.

Scenario	BMP Short Name	BMP Description	Pe, if applicable	Floating Treatment Wetland?	Aggregate Impervious	Treated (acres)			EOS Load Reduction (lbs/yr)			EOT Load Reduction (lbs/yr)		
						Impervious Road	Impervious NonRoad	Turf	TN	TP	TSS	TN	TP	TSS
Milestone 1	BioRetUdCD	Bioretention/raingardens - C/D soils, underdrains	1.00	NO	36.00			19.00	145.34	24.06	42,705.04	145.34	24.06	42,705.04
Milestone 1	Filter	Filtering Practices	1.00	NO	21.90			12.40	144.00	20.10	38,189.21	144.00	20.10	38,189.21
Milestone 1	WetPondWetland	Wet Ponds and Wetlands	1.00	NO	61.30			16.50	174.16	32.70	73,653.02	174.16	32.70	73,653.02
									-	-	-	-	-	-
									-	-	-	-	-	-
									-	-	-	-	-	-
									-	-	-	-	-	-
									-	-	-	-	-	-
Total					119.20	-	-	47.90	463.51	76.87	154,547.28	463.51	76.87	154,547.28