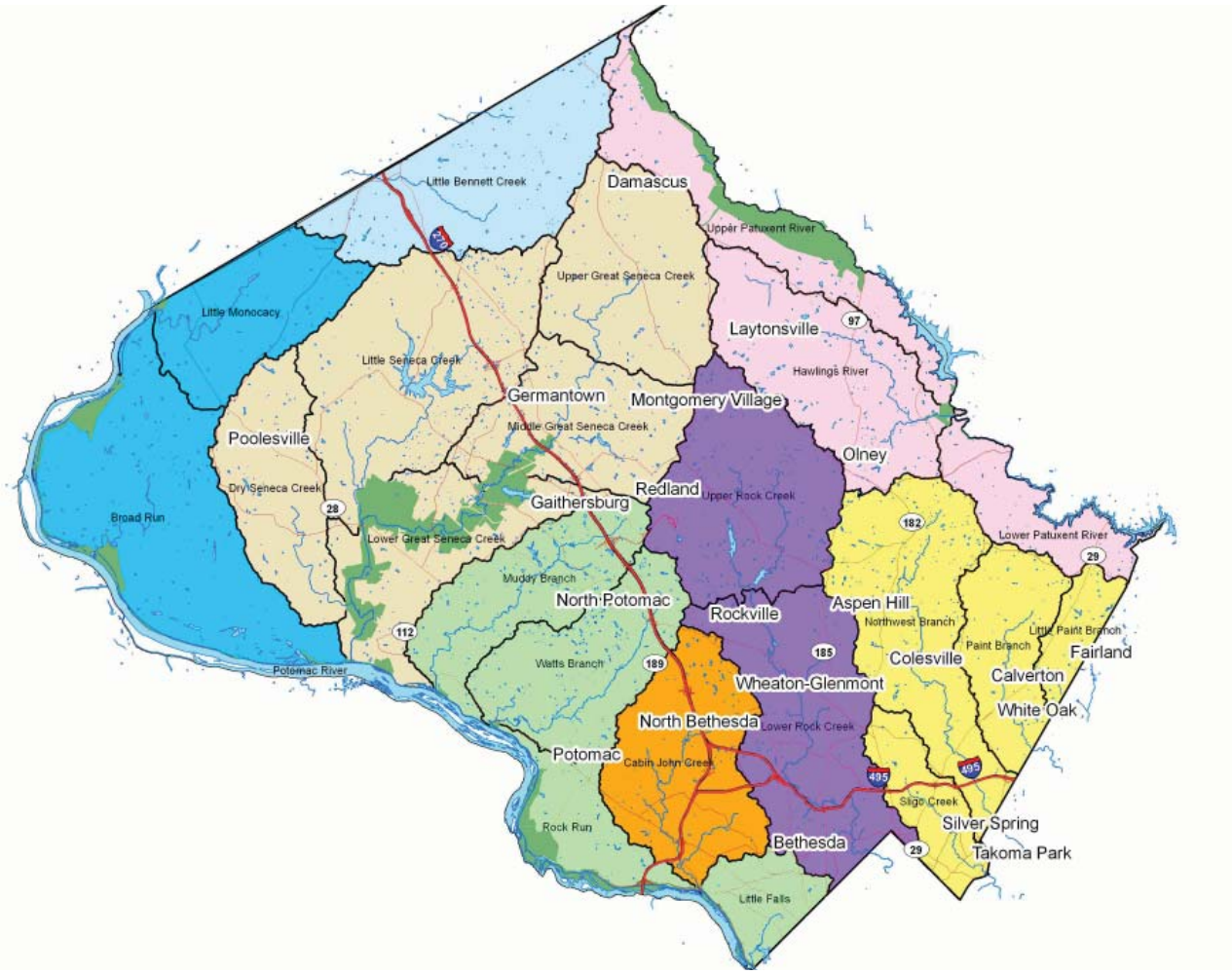
MONTGOMERY COUNTY COORDINATED IMPLEMENTATION STRATEGY



PREPARED FOR:

MONTGOMERY COUNTY

DEPARTMENT OF ENVIRONMENTAL PROTECTION

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January 2012

Montgomery County
Countywide Coordinated Implementation Strategy

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Notes to Reader:

1. Environmental Site Design (ESD) is defined within the 2010 Maryland Stormwater Design Manual as the use of small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic cycling of rainwater and minimize the impact of land development on water resources. The application of the term is focused on new and redevelopment projects, and does not explicitly address or consider retrofit applications where site constraints such as drainage area, utilities, and urban soil quality are significant factors. This countywide strategy uses the term ESD in a more flexible manner to include structural practices such as bioretention, vegetated filters, and infiltration that provide distributed runoff management using filtering, infiltration, and vegetative uptake processes to treat the water quality volume to the maximum extent practicable. These practices are also thought of as Low Impact Development (LID) practices.
2. Montgomery County Department of Environmental Protection (DEP), as the County Department responsible for permit compliance, acknowledges the importance of working closely with other County departments and agencies along with other NPDES MS4 permittees that are located within shared watersheds (e.g., Gaithersburg, Rockville, Takoma Park, NIH). DEP already partners with many of these entities and will expand these efforts under this Strategy. Details of these coordination efforts are not fully developed but they will be particularly important with respect to trash management, cost sharing for structural controls, and broader regional outreach and education initiatives.

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ACRONYMS

BMPs – best management practices

DA – drainage area

DEP – Department of Environmental Protection

DF – discount factor

DU – dwelling unit

EPA – Environmental Protection Agency

ESD – environmental site design

GIS – geographic information systems

HOA – homeowners association

IA – impervious area

IC – impervious cover

LDR – low density residential

LID – low impact development

MDE – Maryland Department of the Environment

MEP – maximum extent practicable

MDP – Maryland Department of Planning

MNCPPC – Maryland National Capital Parks and Planning Commission

MPN – most probable number

MPR – maximum practicable reductions

MS4 – municipal separate storm sewer system

NPDES – National Pollutant Discharge Elimination System

RR – runoff reduction

SPA – Special Protection Area

TFPI – Trash Free Potomac Watershed Initiative

TMDLs – total maximum daily loads

TN – total nitrogen

TP – total phosphorus

TSS – total suspended sediment

USACE – Army Corps of Engineers

WLAs – waste load allocations

WQPC – water quality protection charge

WRAP – watershed restoration action plan

WTM – watershed treatment model

1. PURPOSE

Project Overview

Montgomery County's Department of Environmental Protection (DEP) watershed restoration programs are restoring stream valleys, improving water quality and addressing historical damage caused by urban stormwater pollution. Watershed restoration is a regulatory requirement of the County's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit.

This Countywide Coordinated Implementation Strategy (the Strategy) document presents the restoration strategies that are needed to meet the watershed-specific restoration goals and water quality standards as specified in the current MS4 permit. Specifically, the Strategy will provide the planning basis for the County to:

1. Meet Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) approved by EPA.

2. Provide additional stormwater runoff management on impervious acres equal to 20% of the impervious area for which runoff is not currently managed to the maximum extent practicable (MEP).

3. Meet commitments in the *Trash Free Potomac Watershed Initiative 2006 Action Agreement* which include support for regional strategies and collaborations aimed at reducing trash, increasing recycling, and increasing education and awareness of trash issues throughout the Potomac Watershed.

4. Educate and involve residents, businesses, and stakeholder groups in achieving measurable water quality improvements.

5. Establish a reporting framework that will be used for annual reporting as required in the County's NPDES MS4 Permit.

6. Identify necessary organizational infrastructure changes needed to implement the Strategy.

Chesapeake Bay Total Maximum Daily Load (TMDL)

The Chesapeake Bay Total Maximum Daily Load (TMDL), established by the US Environmental Protection Agency (EPA), sets pollution limits for nitrogen, phosphorus, and sediment in the Chesapeake Bay Watershed. This TMDL, required under the Clean Water Act, is in response to

the slow progress by states within the watershed to limit their pollutants to levels which meet water quality standards in the Bay and its tidal tributaries. Total limits set in the Bay TMDL for the states of Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia are "185.9 million pounds of nitrogen, 12.5 million pounds of phosphorus and 6.45 billion pounds of sediment per year – a 25 percent reduction in nitrogen, 24 percent reduction in phosphorus and 20 percent reduction in sediment" (USEPA December 2010). The TMDL also sets "rigorous accountability measures" for state compliance. Although an implementation plan for the bay TMDL has not been completed, the goals for Urban MS4s (18% nitrogen, 34% phosphorus, and 37% sediment) are compared to the reductions provided by implementation of the Strategy.

Montgomery County TMDLs

The County has a number of watersheds where EPA-approved TMDLs have established pollutant loading limits for waterbodies. These loading limits represent the maximum amount of a pollutant that the waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant (e.g., point sources or nonpoint sources). MS4 permit jurisdictions like Montgomery County are considered point sources and are given a waste load allocation (WLA).

Pollutant loads from point and nonpoint sources must be reduced by implementing a variety of measures. One condition of the County's MS4 Permit is to make progress toward implementation of TMDL load reduction allocations in the County's watersheds . In addition to TMDLs, all of the watersheds in the County also have listed impairments. Table 1.1 below lists TMDLs and Impairments per watershed.

Table 1.1: Summary of TMDLs

Watershed Grouping	Approved TMDLs (Approval Date)	Draft TMDLs	Impairments (First Listed)
Anacostia	Bacteria (2007) Sediment (2007) Nutrients (2008) Trash (2010)	PCBs (2010)	Heptaclor Epoxide (2002) Biological (2006)
Rock Creek	Bacteria (2007)	Sediment (2010)	Phosphorus (1996) TSS (1996) Biological (2002)
Cabin John Creek	Bacteria (2007)	Sediment (2010)	Biological (2006)
Seneca Creek (Mainstem)		Sediment (2010)	Biological (2006)
Seneca Creek (Clopper Lake)	Phosphorus and Sediment (2002)		
Lower Monocacy	Fecal Bacteria (2009)* Sediment (2009)	Nutrients (2010)	Phosphorus (1996) Biological (2002)
Upper Potomac Direct			Phosphorus (1996) TSS (1996) Biological (2006) PCBs in Fish Tissue (2008)
Lower Potomac Direct			Phosphorus (1996) TSS (1996) Biological (2006) PCBs in Fish Tissue (2008)
Patuxent (Tridelphia)	Phosphorus and Sediment (2008)		Biological (2004)
Patuxent (Rocky Gorge)	Phosphorus (2008)		

Sources:
http://www.mde.state.md.us/programs/Water/TMDL/CurrentStatus/Pages/Programs/WaterPrograms/TMDL/Sumittals/index.aspx
http://www.mde.maryland.gov/programs/Water/QualityFinancing/SaterQualityFinanceHome/Pages/Water/hb1141/map_wq_montgomeryco.aspx
MDE 2008 Integrated Report (combined 303(d) List and 305b Report)
* TMDL was approved after Task Order #7 was issued and is therefore not included in the detailed pollutant load modeling associated with the Strategy

Montgomery County MS4 Permit Background

On February 16, 2010, Maryland Department of the Environment (MDE) issued Montgomery County a new MS4 permit. This 5-year permit complies with the Environmental Protection Agency's NPDES regulations that require large urban jurisdictions to control pollution from stormwater runoff to the maximum extent practicable. The EPA's latest estimates are that 10 percent of Maryland's nitrogen load comes from urban and suburban stormwater runoff (USEPA, May 2010). The County MS4 Permit requires development of implementation plans to meet WLAs through watershed restoration and other programmatic measures.

Major new provisions of the permit include:

- Requiring restoration of an additional 20 percent of impervious surfaces not currently receiving adequate treatment
- Developing and implementing measurable strategies to reduce trash as part of the County's commitment to a trash-free Potomac River
- Reducing pollutant loadings to comply with pollution limits necessary to meet water quality standards for impaired waters (TMDLs)

The plans and strategies outlined in this document, establish the steps Montgomery County is taking to fulfill the requirements associated with this MS4 Permit.

Implementation Plans and Pre-assessments

There are two major watersheds located within Montgomery County: the Potomac River watershed which covers approximately 88% of the County, and the Patuxent River watershed which covers approximately 12% of the County. In terms of the County's MS4 Permit area, the area proportion is 96% in the Potomac and 4% in the Patuxent River watersheds. The County is further divided into eight subwatersheds based on the eight digit United States Geologic Survey (USGS) Hydrologic Unit Code (HUC) as shown in Figure 1.1. Seven of the eight subwatersheds have restoration implementation plans that have been developed for this project effort. The eighth watershed, Upper Potomac Direct, does not have an implementation plan because a watershed assessment has not yet been completed for the watershed as noted below.

For more information about a specific watershed and the associated plans see the DEP website (www.montgomerycountymd.gov/stormwaterpermit). The seven watersheds that have implementation plans are:

- Anacostia

- Cabin John Creek
- Lower Monocacy
- Lower Potomac Direct (Muddy Branch and Watts Branch)
- Patuxent
- Rock Creek
- Seneca Creek (Great Seneca, including Clopper Lake)

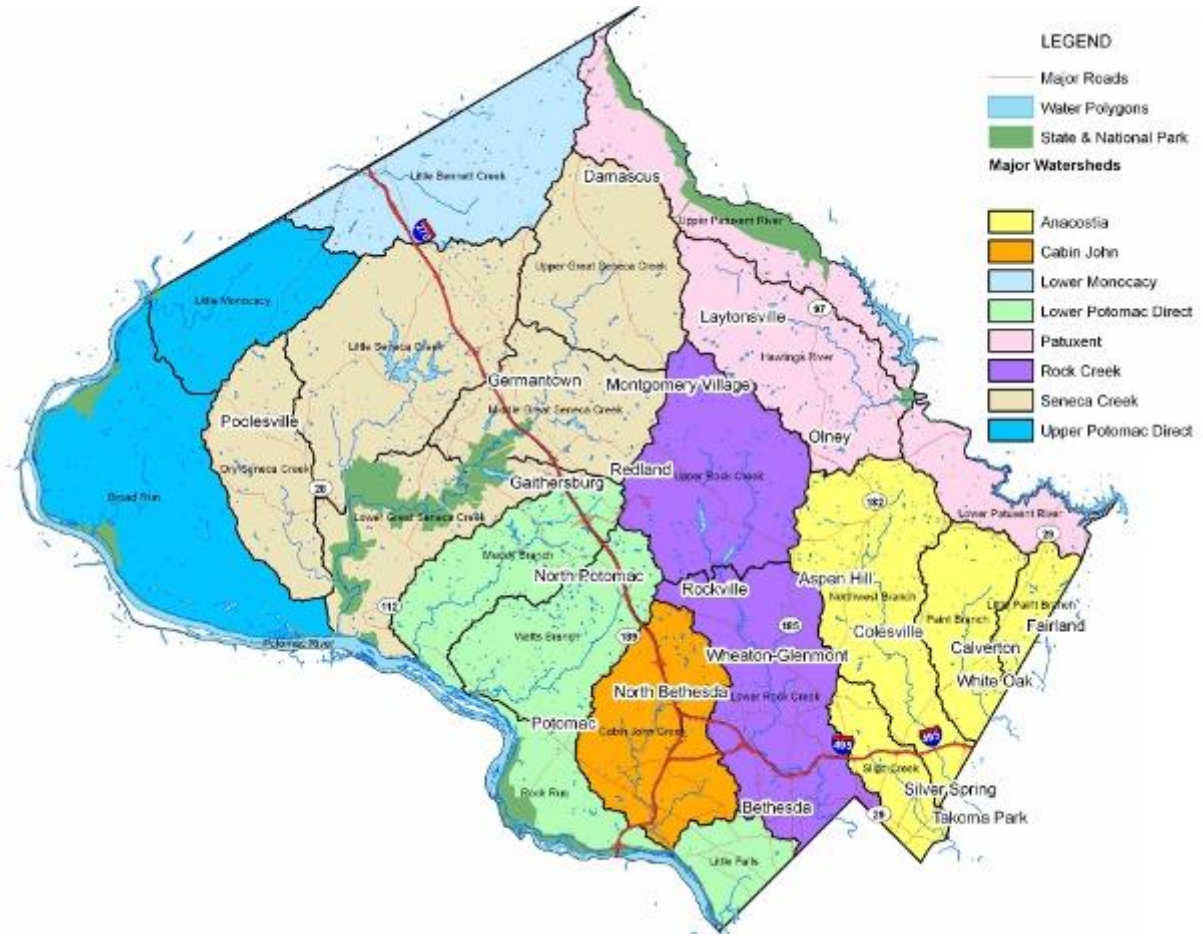

Figure 1.1: Map of Watersheds

The goals of the implementation plans are to:

- Identify feasible best management practices (BMPs)
- Quantify the area they treat and the amount of pollutants they can remove from stormwater runoff before entering into the County's streams, rivers, and lakes

- Determine the restoration potential for each watershed or subwatershed and evaluate the ability to meet applicable TMDLs.
- Provide a schedule and cost estimate for meeting the WLAs set by the TMDL

In addition to the seven implementation plans, there are three watershed pre-assessments that have been completed for watersheds that have not been previously assessed. The pre-assessments will be used by the County to develop watershed assessments and associated implementation plans which will be completed this permit cycle. They include:

- Seneca Creek: Little Seneca and Dry Seneca
- Lower Potomac Direct, including Rock Run and Little Falls but excluding Muddy Branch and Watts Branch
- Upper Potomac Direct, including Little Monocacy & Broad Run

The seven implementation plans (Table 1.2) provided the input data for the development of this Strategy.

Table 1.2 Watershed Groupings and Plans

Watershed grouping	Implementation Plan	Pre-Assessment
Anacostia	X	
Rock Creek	X	
Cabin John Creek	X	
Seneca Creek		
Great Seneca (including Clopper Lake)	X	
Dry Seneca and Little Seneca		X
Lower Monocacy	X	
Upper Potomac Direct (West of Seneca Creek, not described in any other grouping)		X
Lower Potomac Direct (East of Seneca Creek, not described in any other grouping)		
Muddy Branch and Watts Branch	X	
All other subwatersheds		X
Patuxent (Triadelphia/Brighton Dam and Rocky Gorge)	X	

Trash Free Potomac

The Alice Ferguson Foundation founded the Trash Free Potomac Watershed Initiative (TFPWI) in 2005 to reduce trash and increase awareness of trash issues in the watershed. TFPWI actions

include the Potomac River Watershed Trash Treaty, Annual Potomac River Watershed Trash Summit, Annual Potomac River Watershed Cleanup, market-based approaches such as the Trash Free Potomac Facility Program, and a Regional Anti-Litter Campaign (Alice Ferguson Foundation, 2011). The MS4 permit requires Montgomery County to meet the commitments of Potomac River Watershed Treaty. The permit specifically requires that Montgomery County:

1. Support and implement regional strategies to reduce trash
2. Develop a work plan to implement a public outreach and education campaign
3. Establish baseline conditions of trash being discharged and develop a reduction strategy and work plan for the Montgomery County portion of the Anacostia Watershed
4. Implement approved control measures in accordance with the trash reduction work plan
5. Conduct public participation in development of trash reduction strategy
6. Submit progress annually

Public Outreach and Stewardship

The County's MS4 Permit requires significant opportunities for public participation in achieving TMDLs, watershed restoration, and trash management. The permit specifically requires the County to prepare a work plan to implement a public outreach and education campaign. The County recognizes that a successful strategy will require a significant increase in effective and coordinated public outreach and public stewardship. The implementation plans and this Strategy describe how DEP plans to implement public outreach and education campaigns with specific performance goals and deadlines.

2. EXISTING CONDITIONS

Watershed health is variable throughout the County and typically well correlated with intensity and age of urbanization. More specifically, watershed health typically declines with increasing density and older age of development. Many of Montgomery County's older urban and suburban areas were developed in an era when runoff from paved surfaces (roads, parking lots, driveways) was directed to storm drains which conveyed untreated runoff directly to streams. This large volume of water caused massive erosion of the stream banks and destroyed habitat. Stormwater treatment using stormwater ponds to receive, detain, and filter runoff before it flowed into streams was either inadequate or non-existent. The Anacostia, Rock Creek, and Cabin John Creek watersheds are examples where these conditions are common. More recent stormwater techniques, known as environmental site design or ESD, encourage the reduction of runoff by infiltrating the water into the ground near its source, with a goal of mimicking hydrologic conditions associated with woods in good condition.

Watershed health improves in more rural areas of the County, but even in these areas, stream degradation can occur, stemming from isolated large lot development and poor agricultural management practices.

The County has conducted comprehensive water quality and biological sampling for more than a decade, which provides a representative snapshot of existing watershed health as well as the ability to track watershed health over time. Figure 2.1 shows countywide watershed resource conditions based on monitoring that was conducted from 2000-2008. The area inside the beltway in the more urban core has lower water quality (fair to poor) while the area outside the beltway tends to have better water quality (fair to good to excellent).

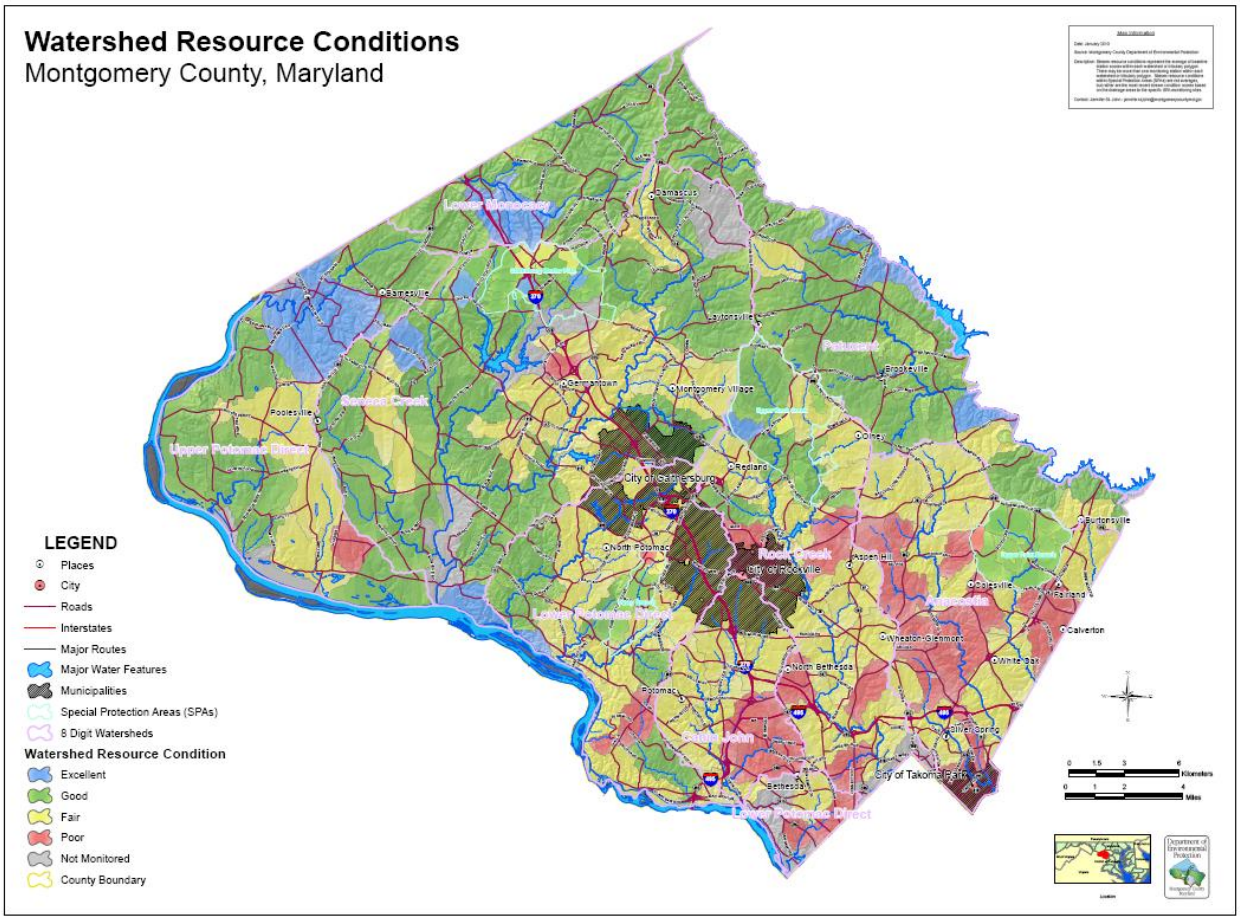

Figure 2.1: County Watershed Resource Conditions

County Statistics

The Strategy will benefit from the fact that the majority of county residents own the property they reside on (nearly 70%) and thus have control over that property. Also, nearly 70% of the residences are single unit homes. Moreover, the average household income is roughly $90,000 making the likelihood of financial capability to install BMPs an appropriate assumption. Both of these statistics make advocacy of BMPs on residential properties an imperative for the Strategy.

Montgomery County's robust business economy was also considered in the Strategy development. Despite the current economic volatility, Montgomery County's business community is still profitable and still maintaining and improving existing facilities. Moreover, the construction of the inter-county-connector (ICC) through much of Montgomery County will provide opportunities to install demonstration BMPs on newly developing properties for replication throughout stakeholder groups. Also, the presence of communication industry leaders (i.e., Discovery Channel) in the County creates unique stewardship education partnership possibilities with businesses. The Strategy will include these stakeholders'

involvement opportunities to best harness the power of Montgomery County's healthy business economy.

The county includes a fairly even split of males and females. The majority of residents, nearly 50%, fall between the ages of 25 and 55. Only 15% of the population is aged 60 and above. In addition, the majority of Montgomery County residents indicate their preferred language as English; however, Spanish translations of stakeholder involvement opportunities will be required in select watersheds to accommodate the 13% of county residents that indicate their preferred language as Spanish. Other potential target groups for translation for stakeholder involvement include the Asian community, as 11% of the county's population is Asian (mostly Korean and Vietnamese). Because of this, the Strategy and implementation plans will take multilingual requirements into consideration for signage and other educational tools as well.

MS4 Permit Coverage

The County's most recent NPDES MS4 stormwater permit only covers runoff from developments within the County area. The following areas are excluded from the County's MS4 permit area, shown in Figure 2.2:

- Cities of Gaithersburg, Rockville, and Takoma Park
- Maryland National Capital Park and Planning Commission (MNCPPC) lands
- Washington Sanitary Sewer Commission (WSSC) land
- Federal and State government owned land and facilities
- Rural zoning (five acre minimum lot size, 10% maximum developed coverage)

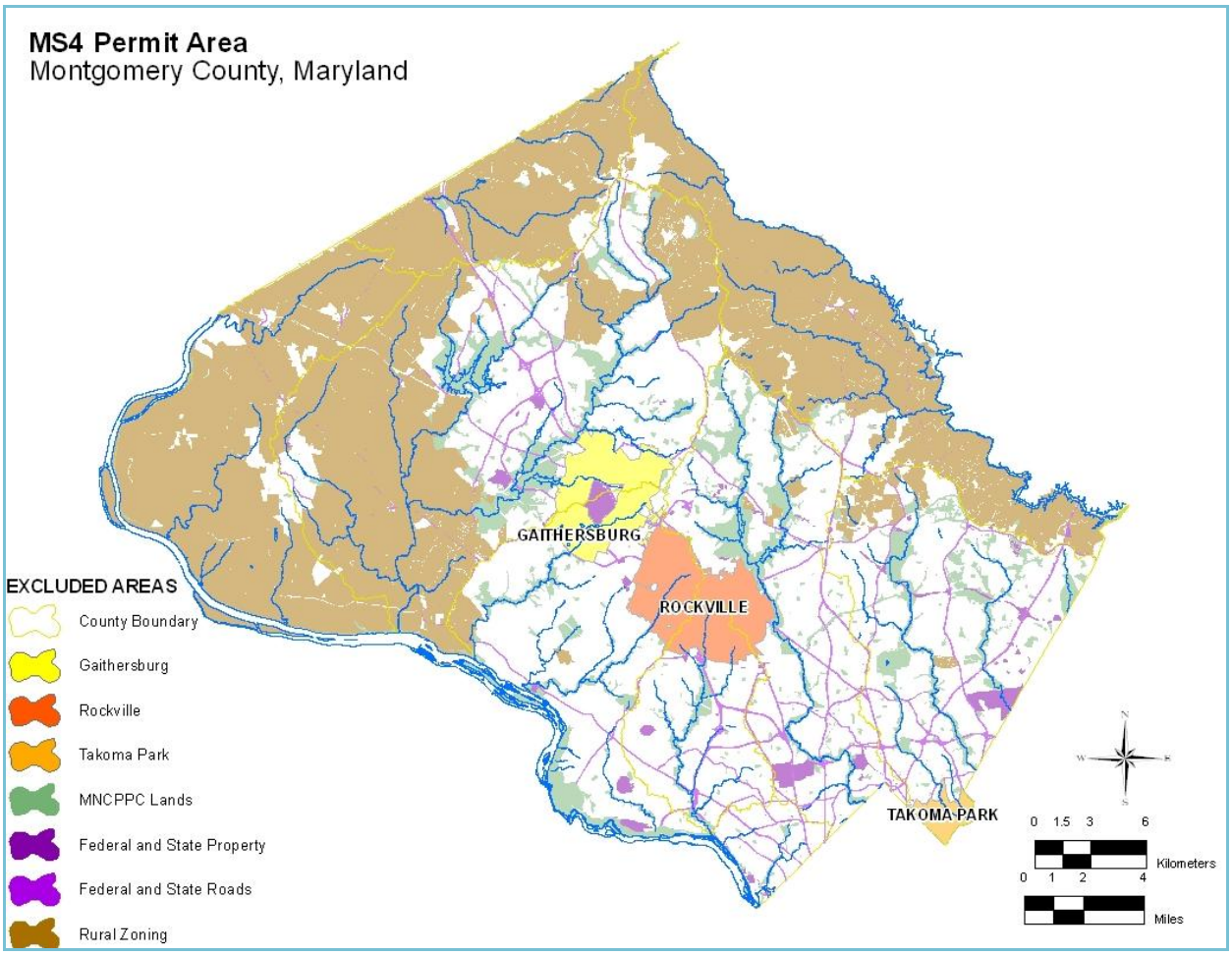

Figure 2.2: Areas outside the Montgomery County MS4 Permit Area

Impervious Surfaces

As previously mentioned, the County's MS4 Permit requires treatment of an additional 20% of impervious cover not currently receiving treatment to the MEP. Table 2.1 presents a summary of the countywide impervious cover totals along with breakdowns by major land cover type. These land covers will be the focus of much of the County's targeted effort to treat the 20% target.

Table 2.1 Impervious Surface Summary

Description	Area in Acres	% of Total Area
Total County Area	324,552	100%
Total Area of Impervious Surface	35,965	11%
County Area Subject to Stormwater Permit (1)	138,649	43%
Impervious Cover Subject to Stormwater Permit (2)	25,119	18%
Areas of Impervious Surface (3)		
Road	13,607	38%
Building	13,073	36%
Parking	7,870	22%
Sidewalk	1,069	3%
Recreation (4)	347	1%

1. Exclusions include: Certain zoning codes, parklands, forests, municipalities with own stormwater management programs, state and federal properties, and state and federal maintained roads
2. Percent of County Jurisdictional Area subject to the Stormwater Permit
3. Impervious area within each category within the total County area.
4. Recreation imperviousness excludes swimming pools

Implementation Plan Guidance Document

The Implementation Plan Guidance Document (revised September 2011) provides a road map for how the implementation plans were created. The primary sections of the Guidance Document and a short description of each are provided in Appendix 1.

The Guidance Document divides BMPs into five classes or codes based on an evaluation of the practice type. Appendix 2 provides a list of BMPs and which code they fall under. A description of each code is provided below.

Code 0: Pretreatment Practices
Code 1: Non-performing BMPs: No runoff reduction and no long term pollutant removal
Code 2: Under-performing BMPs: Limited runoff reduction and low pollutant removal
Code 3: Effective BMPs: Limited runoff reduction but moderate to high pollutant removal
Code 4: ESD BMPs: High runoff reduction and moderate to high pollutant removal

BMPs were also screened based on County approval date for the BMP, which reflects the design era under which the BMPs were designed and installed. Three broad design eras were defined, as follows:

- Era 1: Pre-1986. BMPs installed prior to full implementation of the Maryland Stormwater law of 1984, which typically focused on detention and peak shaving.
- Era 2: 1986 to 2002. These practices reflect a design era where water quality was an important part of design, although water quality sizing and design standards were not as great.
- Era 3: 2002 to 2009. These practices were built to the more stringent water quality and channel protection sizing requirements and BMP design standards contained in the 2000 edition of the Maryland Stormwater Manual

The codes and design eras were then used as the basis to determine the level of impervious cover being treated to the MEP and the amount of inadequately treated impervious cover that will be targeted as part of this Strategy.

Impervious Cover Accounting and Tracking

Montgomery County has GIS data layers that contain all the stormwater BMPs in the County and their drainage areas. In order to determine the 20% target for impervious cover treatment to the MEP, the County analyzed their existing impervious cover and their existing BMP database to determine how much impervious cover is currently being treated to the MEP. Several methods were considered based on a determination of the MEP standard compared to existing treatment methods. According to MDE guidance, to be considered MEP, a BMP must capture at least the Water Quality Volume (WQv) (the first inch of rainfall) or the CPv volume (2.6 inches of rainfall). The final method used for determining which BMPs are MEP and the amount of impervious surface not treated to the MEP was as follows:

1. All BMPs that were installed after 2002 or are classified as Code 4 were considered MEP.
2. A database analysis of almost 500 stormwater ponds installed after 1986 was performed to determine if this class of BMPs met the definition of MEP (i.e., capture at least the WQv). Based on that analysis, stormwater ponds constructed after 1986 are considered MEP and designated as Code 3 BMPs.
3. All other classes of BMPs not specified above are not considered MEP and are eligible for retrofit credit.

Table 2.2 below shows the breakdown of the impervious acres treated by BMP codes and era (shaded areas are BMP codes treated to the MEP).

Table 2.2 Acres of Impervious Cover Treated by BMP Code and Design Era

Design Era		Post2002	1986-2002	Pre1986	Blank	*Total*
BMP Code	0	28	711	24	132	***895***
	1	33	555	1,391	367	***2,346***
	2	41	299	12	23	***375***
	3	75	2,482	1,437	267	***4,261***
	4	20	459	482	40	***1,001***
Totals*		***198***	***4,506***	***3,345***	***828***	***8,877***

IC Credit	100%	Code 3& 4	Code 4		*Total*
Acres treated to MEP	198	2,942	482	40	***3,661***

Assuming a total countywide impervious acreage of 25,119 acres and an impervious acreage treated to the MEP of 3,661 as shown in Table 2.2, there are currently 21,458 acres of untreated impervious area. Twenty percent of 21,458 equates to 4,292 acres of impervious area that must be restored over the current permit cycle.

It is worth noting that at the time this impervious cover analysis was developed, there was no formal guidance or direction provided by MDE to follow. Therefore, for the purpose of this Strategy, the method presented above is what was assumed. If MDE were to require the County to modify the accounting methodology, the impervious cover area needing treatment to meet the 20% target might change; however, any change is not likely to be significant. Adjustments, if any, in impervious cover tracking will be documented in a future annual report provided as part of the County's NPDES permit requirements.

Pollutant Load Tracking

In addition to tracking impervious cover, it is necessary to compute existing pollutant loads and projected reductions in loads as a result of applying stormwater controls and BMPs. The Center for Watershed Protection's (CWP) Watershed Treatment Model (WTM) version 2.0 (CWP, 2001) was the tool selected to conduct this analysis and track load reductions across a range of implementation strategies.

The WTM uses a spreadsheet model to calculate annual pollutant loads and runoff volumes. The model also accounts for the benefits contributed by a full suite of stormwater treatment practices and programs. The first step in the model calculates existing pollutant loads by adding primary and secondary source loads, then subtracting reductions according to existing

management practices. The second step applies future management practices by subtracting these calculated reductions from the existing loads. Appendix B of the Guidance Document provides a detailed explanation of the assumptions and steps in the modeling process.

For each watershed, the WTM was run under existing conditions with existing BMPs to determine a baseline pollutant load for targeted pollutants. The baseline period for non-TMDL parameters was based on 2002 Maryland Department of Planning land use/land cover data coupled with the County's existing urban BMP database. Pollutants targeted included: bacteria, Total Phosphorus (TP), Total Nitrogen (TN), Total Suspended Solids (TSS), and Trash. Next, a series of model runs was developed for analyzing the pollutant load reduction effect that various restoration strategies would have based on assumed levels of implementation for the various strategies. Individual restoration strategies that were sequentially modeled included the following:

- Completed and High Priority Projects – these include projects completed since the last permit cycle or high priority structural BMPs scheduled for retrofit in the FY11-FY16 Capital Improvements Program (CIP)
- Low Priority Projects – these includes FY11-FY16 CIP projects that for various reasons are considered a lower priority.
- Other Potential Projects – these include other projects in existing inventories that were not listed in the previous two categories. For the Anacostia, they include projects in Anacostia Restoration Plan (ARP) prepared by the Army Corp of Engineers.
- Public ESD Retrofits – These include small scale ESD practices applied to County-owned buildings, streets and parking lots and rights of way. Examples include rainwater harvesting, green roofs, upland reforestation, soil compost amendments, rooftop disconnection "green street" retrofits and converting drainage ditches to dry swales. These are Code 4 structures. This category also includes other structural BMP upgrades to existing County BMPs which were designated as under-performing or non-performing.
- Private ESD Retrofits - These projects include ESD on commercial property and residential property and include green roofs, rain gardens, and permeable pavement.
- Riparian Reforestation - Focuses primarily on tree planting for riparian buffer restoration.
- Stream Restoration - Includes the use of natural materials such as rocks, logs, and native vegetation to reduce pressure on eroded banks, prevent down-cutting of the streambed, and restore the natural meander patterns and slope profiles found in stable reference streams.

- Programmatic Practices – This category deals with potential pollutant reduction that can be attributed and quantified through MS4 stormwater pollution prevention improvements and better housekeeping on County land and facilities. Also includes any pollutant reductions due to product substitution (e.g., nitrogen and phosphorus limits in fertilizer), operational programs (e.g., recycling) and enforcement. This category also deals with reduced pollutants that can be attributed and quantified through MS4 stormwater education (e.g., lawn care) and outreach aimed at pollution prevention, better housekeeping, and increased stewardship.

The naming convention applied for the model runs was WTM 1.0 (i.e., baseline), WTM 2.0 (i.e., completed and high priority, low priority and other potential projects), WTM 3.0 (i.e., public and private ESD), WTM 4.0 (i.e., riparian reforestation and stream restoration), and WTM 5.0 (i.e., programmatic). Model runs were developed sequentially to yield incremental increases in load reduction by strategy. In practice, however, strategies can be applied in combination and out of sequence to achieve targeted outcomes and the most cost-effective solutions. A summary of the scenarios is provided in Table 2.3 below.

The analyses conducted to support the Strategy did not factor in increased loading from potential new development. First, the County is largely built out and the majority of development that will occur will be redevelopment. The relative proportion of new development load to existing load will be very small in most watersheds. Second, new development and redevelopment are subject to the full extent of Maryland's ESD requirements, which target a "woods in good condition" standard. As a result, the loading for the most common TMDL pollutants (e.g., TSS, nutrients, and bacteria) is not expected to increase significantly, if at all.

Table 2.3 Summary of Watershed Treatment Model (WTM) Scenarios

Implementation Phase	*Description*
WTM Baseline Conditions	The WTM was run under existing conditions approach with the MDP year 2002 land use/land cover data and existing BMPs.
WTM 2.0 Completed as of 2009; High Priority; Low Priority and Other Potential Projects	The WTM was run with a series of future management practices, which were proposed projects from the County inventory of restoration sites. These practices cover new ponds, retrofits of existing BMPs, and some ESD practices from the proposed projects list.
WTM 3.0 ESD Strategies and Other Structural BMPs	The County's inventory for other project types that include public properties (e.g., libraries and parking lots), public schools, and open section roads available for ESD retrofits was reviewed, as were areas for private property ESD retrofits.
WTM 4.0 Habitat Restoration	This category includes any pollutant reduction or volume reduction that can be attributed to specific stream rehabilitation, wetland restoration and or riparian reforestation projects planned for construction in the watershed for the permit cycle
WTM 5.0 MS4 Programmatic Practices	See description above.

TMDL Calibration and Tracking

Where TMDLs existed for individual watersheds, the WTM was run under existing conditions with existing BMPs based on the year in which the data was collected for TMDL development. The baseline pollutant load was then compared and normalized to the MDE-determined baseline MS4 load for the TMDL pollutant (see Guidance Document Part 3 and Appendix B). Any County-maintained BMPs with "approved" dates after the year in which the data was collected for TMDL development were not included in the baseline calculation, but rather were counted towards meeting the TMDL reduction target.

Once the normalized model was established, reductions achieved through programs and practices were tracked using the WTM scenarios based on the percent load reduction from baseline toward meeting the TMDL required WLA. The normalized baseline and WLA target are determined and specified in the relevant TMDL documents developed by MDE.

3. WATERSHED IMPLEMENTATION PLANS AND RESTORATION POTENTIAL

The watershed implementation plans and pre-assessments developed in conjunction with the Strategy are driven by regulatory requirements facing each watershed. Table 3.1 summarizes the drivers by watershed.

Table 3.1 Restoration Objectives

Watershed/Subwatershed	Pollutants	Impervious Cover	Trash
Patuxent	TMDL	20% Countywide Goal	
Anacostia			TMDL
Rock Creek			Trash-Free Potomac
Great Seneca			
Cabin John Creek			
Lower Monocacy			
Watts Branch/Muddy Branch			
Dry and Little Seneca			
Lower Potomac Direct			
Upper Potomac Direct			

Table 3.2 presents the more detailed and quantitative aspects of the TMDL requirements for the MS4 portion within each watershed. The Strategy has been developed to meet the MS4 permit area WLA compliance targets presented in Tables 3.2.

In addition to the individual watershed requirements, there is a Countywide requirement to comply with the wasteload allocations associated with urban areas under the Chesapeake Bay TMDL which applies to nutrients and sediment. There is an interim target established for 2017, where reductions from baseline conditions of 9%, 12%, and 20% respectively for TN, TP, and TSS are to occur. Then by 2020, full compliance is required, which correspond to reductions from baseline conditions of 18%, 34%, and 37%, respectively for TN, TP, and TSS.

Table 3.2 TMDL Summary by Impairment

TMDL	Watershed	Date	Pollutant	TMDL % Reduction	County MS4 Baseline Load	Annual Allocation	Units	WLA_{SW} Percent Reduction
Bacteria	Cabin John Creek	2007	*E. coli*	52.0%	44,257	30,670	Billion MPN/yr	30.7%
	Rock Creek	2007	Enterococci	97.0%	453,669	18,195	Billion MPN/yr	96.0%
	Anacostia River	2007	Enterococci	86.0%	247,809	29,978	Billion MPN/yr	87.9%
Nutrients	Anacostia River	2008	TN	78.8%	206,312	38,959	lbs/yr	81.8%
	Anacostia River	2008	TP	79.7%	20,953	3,947	lbs/yr	81.2%
	Triadelphia Reservoir	2008	TP	58.0%	438	373	lbs/yr	15.0%
	Rocky Gorge Reservoir	2008	TP	48.0%	4,268	3,628	lbs/yr	15.0%
	Clopper Lake	2002	TP	39.3%	101	55	lbs/yr	45.4%
Sediments	Anacostia River	2007	TSS	85.0%	7,682	1,101	tons/yr	87.5%
	Triadelphia Reservoir	2008	TSS	29.0%	29	29	tons/yr	0.0%
	Clopper Lake	2002	TSS	0.0%	13	13	tons/yr	0.0%
	Lower Monocacy River	2009	TSS	38.0%	172	68	tons/yr	60.8%
Trash	Anacostia River	2010	Trash	100.0%	228,683	-	lbs/yr removed	100.0%

Adapted from "2010 Status of Approved Stormwater Wasteload Allocations for NPDES Regulated Stormwater Entities in Montgomery County," April 27, 2010 by Jeff White, MDE

Potential to Reduce Stormwater Pollutant Loads

Within each of the implementation plans, an analysis was developed that explored the restoration potential for that watershed. Cost was not a limiting factor for the analysis, but rather assumptions were made based on feasibility of implementation rates and consideration of conflicts with typical site conditions with respect to site use, utilities, land ownership, etc. For example, it was assumed that 40% of large County-owned parking lots would be available for stormwater retrofitting. These assumptions are necessary for planning purposes where detailed site investigations have not occurred. However, some level of implementation is

reasonable to assume. In addition, all identified high priority and low priority County projects that have the potential to be constructed were assumed to be implemented.

Implementation cost and effectiveness (in terms of pollutant load reduced) was also tracked through the process of determining watershed restoration potential, which enables the cost/benefit evaluation of various strategies for a target parameter (e.g., tons of sediment per dollar spent or billion MPN of bacteria per dollar, etc.). For example, by tracking cost and effectiveness it is possible to evaluate the relative cost/benefit of a strategy like ESD versus a non-structural programmatic practice. Moreover, the comparison of these two strategies is going to be different depending on what parameter is being considered (e.g., ESD may be more cost effective for nutrient reduction but less cost effective for bacterial load reduction).

The tables in Appendix 3 help to illustrate this point. Specifically, a series of summary charts and tables have been developed that illustrate the cost effectiveness of the range of strategies considered by watershed with respect to pollutant load reduction. The summaries reflect the full restoration potential developed for each watershed.

It is also useful to compare strategy effectiveness and range of opportunity across watersheds. To facilitate this, a series of tables were compiled that groups all watersheds together and considers watershed restoration potential by strategy. These summary tables are presented in Tables 3.3 through 3.10.

For this analysis, stream restoration was treated as a special modeling case (Table 3.9), because it was not tracked as a strategy that receives credit for impervious cover treatment and because it requires a different pollutant load reduction tracking method based on linear feet of implementation and the existing stream resource condition (good, fair, or poor IBI scores received different pollutant removal credit). Further details on stream restoration modeling are presented in the individual implementation plans and the Guidance Document. Computationally, it is possible to remove more than the baseline sediment load in some watersheds (e.g., Anacostia) if all potential stream restoration projects are implemented.

Not all WTM scenarios were modeled for all watersheds. For example, if there were no previously identified completed, high priority, low priority, or other potential projects within a watershed, they would appear as zeros for that individual watershed in Tables 3.3 through 3.6. Also, for non-TMDL watersheds such as Great Seneca and Muddy Branch and Watts Branch subwatersheds, the public and private property ESD, riparian reforestation, and MS4 programmatic practices scenarios were not modeled due to the lack of regulatory drivers that define pollutant removal targets.

Table 3.3. Cost and benefit summary for completed projects (WTM 2.0)

Watershed	Total			ESD Projects		Incremental reduction from baseline (%)				
	Cost (million $)	Number of projects **	Impervious control added (ac)	Cost (% total)	Impervious (% total)	TN	TP	TSS	Bacteria	Trash
Anacostia	9.5	25	167	7%	3%	4%	4%	1%	4%	4%
Cabin John	0.0	0	0	0%	0%	0.2%	0.2%	0.3%	0.3%	1%
Rock Creek	4.4	6	212	13%	1%	2%	2%	3%	3%	2%
Triadelphia	0.0	0	0	0%	0%	0%	0%	0%	0%	0%
Rocky Gorge	0.0	0	0	0%	0%	0%	0.1%	0%	0%	0%
Lower Monocacy	0.0	0	0	0%	0%	0%	0%	0%	0%	0%
Clopper Lake	0.0	0	0	0%	0%	0%	0%	0%	0%	0%
Great Seneca *	0.6	2	11	0%	0%	1%	1%	1%	0%	2%
Muddy/Watts	0.0	0	0	0%	0%	0%	0%	0%	0%	0%

* Includes Clopper Lake ** Project count does not include stream restoration *Pollutants with a TMDL are highlighted*

Table 3.4. Cost and benefit summary for high priority projects (WTM 2.0)

Watershed	Total			ESD Projects		Incremental reduction from baseline (%)				
	Cost (million $)	Number of projects **	Impervious control added (ac)	Cost (% total)	Impervious (% total)	TN	TP	TSS	Bacteria	Trash
Anacostia	6.4	33	148	65%	16%	2%	2%	0.6%	2%	2%
Cabin John	1.6	6	88	19%	2%	3%	3%	3%	3%	1%
Rock Creek	8.9	14	373	13%	1%	2%	3%	3%	3%	4%
Triadelphia	0.0	0	0	0%	0%	0%	0%	0%	0%	0%
Rocky Gorge	0.4	2	5	77%	27%	0.6%	0.6%	0.7%	0.6%	1%
Lower Monocacy	0.0	0	0	0%	0%	0%	0%	0%	0%	0%
Clopper Lake	0.0	0	0	0%	0%	0%	0%	0%	0%	0%
Great Seneca *	18.3	24	789	6%	0.8%	19%	19%	20%	0%	24%
Muddy/Watts	4.4	16	211	8%	1%	6%	6%	6%	0%	6%

* Includes Clopper Lake ** Project count does not include stream restoration *Pollutants with a TMDL are highlighted*

Table 3.5. Cost and benefit summary for low priority projects (WTM 2.0)

Watershed	Total			ESD Projects		Incremental reduction from baseline (%)				
	Cost (million $)	Number of projects **	Impervious control added (ac)	Cost (% total)	Impervious (% total)	TN	TP	TSS	Bacteria	Trash
Anacostia	5.1	16	188	61%	8%	2%	2%	0.7%	2%	3%
Cabin John	1.6	8	10	98%	78%	0.2%	0.2%	0.2%	0.2%	0.3%
Rock Creek	8.8	24	657	7%	1%	4%	4%	6%	5%	7%
Triadelphia	0.40	1	2.0	100%	100%	0.5%	0.5%	0.6%	0.5%	1%
Rocky Gorge	0.9	2	4.58	100%	100%	8.4%	8.2%	8.3%	8.2%	11.6%
Lower Monocacy	0	0	0	0%	0%	0%	0%	0%	0%	0%
Clopper Lake	0	0	0	0%	0%	0%	0%	0%	0%	0%
Great Seneca *	6.6	16	87	41%	15%	4%	4%	4%	0%	4%
Muddy/Watts	2.0	6	26	84%	33%	0%	0%	1%	0%	0%

* Includes Clopper Lake ** Project count does not include stream restoration *Pollutants with a TMDL are highlighted*

Table 3.6. Cost and benefit summary for other potential projects (WTM 2.0)

Watershed	Total			ESD Projects		Incremental reduction from baseline (%)				
	Cost (million $)	Number of projects **	Impervious control added (ac)	Cost (% total)	Impervious (% total)	TN	TP	TSS	Bacteria	Trash
Anacostia	249.2	497	2222	73%	62%	23%	24%	8%	26%	30%
Cabin John	0.0840	1	5	0%	0%	0.1%	0.1%	0.1%	0.1%	0.1%
Rock Creek	2.0	4	201	0%	0%	1.2%	1.2%	1.9%	1.5%	2.1%
Triadelphia	0.0	0	0	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rocky Gorge	2.0	2	0	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lower Monocacy	0.0	0	0	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Clopper Lake	0.0	0	0	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Great Seneca *	0.2	5	53	0%	0%	2.3%	2.3%	2.7%	0.0%	2.7%
Muddy/Watts	0.0	0	0	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%

* Includes Clopper Lake ** Project count does not include stream restoration

Pollutants with a TMDL are highlighted

Table 3.7. Cost and benefit summary for ESD projects (WTM 3.0)

Watershed	Cost (million $)		Impervious control added (ac)	Incremental reduction from baseline (%)				
	ESD for public property	ESD for private property		TN	TP	TSS	Bacteria	Trash
Anacostia	237.8	212.96	1,813	20%	21%	7%	22%	27%
Cabin John	87.8	103.07	876	22%	23%	25%	24%	28%
Rock Creek	247.1	341	2,427	30%	30%	33%	32%	35%
Triadelphia	4.1	4.7	36	10%	10%	11%	11%	20%
Rocky Gorge	31.2	19	285	26%	27%	32%	30%	46%
Lower Monocacy	8.6	2.9	53	14%	15%	15%	15%	0%
Clopper Lake	0.8	0.51	21	14%	14%	15%	0%	14%
Great Seneca *	0.0	0	0	0%	0%	0%	0%	0%
Muddy/Watts	0.0	0	0	0%	0%	0%	0%	0%

* Includes Clopper Lake

Pollutants with a TMDL are highlighted

Table 3.8. Cost and benefit summary for riparian reforestation (WTM 4.0)

Watershed	Cost (million $)	Impervious control added (ac)	Incremental reduction from baseline (%)				
	Habitat restoration		TN	TP	TSS	Bacteria	Trash
Anacostia	1	6	0%	0%	0%	0.1%	0.2%
Cabin John	7.77	39	1%	2%	1%	3%	3%
Rock Creek	24	119	2%	2%	2%	4%	5%
Triadelphia	0.10	1	0.1%	0.2%	0.1%	0.4%	0.3%
Rocky Gorge	2.5	12	1%	2%	2%	3%	8%
Lower Monocacy	1.1	5	3%	3%	3%	4%	0%
Clopper Lake	0.23	2	4%	4%	2%	0%	4%
Great Seneca *	0	0	0%	0%	0%	0%	0%
Muddy/Watts	0	0	0%	0%	0%	0%	0%

* Includes Clopper Lake

Pollutants with a TMDL are highlighted

Table 5.7. Cost and benefit summary for stream restoration (WTM 4.0)

Watershed	Stream Restoration		Impervious control added (ac)	Incremental reduction from baseline (%)				
	Cost (million $)	Number of projects		TN	TP	TSS	Bacteria	Trash
Anacostia	93.7	200	0	42%	56%	326%	0%	0%
Cabin John	16.2	15	0	17%	9%	80%	0%	0%
Rock Creek	20.1	30	0	9%	7%	100%	0%	0%
Triadelphia	0.0	0	0	0%	0%	0%	0%	0%
Rocky Gorge	19.1	18	0	10%	7%	36%	0%	0%
Lower Monocacy	7.3	n/a	0	7%	10%	32%	0%	0%
Clopper Lake	0.0	0	0	0%	0%	0%	0%	0%
Great Seneca *	25.9	33	0	19%	8%	16%	0%	0%
Muddy/Watts	24.2	45	0	16%	7%	13%	0%	0%

* Includes Clopper Lake

Pollutants with a TMDL are highlighted

Table 5.8. Cost and benefit summary for MS4 programmatic practices (WTM 5.0)

Watershed	Cost (million $)	Impervious control added (ac)	Incremental reduction from baseline (%)				
	Programmatic practices - MS4		TN	TP	TSS	Bacteria	Trash
Anacostia	3.6	0	9%	9%	10%	8%	82%
Cabin John	0.47	0	15%	14%	0%	10%	0%
Rock Creek	1.2	0	11%	11%	0%	7%	0%
Triadelphia	0.0056	0	23%	3%	0%	0%	0%
Rocky Gorge	0.09	0	38%	8%	0.3%	5%	2%
Lower Monocacy	0.07	0	0%	0%	19%	0%	0%
Clopper Lake	0.01	0	61%	30%	0%	0%	0%
Great Seneca *	0	0	0%	0%	0%	0%	0%
Muddy/Watts	0	0	0%	0%	0%	0%	0%

* Includes Clopper Lake

Pollutants with a TMDL are highlighted

4. COORDINATED IMPLEMENTATION STRATEGY

Overall Strategy Framework

Montgomery County DEP is required to develop a Countywide Coordinated Implementation Strategy as part of their NPDES MS4 Permit. The Strategy is informed by the individual watershed implementation plans for seven watersheds. The process for developing the Strategy requires an iterative approach that starts with an understanding of the full restoration potential of each individual watershed (see Section 3 for a summary). Once the restoration potential was determined for the individual plans, the Countywide Strategy and schedule was developed by balancing the restoration potential with the compliance targets as well as other County priorities. The Countywide Strategy then ultimately defines how implementation is envisioned at the individual watershed level.

The Strategy has multiple objectives to accomplish, whereby a challenging balance between available opportunities, cost of implementation and timeframe is required. There isn't necessarily a correct answer in the process but rather an optimized result that addresses an agreed upon suite of priorities.

Strategy Details

The Strategy presented here was primarily driven by known and established regulatory timeframes and compliance endpoints. Meeting these endpoints using the more cost effective approaches was also given priority. After this, consideration was given to other known and important approaches that stakeholders and the County have an interest in pursuing. Specifically, the following compliance dates and objectives were considered in developing the Strategy over the long-term (Table 4.1):

Table 4.1 Compliance Targets for Countywide Coordinated Implementation Strategy

Target Date	Compliance Target	Metric
2015	Meeting 20% impervious cover treatment requirement within the MS4 Permit cycle	~4,300 acres of Impervious Cover
2017	Meet the interim dates and targets for the Chesapeake Bay TMDL, which include specific regulated urban area reductions by 2017 for nutrients and sediment (based on Maryland Department of the Environment's Watershed Implementation Plan)	9%, 12%, and 20% respectively for TN, TP, and TSS reductions from baseline conditions
2020	Meet the full compliance and targets for the Chesapeake Bay TMDL, which include specific regulated urban area reduction by 2020 for nutrients and sediment (based on Maryland Department of the Environment's Watershed Implementation Plan) Meet additional impervious cover treatment targets associated with next MS4 Permit cycle (assumes another 20% target)	18%, 34%, and 37% respectively for TN, TP, and TSS reductions from baseline conditions ~3,400 acres of Impervious Cover (20% of impervious remaining after 2015)
2025	Meet additional impervious cover treatment targets associated with next MS4 Permit cycle (assumes another 20% target)	~2,750 acres of Impervious Cover (20% of impervious remaining after 2020)
2030	Out year compliance with other watershed TMDLs	100% compliance with MS4 Permit Area WLAs

The impervious cover treatment targets were developed based on the assumption each permit cycle into the future would continue to use a 20% target and that the baseline would be recomputed after each permit cycle to reflect the areas that had been treated during that permit cycle and also that the targets had been met. MDE has not specified what future permits might stipulate in this regard, so this assumption is subject to change pending MDE's position during the next permit cycle negotiation.

To meet the compliance targets outlined in Table 4.1, the following priorities were generally followed:

- 100% implementation of completed, high, and low priority County projects by 2015.

- Greater ESD focus in urban (as opposed to suburban and rural) watersheds initially. Goal for ESD in these watersheds on public property by 2015 is 10% and on private property is 10%. The level of implementation was largely driven by the 20% Countywide impervious goal.
- 100% of Public Outreach Potential for all TMDL watersheds by 2015. This was pursued to address trash, nutrient and bacteria loading which rely strongly on effective outreach programs to modify behaviors.
- Generally limited strategies to the top four most cost effective per watershed.
- Habitat restoration (stream restoration and buffer reforestation) not pursued as priority until after 2015. These programs emphasize greater pollutant reduction efficiency rather than impervious cover treatment, which is the primary focus for the first permit cycle.

In order to develop countywide estimates for pollutant load reduction (as is required by the Chesapeake Bay TMDL), watershed area weighting was applied. It is also worth noting that the high and low priority projects along with the other potential projects strategies represent a static or fixed number of projects that have been identified by the County. For this analysis, this list of practices is not replenished and therefore, once all opportunities have been implemented, other strategies are pursued. In reality, the County will continue to develop and update its list of specific project opportunities and have these available for implementation in future years.

The output from this effort is presented in a series of tables ordered by target date in Appendix 4. In addition, Table 4.2 provides an overall summary of pollutant load reduction tracking versus time. Through inspection of Table 4.2 it can be seen that the Strategy meets the impervious cover treatment targets under the current MS4 permit (as well as projected targets for 2020 and 2025 assuming a continued 20% treatment requirement), interim and final Chesapeake Bay nutrient and sediment reduction targets by 2017 and 2020 respectively, and out year MS4 permit area WLA compliance for the majority of pollutants. Exceptions include meeting the bacteria WLA load reductions required for the Anacostia and Rock Creek.

Table 4.2 Projection by Phase for Watersheds and Pollutants

							Permit/TMDL Targets	
Watershed	Fiscal Year	2015	2017	2020	2025	2030	2017	2020
Anacostia	Impervious Treated (acres)	1,421	2,393	3,364	4,272	4,544		
	ESD (% Impervious)	26%	44%	61%	69%	71%		
	Cost (Million $)	160	307	486	732	820		
	ESD (% Cost)	45%	62%	71%	78%	78%		
	Nitrogen	25%	39%	68%	89%	100%	81.8%	82%
	Phosphorus	27%	42%	77%	100%	100%	81.2%	81%
	Sediment	47%	72%	100%	100%	100%	87.5%	88%
	Bacteria	21%	33%	46%	59%	64%	87.9%	88%
	Trash	41%	65%	89%	100%	100%		
Rock Creek	Impervious Treated (acres)	1,541	1,961	2,381	3,625	3,989		
	ESD (% Impervious)	17%	28%	36%	57%	61%		
	Cost (Million $)	87	172	262	566	658		
	ESD (% Cost)	70%	79%	79%	89%	90%		
	Nitrogen	24%	30%	38%	55%	61%		
	Phosphorus	25%	30%	38%	54%	60%		
	Sediment	38%	50%	92%	100%	100%		
	Bacteria	21%	27%	33%	50%	55%	96.0%	96%
	Trash	17%	24%	31%	50%	55%		
Cabin John	Impervious Treated (acres)	187	380	570	1,018	1,018		
	ESD (% Impervious)	52%	72%	78%	87%	87%		
	Cost (Million $)	23	65	114	215	219		
	ESD (% Cost)	92%	91%	86%	90%	88%		
	Nitrogen	21%	27%	39%	55%	58%		
	Phosphorus	20%	26%	35%	49%	51%		
	Sediment	6%	17%	60%	91%	100%		
	Bacteria	16%	22%	27%	40%	40%	31%	31%
	Trash	6%	12%	19%	34%	34%		
Muddy Watts	Impervious Treated (acres)	237	237	237	237	237		
	ESD (% Impervious)	4%	4%	4%	4%	4%		
	Cost (Million $)	6	8	19	25	31		
	ESD (% Cost)	32%	27%	11%	8%	7%		
	Nitrogen	6%	7%	15%	18%	22%		
	Phosphorus	6%	7%	10%	12%	13%		
	Sediment	7%	8%	14%	17%	20%		
	Bacteria	0%	0%	0%	0%	0%		
	Trash	6%	6%	6%	6%	6%		
Great Seneca	Impervious Treated (acres)	901	921	941	941	941		
	ESD (% Impervious)	2%	2%	2%	2%	2%		
	Cost (Million $)	26	48	50	51	52		
	ESD (% Cost)	15%	8%	8%	8%	8%		
	Nitrogen	24%	41%	43%	44%	45%		
	Phosphorus	24%	32%	34%	34%	34%		
	Sediment	26%	41%	43%	44%	44%		
	Bacteria	0%	0%	0%	0%	0%		
	Trash	31%	32%	33%	33%	33%		

							Permit/TMDL Targets	
Watershed	Fiscal Year	2015	2017	2020	2025	2030	2017	2020
Clopper	Impervious Treated (acres)	0	6	12	22	22		
	ESD (% Impervious)	0%	86%	86%	92%	92%		
	Cost (Million $)	0	0	1	2	2		
	ESD (% Cost)	0%	72%	73%	84%	84%		
	Nitrogen	61%	67%	72%	79%	79%		
	Phosphorus	30%	36%	41%	48%	48%	45%	45%
	Sediment	0%	5%	10%	17%	17%		
	Bacteria	0%	0%	0%	0%	0%		
	Trash	0%	6%	11%	18%	18%		
Lower Monocacy	Impervious Treated (acres)	1	16	32	58	58		
	ESD (% Impervious)	100%	85%	84%	91%	91%		
	Cost (Million $)	0	4	11	18	20		
	ESD (% Cost)	100%	85%	54%	63%	58%		
	Nitrogen	0%	5%	14%	22%	24%		
	Phosphorus	0%	5%	16%	26%	28%		
	Sediment	0%	5%	46%	61%	69%	60.8%	61%
	Bacteria	0%	6%	12%	19%	19%		
	Trash	0%	0%	0%	0%	0%		
Rocky Gorge	Impervious Treated (acres)	11	88	165	307	307		
	ESD (% Impervious)	64%	89%	90%	95%	95%		
	Cost (Million $)	3	17	40	70	75		
	ESD (% Cost)	55%	82%	64%	73%	68%		
	Nitrogen	47%	55%	67%	82%	85%		
	Phosphorus	17%	25%	36%	52%	53%	15%	15%
	Sediment	10%	19%	45%	70%	79%		
	Bacteria	14%	23%	32%	47%	47%		
	Trash	15%	30%	46%	68%	68%		
Triadelphia	Impervious Treated (acres)	3	12	20	38	38		
	ESD (% Impervious)	100%	98%	97%	99%	99%		
	Cost (Million $)	1	3	5	9	9		
	ESD (% Cost)	99%	98%	98%	99%	99%		
	Nitrogen	24%	27%	29%	34%	34%		
	Phosphorus	4%	7%	9%	14%	14%	15%	15%
	Sediment	1%	4%	6%	12%	12%		
	Bacteria	1%	4%	6%	12%	12%		
	Trash	2%	6%	11%	21%	21%		
Countywide	Impervious Treated (acres)	4,302	6,014	7,722	10,518	11,154	6,008	7,723
	ESD (% Impervious)	18%	34%	47%	60%	63%		
	Cost (Million $)	305	622	987	1,687	1,884		
	ESD (% Cost)	53%	66%	70%	80%	80%		
	Nitrogen	18%	25%	36%	46%	51%	9%	20%
	Phosphorus	17%	23%	34%	44%	46%	12%	34%
	Sediment	23%	34%	54%	60%	62%	20%	37%
	Bacteria	11%	15%	20%	28%	30%		
	Trash	18%	26%	33%	41%	42%		

Assumptions:

1. Does not include repeated Outreach and Education costs beyond FY2015
2. Does not include an inflation multiplier

Summary of Individual Implementation Plans

A summary of the general considerations and prioritization for each watershed implementation plan is provided below. While most watersheds are faced with local load reduction targets that must be met, the impervious cover area treated and the Chesapeake Bay load reduction targets are countywide and can be met in aggregate from all watershed efforts.

Anacostia – For the first permit cycle (through 2015), a priority was placed on full implementation of completed, high, and low priority projects. Next, implementation of a third of the other potential projects was targeted, as a large number of these were identified in conjunction with the USACE's Anacostia Watershed Restoration Plan efforts. ESD was emphasized on both public (10%) and private property (10%). Finally, outreach (25%) and stream restoration (12%) are targeted for pollutant load reduction but are not credited towards impervious cover credit. In future permit cycles, the remainder of the other potential projects are targeted along with ESD and a limited amount of riparian reforestation for impervious cover and pollutant load reduction. Outreach and stream restoration are significant strategies pursued for load reduction benefits. Nutrient and sediment MS4 permit area WLAs are met by 2030, but bacteria load reduction does not meet MS4 permit area WLA compliance. The remaining bacteria reduction is believed to be associated with urban wildlife sources. Unless intense urban wildlife management practices are implemented, this remaining load reduction will not be possible.

Rock Creek – For the first permit cycle (through 2015), a priority was placed on full implementation of complete, high and low priority projects. Next, 25% implementation of other potential projects was targeted. ESD was emphasized on both public (10%) and private property (10%), with private property implementation being linked to Rainscapes Program success. Finally, outreach (100%) and stream restoration (22%) are targeted for pollutant load reduction but are not credited towards impervious cover credit. In future permit cycles, the remainder of the other potential projects are targeted along with ESD and riparian reforestation for impervious cover and pollutant load reduction. Stream restoration is a significant strategy pursued for load reduction benefits. The bacterial load reduction does not meet MS4 permit area WLA compliance. However, the remaining bacterial load is believed to be associated with urban wildlife sources. Unless intense urban wildlife management practices are implemented, this remaining load reduction will not be possible.

Cabin John Creek – Similar to the other two more urban watersheds in the County, during the first permit cycle (through 2015), a priority was placed on full implementation of complete, high and low priority projects. Fewer opportunities exist overall compared to the Anacostia and Rock

Creek. Next, 25% implementation of other potential projects was targeted. ESD was emphasized on both public (10%) and private property (10%). Finally, outreach (100%) was targeted for pollutant load reduction but not credited towards impervious cover credit. No riparian reforestation or stream restoration was targeted due to limited or no opportunities. In future permit cycles, the remainder of the other potential projects are targeted along with ESD and some riparian reforestation for impervious cover and pollutant load reduction. The bacteria load reduction meets MS4 permit area WLA compliance by 2025.

Muddy Branch/Watts Branch – During the first permit cycle (through 2015), a priority was placed on full implementation of complete, high and low priority projects. Fewer opportunities exist overall compared to the Anacostia and Rock Creek Watersheds. No other strategies were pursued as there are no existing TMDLs in the Muddy Branch/Watts Branch subwatersheds. In future permit cycles, previously identified stream restoration projects are implemented for pollutant load reduction.

Great Seneca Creek – This watershed implementation plan is unique in that it includes the small Clopper Lake subwatershed which has a TMDL for phosphorus. Even with the TMDL, there are limited identified opportunities to pursue in the Clopper Lake subwatershed, in part due to the limited area of the subwatershed within the County MS4 permit area. During the first permit cycle (through 2015), a priority was placed on full implementation of complete, high and low priority projects within Great Seneca Creek subwatershed. No opportunities exist for these strategies in Clopper Lake. However, full outreach was applied in Clopper Lake in the first permit cycle. In future years, other potential projects, ESD on public and private property and a small amount of riparian reforestation (in Clopper Lake) is pursued. The Clopper Lake WLA for phosphorus within the MS4 permit area is met.

Patuxent – During the first permit cycle (through 2015), a priority was placed on full implementation of complete, high and low priority projects. Far fewer opportunities exist overall compared to the Anacostia and Rock Creek. A limited amount of ESD on private land and stream restoration was pursued. Finally, outreach (100%) was targeted for pollutant load reduction (primarily nutrients) but not credited towards impervious cover credit. No riparian reforestation was targeted within the MS4 Permit area due to cost effectiveness in the Rocky Gorge subwatershed and limited opportunities in the Triadelphia subwatershed. In future permit cycles, ESD on private and public land is pursued more substantially as is stream restoration. A limited amount of riparian reforestation achieves some impervious cover and pollutant load reduction. The Rocky Gorge phosphorus WLA within the MS4 permit area is met easily and the Tridelphia phosphorus WLA is also met, but with a longer timeframe needed for compliance.

Lower Monocacy Creek – Lower Monocacy Creek is the most rural watershed in the County and has the least amount of area subject to the County MS4 permit. In addition, there are no pre-identified restoration projects within the watershed. Therefore, during the first permit cycle (through 2015), only a very small amount (5%) of private property ESD is pursued. It is not until the second permit cycle that more focus is placed on private and public ESD as well as stream restoration and programmatic strategies such as street sweeping to target sediment loads associated with the TMDL. In future permit cycles, stream restoration is pursued for pollutant load reduction. The sediment WLA within the MS4 permit area is projected to be met around 2025.

Countywide – The Countywide effort was driven by impervious cover treatment targets and Chesapeake Bay TMDL 2017 and 2020 reduction targets associated with sediment and nutrients for urban MS4s. For impervious cover, it was assumed that a 20% target would be required for each five-year permit cycle. The Bay TMDL targets for urban MS4 areas were easily met for all pollutants in 2017 and easily met for nitrogen and sediment but more difficult to meet for phosphorus in 2020.

Public Outreach and Stewardship

The County recognizes and is committed to the increasingly important role that public outreach and stewardship will play if improved water quality conditions are going to be achieved countywide. While the County currently has a very active and layered outreach program, the model requires changes that will result in broader stakeholder groups serving as the leaders and primary champions for clean water in their communities. This includes greater participation from minority and faith-based groups, business consortiums, schools, neighborhood associations, and civic groups. Additionally, the new model requires revisiting current initiatives carried out by the various County agencies to look for better and more efficient ways to communicate messages, cross-train, and create synergies that result in greater engagement, greater awareness, and sustained changes in behavior.

Within each implementation plan, specific suggestions for outreach and education opportunities are identified. In addition, Appendix 5 of this Strategy contains “practice sheets” which highlight targeted restoration activities for the County to develop and refine. A total of eight practices have been identified that can be adopted countywide or in more targeted watershed areas where there are specific water quality issues to address. Many of the practices build upon existing County programs but require a much broader reach to new partner groups. Program start up costs are suggested and were used for cost estimates associated with the Countywide strategy. The highlighted practices include:

- Pet Waste Pickup Outreach and Stewardship Campaign
- Lawn Stewardship Outreach and Stewardship Campaign
- Anti-Littering Outreach and Stewardship Campaign
- Innovative Stormwater Management Awareness Outreach and Stewardship Campaign
- Stream Stewards Outreach and Stewardship Campaign
- Riparian Reforestation Outreach and Stewardship Campaign
- Roof Runoff Reduction Outreach and Stewardship Campaign
- Parking Lot Runoff Water Quality Outreach and Stewardship Campaign

Initial start up costs for comprehensive Public Outreach and Stewardship programs is approximately $750K with projections over five years of about $2.6M (Table 4.3). Start up timeframes are assumed to be up to 18 months. This compares well with the targeted strategies identified in each of the seven implementation plans, where an estimated $2.6M is projected to support public outreach and stewardship efforts typically focused on a single pollutant as part of a strategy to meet TMDL requirements. In reality all public outreach and stewardship campaigns can be designed and structured to focus on a specific pollutant as necessary. For example, bacteria can be targeted through direct pet waste management outreach (one of the most common linkages made to bacteria loads). However, additional bacteria load reduction can be achieved with outreach efforts that target litter, better yard practices (picking up after pets), runoff reduction (less runoff means less loading), and reforestation (less runoff).

Table 4.3 Outreach Start Up and 5-Year Cost Projections

Practice	Practice Start Up Cost
Pet Waste Pickup	$240,500
Lawn Stewardship	$30,600
Anti-Littering	$175,050
Stormwater Management Improvements Awareness	$50,450
Stream Stewards	$74,825
Riparian Reforestation	$30,575
Roof Runoff Reduction	$101,400
Parking Lot Runoff Water Quality	$41,500
Estimated Start Up Total	**$744,900**
5-Year Outreach Budget Projection	**$2,650,000**

These eight practice sheets provide specific costs and timelines for implementation. They also provide suggestions for measuring program success. These practice sheets along with the specific recommendations in the implementation plans make up the Public Outreach and Education Campaign.

Trash Reduction

Most of the implementation plans have to address trash loadings to meet requirements of the Potomac Trash Treaty that is referenced in the County's MS4 Permit. In addition, the Anacostia Trash TMDL has recently been accepted by MDE and the EPA. According to the Anacostia TMDL, there is reasonable assurance that the goals of the Treaty and TMDL can be met with proper watershed planning, implementing pollution-reduction BMPs, and using strong political and financial mechanisms.

No implementation plan places a priority on structural BMPs to be the primary trash strategy. However, by the very virtue of being present, these structural practices will act as trash traps for the drainage area draining to them. The County's trash strategy recognizes the importance of eliminating trash at its source. To do so requires enhanced and stepped up approaches for programmatic practices such as education, improved enforcement, targeted media campaigns, and commitments from commercial business districts.

Currently, the County has a number of activities which target trash reduction. They include the following:

- Adopt-a-Road Program through DOT, which focuses on public awareness and involvement in trash management. There are 205 participants who adopted road segments and agreed to six major road cleanups per year;
- Storm Drain Marking through DOT
- Support for illegal dumping enforcement, outreach, and research and monitoring.
- Partnership with DOT to conduct street sweeping covering about 2,500 curb miles and occurring once a year;
- Partnership with the Park Police to monitor illegal dumping, which combined enforces 300-400 actions a year.
- Non-residential and residential recycling programs through Solid Waste Services (SWS).
- Transit stop trash management program at 600 bus stops countywide supported by DOT Transit Services.

In addition to continuing these efforts, a number of trash good-housekeeping efforts have been proposed as part of this Strategy. A detailed description of the quantitative methods and

strategies applied can be found in Appendix E of the Guidance Document. In general, the following six trash-reduction strategies are recommended:

1. Significantly increase funding for trash reduction programs
2. Create and enhance regional partnerships and coordination among businesses, environmental groups, individual citizens, and government at all levels and in all jurisdictions
3. Improve people's awareness, knowledge, and behavior relating to littering and illegal dumping
4. Promote the greater introduction and use of effective trash-reduction technologies and approaches
5. Improve enactment and enforcement of laws to reduce trash
6. Increase trash monitoring-related data collection, generation, and dissemination efforts

The Anacostia watershed implementation plan provides an outline of the actions that will be taken through the first permit cycle to reduce trash. The range of programs and practices specially aimed at reducing trash inputs to roads and streams that will be targeted include: reduce, reuse and recycle campaigns; littering and illegal dumping enforcement; stream cleanups; and street sweeping. These measures are in addition to any trash trapped and removed by structural practices which are computed using the WTM. The plan shows that the trash TMDL can be met by 2025 at a cost of 732 million dollars.

Runoff Volume Reduction

The effect of ESD practices on annual runoff volume within the seven watersheds was modeled using the WTM. Table 4.4 outlines the percent annual runoff volume reduction for the four BMP groups investigated in the watershed implementation plans. The reduction rates were derived from the National Pollutant Removal Database (Version 3.0, CWP, 2007). For ESD practices, the runoff reduction rates were derived using a composite blend of runoff reduction practices, as shown in Table 4.5. In addition, runoff reduction benefits are realized with riparian reforestation strategies. This benefit is captured by the WTM through a land cover change (e.g., converting unforested areas to forest).

Table 4.4 Composite Runoff Reduction by BMP Code

Code	Description	Runoff Reduction[1] (%)
1	**Non-performing**	0
2	**Under-performing**	5
3	**Effective**	10
4	**ESD Practices**	60
[1] RR: percent annual reduction in post development runoff volume for storms		

Table 4.5 Composite Annual Runoff Reduction and Nutrient Mass Loadings for ESD Practices [1]

Type	Runoff Reduction (%)
Bioretention	60
Dry Swale	50
Infiltration	70
Permeable Pavers	60
Green Roofs	52.5
Rain Tanks	52.5
Average ESD	**60**
[1] Source: Schueler 2009. Introduction to VA DCR Stormwater Practices, Table 1	

Based on the results of the WTM modeling, the runoff reduction rates per practice group and watershed are presented in Table 4.6. The countywide benefit of the full restoration potential of the implementation strategies are also presented as an area-weighted average. Since Watersheds Implementation Plans were not completed for Little and Dry Seneca, Upper Potomac Direct, and Lower Potomac Direct, these watersheds were delegated 0% runoff reduction (not shown). The countywide area-weighted average accounts for the entire MS4 permit area, including Little and Dry Seneca, Upper Potomac Direct, and Lower Potomac Direct.

Table 4.6 Annual Runoff Volume Reduction per Watershed and by Strategy

Strategies*	Completed Projects WTM 1.0	High Priority Projects WTM 2.0	Low Priority Projects WTM 2.0	Other Potential Projects WTM 2.0	ESD Projects WTM 3.0	Riparian Reforestation WTM 4.0	*Total*
Watershed	**Runoff Volume Reduction from baseline (%)**						
Anacostia	3%	1%	1%	15%	14%	0%	***34%***
Rock Creek	1%	1%	1%	0.3%	21%	4%	***28%***
Cabin John	0%	2%	0.1%	0%	15%	3%	***20%***
Muddy and Watts Branch	0%	4%	0%	0%	0%	0%	***4%***
Great Seneca (inclusive of Clopper Lake)	1%	14%	3%	2%	0%	0%	***19%***
Clopper Lake (subshed of Great Seneca)	0%	0%	0%	0%	10%	4%	***14%***
Lower Monocacy	0%	0%	0%	0%	13%	6%	***19%***
Patuxent (Rocky Gorge)	0%	0%	6.9%	0%	18%	3%	***29%***
Patuxent (Triadelphia)	0%	0%	1%	0%	12%	0.6%	***13%***
Countywide **	***4%***	***1%***	***3%***	***4%***	***5%***	***1%***	***19%***

*** Stream Restoration and MS4 Programmatic Practices (not shown) achieved 0% runoff reduction**

**** Area weighted total, includes portions of Upper and Lower Potomac Direct and Seneca Creek, which have 0% volume reduction according to the implementation plans**

The runoff reduction potential formulated by the implementation plans provide a countywide runoff reduction of 19% overall. The Anacostia watershed had the highest runoff reduction potential of 34%, whereas Muddy Branch and Watts Branch had the least potential of 4% according to the plan. ESD projects accounted for the greatest volume reduction on a countywide basis of all the strategies.

The results from the modeling effort were used to assess the relative benefits of ESD application compared to the other strategies (Table 4.7). Completed and High Priority Projects were the most cost effective. ESD retrofits, despite having the highest runoff volume reduction, were among the least cost effective strategies.

Table 4.7 Cost Effectiveness of the Implementation Plan Strategies for Countywide, Annual Runoff Volume Reduction

Strategies	Cost (Million $)	ESD (% Cost)	Runoff Volume Reduction	Cost Effectiveness (%/M$)
Completed and High Priority Projects	$54	16%	4%	0.07%
Low Priority Projects	$25	43%	1%	0.04%
Other Potential Projects	$254	71%	3%	0.01%
Public ESD Retrofits	$617	100%	4%	0.01%
Private ESD Retrofits	$684	100%	5%	0.01%
Riparian Reforestation	$37	0%	1%	0.03%
Stream Restoration	$206	0%	0%	0.00%
Programmatic Practices	$5	0%	0%	0.00%

There were no clear relationships between the percentage of funds allocated to ESD projects and cost effectiveness at reducing runoff volume at a countywide scale. Clearly, ESD projects have a greater potential to reduce runoff volume. However, the cost effectiveness of the ESD-focused strategies is low. This relationship is most likely due to the small catchment area of ESD projects in comparison to conventional stormwater BMPs. Despite the fact that large regional stormwater ponds have a lower runoff volume reduction potential, the large area of land draining to the ponds allows for a greater impact per dollar spent on design and construction.

Adaptive Management, Monitoring, and Reporting

Sound implementation strategies require assessment and effective adaptation to respond to new information, changing conditions, new technologies, and lessons learned. This will be the basis of the plan that will be used when benchmarks are not met and the projected funding is inadequate.

Adaptive management requires monitoring of a variety of measures that can be used to determine whether progress is being made towards meeting the Countywide water quality objectives. Ultimately, it is the instream water quality and the loading limits with respect to the TMDLs that determine the success of implementation; however, there are many interim measures that can also be correlated to success, which are worthwhile pursuing.

Surface water monitoring can be an expensive and time consuming undertaking. Montgomery County is fortunate to have an extensive Countywide stream monitoring network that can serve as a foundation for providing spatial and temporal data to indicate stream health. The County's MS4 Permit also outlines the required assessment of controls, which includes chemical, biological, and physical monitoring. Specifically, the permit calls for the County to continue their watershed restoration monitoring of the Lower Paint Branch subwatershed and physical monitoring of the Clarksburg Special Protection area. In addition to the existing monitoring network, the County will continue tracking and data reporting associated with levels of implementation (e.g., acres of impervious cover treated, areas of buffer planted, miles of stream restored, miles of streets swept). For measuring effectiveness of outreach and stewardship efforts, other types of monitoring and reporting are planned that include before and after attitude and behavior surveys, frequency of website visits and information requests.

For many restoration strategies it may be difficult to tease out their individual effectiveness in terms of pollutant load reductions, but collectively, the monitoring that occurs should provide adequate insight into the overall effectiveness of a layered implementation strategy.

In addition to the monitoring and assessment, the County will be reporting results on an annual basis as part of their NPDES MS4 Permit annual report. The MS4 Permit requires annual reporting of the following:

- The status of implementing the components of the stormwater management program that are established as permit conditions
- A narrative summary describing the results and analyses of data, including monitoring data that is accumulated throughout the reporting year;
- Expenditures for the reporting period and the proposed budget for the upcoming year;
- A summary describing the number and nature of enforcement actions, inspections, and public education programs;
- The identification of water quality improvements and documentation of progress toward meeting applicable WLAs developed under EPA approved TMDLs; and
- The identification of any proposed changes to the County's program when WLAs are not being met.

The County will build upon annual reporting that has historically occurred to meet permit requirements and will supplement this reporting with tracking table summaries that quantify implementation activities for the range of strategies pursued during that year and the associated treatment (e.g., impervious cover treated, pollutant load reduced, education and outreach partners established, etc.). Cost will also be tracked in association with rates of

implementation. This level of performance will then be compared with countywide strategy targets (e.g., progress towards meeting WLAs) associated with key performance dates such as those presented in Table 4.1. The level of progress achieved by the County will then feed into the adaptive management approach described above.

Organization Needs to Implement Strategy

Montgomery County DEP staff possesses substantial expertise and institutional knowledge that yields many positive outcomes and efficient processes under the current pace of restoration and permit compliance activities. Under this strategy, however, the pace of implementation is required to significantly increase. Based on an increase in the level of implementation it is reasonable to assume that additional capacity may be needed to provide sufficient oversight and management of all the projects.

Another critical element of this strategy is the recognition and commitment to pursuing outreach initiatives that build community capacity by targeting new partner groups that provide the necessary leadership, oversight, and sustained effort to change behaviors and foster stewardship. The County currently carries out many well established and managed outreach programs, but it may require additional focus across County agencies and departments for these partnerships to become established and thrive.

Through the implementation process, and the monitoring and reporting that is required, large amounts of data will be generated. Technological advances happen so rapidly in this day and age, it will be important for the County to stay current with technology and methods so that more efficient and cost-effective data management and reporting will be possible. The County currently relies on a detailed and sophisticated GIS to spatially locate projects, and manage tables of data related to projects. The growth and development of this spatial database will be a critical component of the reporting and tracking capability of the County. These databases generate the input data that are used to measure progress towards baseline loading targets. Regular review and upkeep of the data as well as routine summarization of progress (annually at a minimum) will likely require additional dedication of staff. This is especially the case during periods where the implementation rate of structural practices in the ground is accelerated.

5. REFERENCES

Alice Ferguson Foundation. 2011. *Trash Free Potomac Watershed Initiative.* http://www.fergusonfoundation.org/trash_initiative/trash_index.shtml

Biohabitats and Chesapeake Stormwater Network. 2010 (updated 2011). *Implementation Plan Guidance Document*.

Center for Watershed Protection, Inc (CWP). 2001. *Watershed Treatment Model (WTM) 2001 User's Guide.* http://www.stormwatercenter.net/monitoring%20and%20assessment/watershed_treatment_model.htm

Center for Watershed Protection, Inc (CWP). 2007. National Pollutant Removal Database (Version 3.0). Ellicott City, MD.

Maryland Department of the Environment (MDE). 2008. The Integrated Report of Surface Water Quality in Maryland (combined 303(d) List and 305b Report). Resource Assessment Service, Annapolis, MD.

Maryland Department of the Environment (MDE). 2010. Memorandum from Jeff White entitled: "2010 Status of Approved Stormwater Wasteload Allocations for NPDES Regulated Stormwater Entities in Montgomery County," Baltimore, MD.

Montgomery County Department of Environmental Protection (MCDEP). 2010. *Watershed Quality: Total Maximum Daily Load (TMDL) Watersheds.* http://www.montgomerycountymd.gov/dectmpl.asp?url=/Content/dep/water/watershedQuality.asp

US Army Corps of Engineers. 2009. Draft Anacostia Watershed Restoration Plan and Report. Anacostia Watershed Restoration Partnership.

US Environmental Protection Agency (USEPA). May 2010. *Chesapeake Bay Compliance and Enforcement Strategy*. Office of Enforcement and Compliance Assurance (OECA). http://www.epa.gov/oecaerth/civil/initiatives/chesapeake-strategy-enforcement.pdf

US Environmental Protection Agency (USEPA). December 29, 2010. *Chesapeake Bay TMDL Executive Summary.* http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html

APPENDICES

Appendix 1 – Implementation Guidance Document Table of Contents
Appendix 2 – General BMP Coding of Montgomery County BMP Database
Appendix 3 – Restoration Potential by Watershed
Appendix 4 – Implementation Strategy by Timeframe
Appendix 5 – Outreach and Stewardship Practice Sheets

Appendix 1 – Implementation Plan Guidance Document Table of Contents

Implementation Plan Guidance Document
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Part 1: General Issues Involved in Implementing the Permit of the memo provides over-arching information on current County watershed management policies and practices that drive the planning effort. These include:

- **1.1 Key Watershed Management Provisions in the New Stormwater NPDES Permit**
- **1.2 Defining ESD and MEP in the Context of Existing Development and Watershed Restoration**
- **1.3 Current County Watershed Management Classification**
- **1.4 Existing Watershed Plans/Studies and Resources**
- **1.5 Involving and Engaging County Stakeholders in** the **Watershed Process**

Part 2: Baseline Inventories and Baseline Water Quality Input Data of the memo describes the structure and content of the baseline inventories with the detailed tables provided in Appendix A. This section outlines the watersheds with current EPA-approved TMDL goals and the baseline loads established by MDE, providing a starting point for watershed restoration. In addition, this section begins to outline the process for estimating baseline loads for those watersheds which do not have baseline loads established through modeling associated with EPA approved TMDLs.

Part 3: Pollutant Load Reduction Estimation of the memo includes a unified modeling approach, subject to data variability. This part also presents standard methods for conducting desktop BMP coverage, with a special analysis of BMP performance in the County BMP inventory. It also outlines an alternative method to evaluate the effect of ESD practices on runoff reduction.

Part 4: Restoration Practices of the memo outlines the 13 different restoration practices that will be evaluated for each watershed.

Part 5: Evaluating Impact of Restoration Practice Implementation in Watersheds of the memo outlines how the Watershed Treatment Model (WTM) will be used to evaluate the impact of various levels of restoration implementation, in relation to the baseline load and the treatment and/or load reduction benchmarks for each watershed.

Part 6: Process for Defining Outcomes and Tracking Progress of the memo outlines the process for defining outcomes and tracking progress in each of the implementation plans.

Five appendices are included as follows:

Appendix A - Acronyms, Units Abbreviations and Consolidation References
Appendix B – Modeling Framework
Appendix C - GIS Steps for Processing Montgomery County Data
Appendix D – Baseline Inventory Template
Appendix E – Trash Reduction Strategies

Appendix 2 – General BMP Coding of Montgomery County BMP Database

Table B.16 of Appendix B Modeling Framework of Implementation Guidance Document

Table B.16 General BMP Coding of Montgomery County BMP Database	
Performance Code	**Structure Type** [1]
Code 0: Pretreatment BMPs[2] Not intended to provide runoff reduction or significant pollutant removal	Baysaver (BAYSAV), Interceptor (INT), Vortechnics (VORTEC), Oil/grit separator (SEP), Stormcepter (STC), Flowsplitter (FS), Plunge Pool (PP), V2B1 (V2B1), Vegetated Pool (VP), Aquaswirl (AQSW)
Code 1: Non-performing BMPs Detention or other practices with no runoff reduction and no long term pollutant removal	Control Structure underground (CS), Pond-dry quantity control (PDQN), Underground detention (UG), Underground with stone bottom (UGINF), Pond-dry quantity control and extended detention (PDQNED)
Code 2: Under-performing BMPs No runoff reduction and low pollutant removal	Pond-dry quantity control and sand filter base (PDQNSF), Pond-infiltration basin quality control (PDIB), Pond-infiltration basin with extended detention (PDIBED), Pond-infiltration basin quantity control (PDIBQN), Stormfilter (STFIL), Aquafilter (AQFIL)
Code 3: Effective BMPs[3] Limited runoff reduction but moderate to high pollutant removal	Pond-wet quantity control and extended detention (PDWTED), Pond-wet quantity control and extended detention (PDWTQNED), Pond-infiltration basin quantity control and extended detention (PDIBQNED), Sand filter (SF), Sand filter quantity control (SFQN), Oil/grit separator and sand filter (SEPSF), Sand filter underground (SFU), Pond-wetland (PDWD), Pond-wetland with extended detention (PDWDED), Pond-wetland quantity control and extended detention (PDWTQN), Pond-wet quality and quantity control (PDWT),
Code 4: ESD BMPs High runoff reduction and moderate to high pollutant removal	Dry swale (DS), Bioretention quality control (BR), Bioretention quantity control (BRQN), Infiltration trench quality control (INF), Infiltrator (INFIL), Infiltration trench quality and quantity control (INFQN), Infiltration trench quality control underground (INFU), Infiltration trench quality and quantity control buried non-surface fed (INFUQN), Level Spreader (LS), Peat sand filter (PSF), and Vegetated Swale (VS).

[1] Structure type codes as reported in MCDEP 2005-06
[2] Stand-alone practices are given Code 2 pollutant removal efficiency.
[3] Structure may not always achieve these rates due to poor design, installation and maintenance, and may be down-graded to under-performing based on inspection reports and hydrologic assessment of pra

Appendix 3 – Restoration Potential by Watershed

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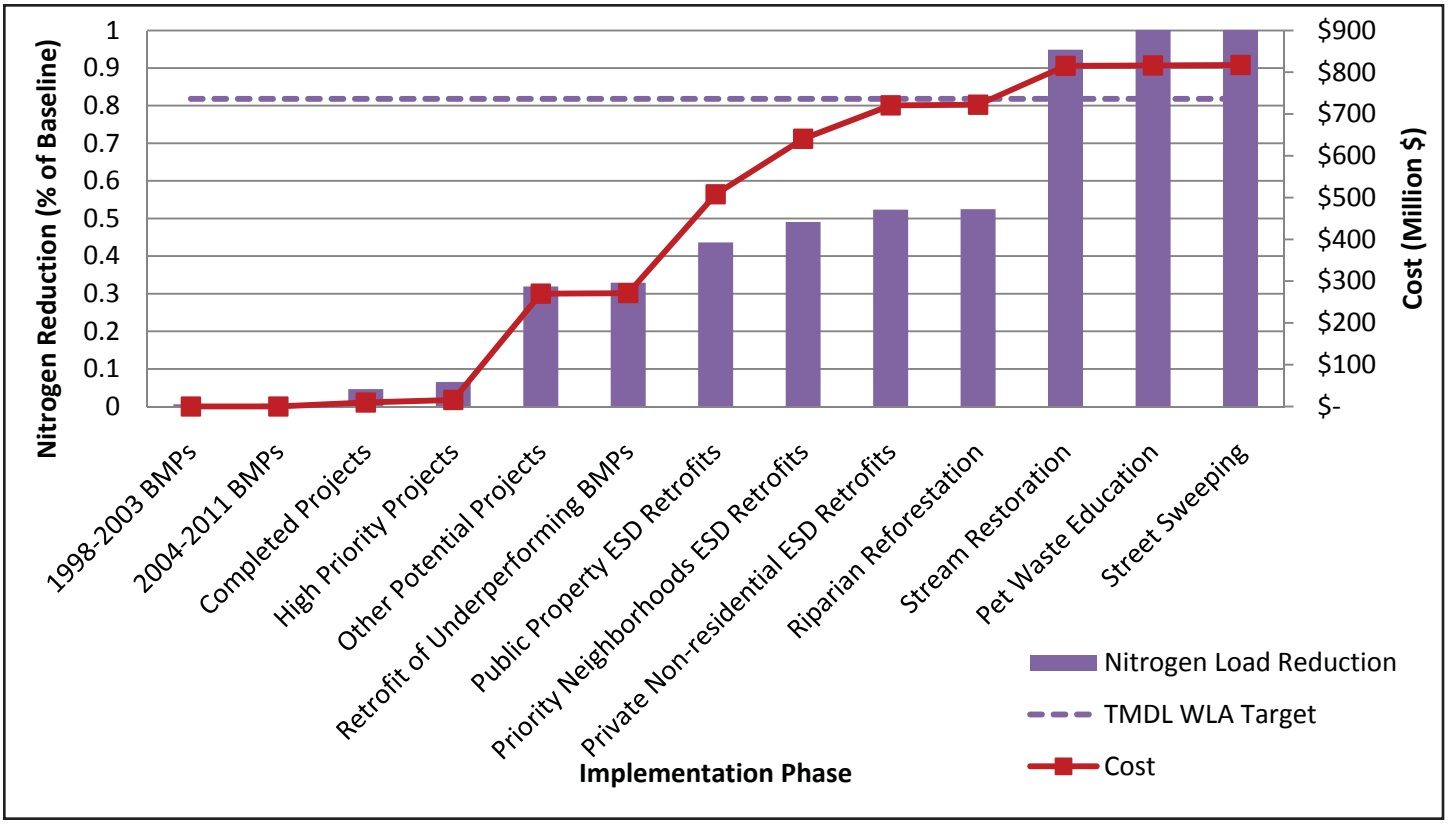
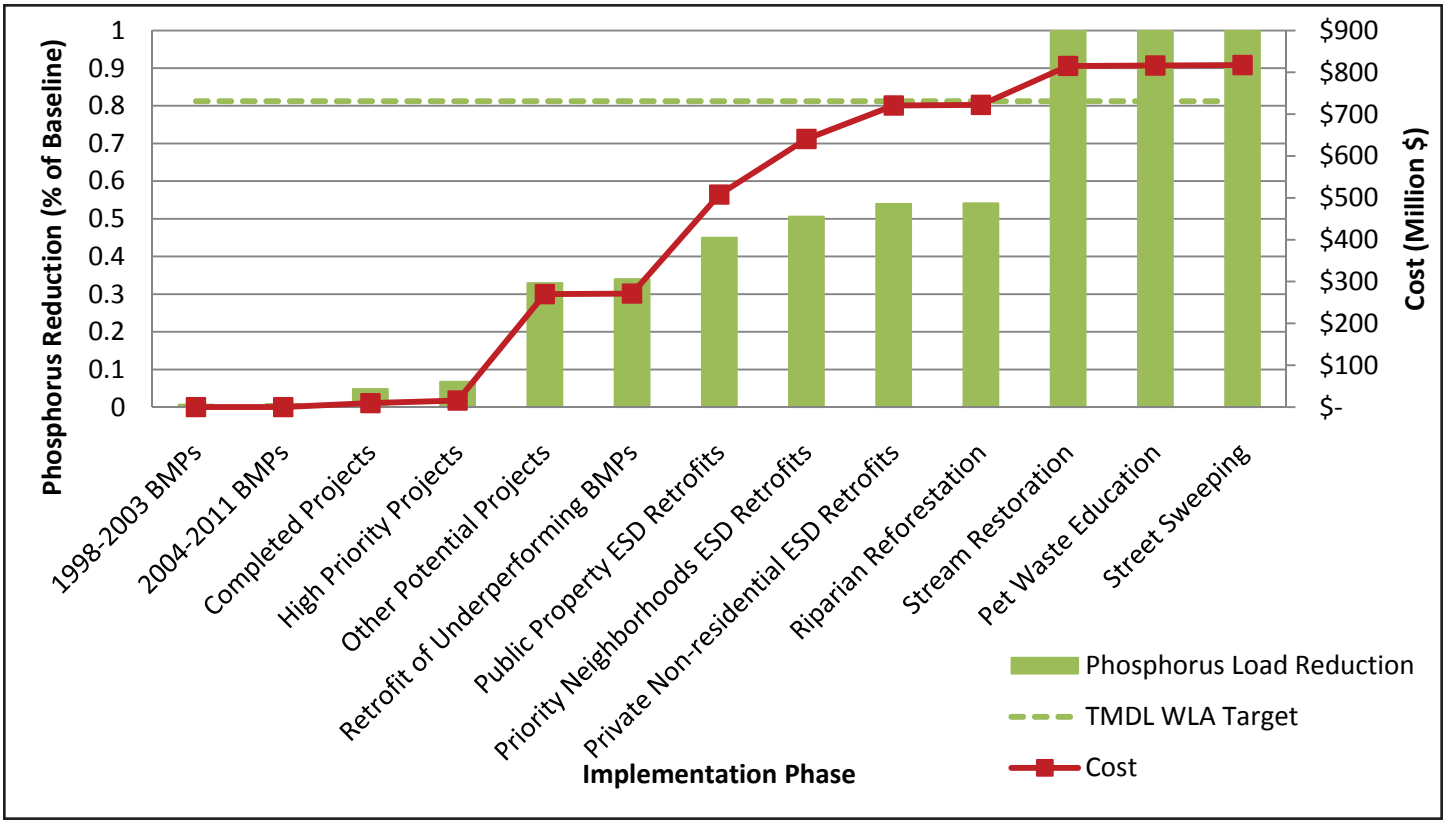


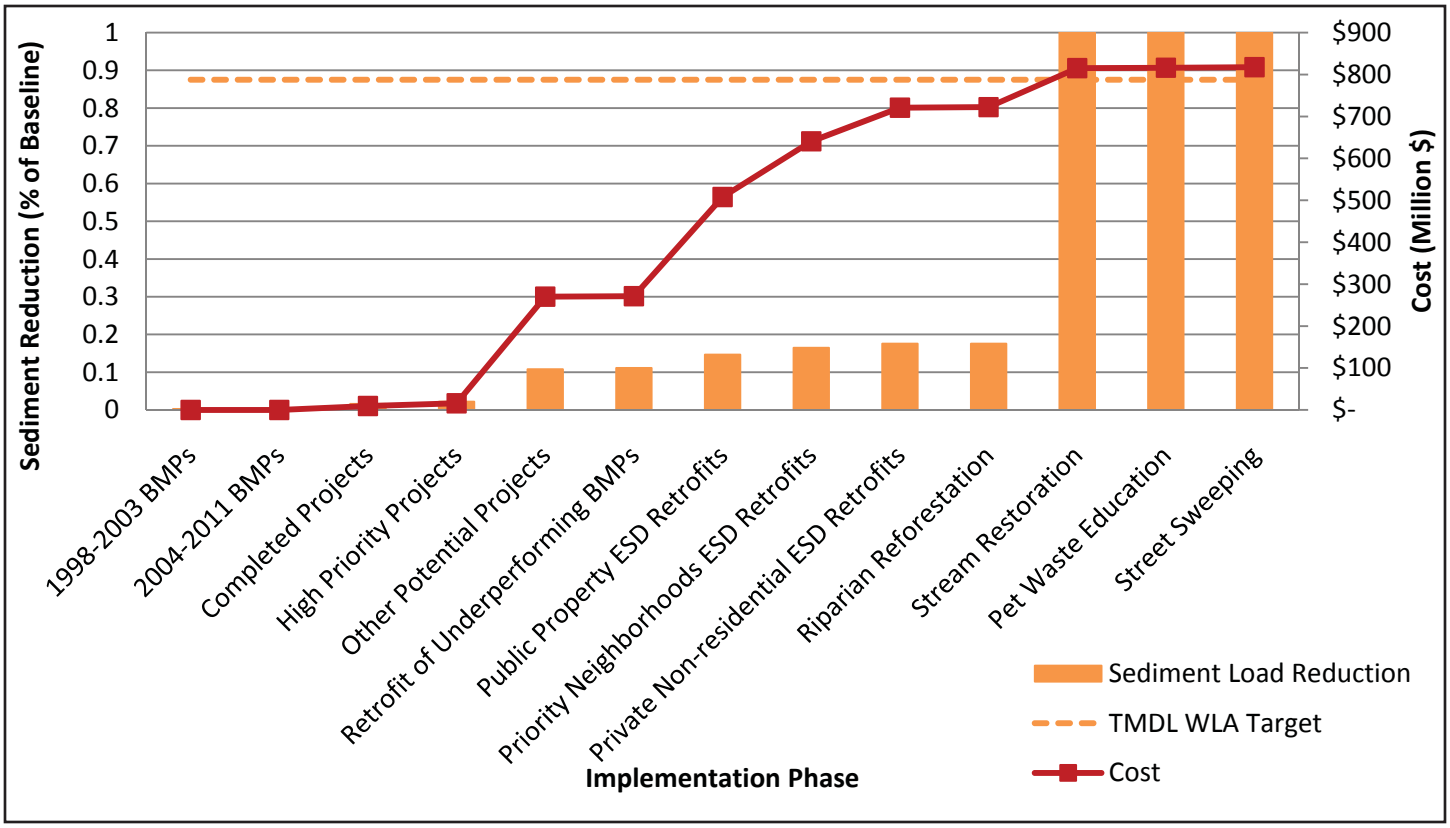
Rank	***Restoration Strategy***	***TN reduction***	***Incremental Cost***	***Unit Cost***
		lbs/yr	Million $	lbs/Million $
1	Pet Waste Education	15,169	0.88	17,193
2	Retrofit of Underperforming BMPs	1,769	1.20	1,475
3	Stream Restoration	72,423	93.04	778
4	Completed Projects	6,643	9.48	701
5	High Priority Projects	3,260	6.35	513
6	Other Potential Projects	43,276	254.30	170
7	Habitat Restoration	224	1.41	158
8	Public Property ESD Retrofits	18,270	236.55	77
9	Priority Neighborhoods ESD Retrofits	9,271	132.78	70
10	Private Non-residential ESD Retrofits	5,594	80.18	70
11	Street Sweeping	-	1.24	-

ANACOSTIA



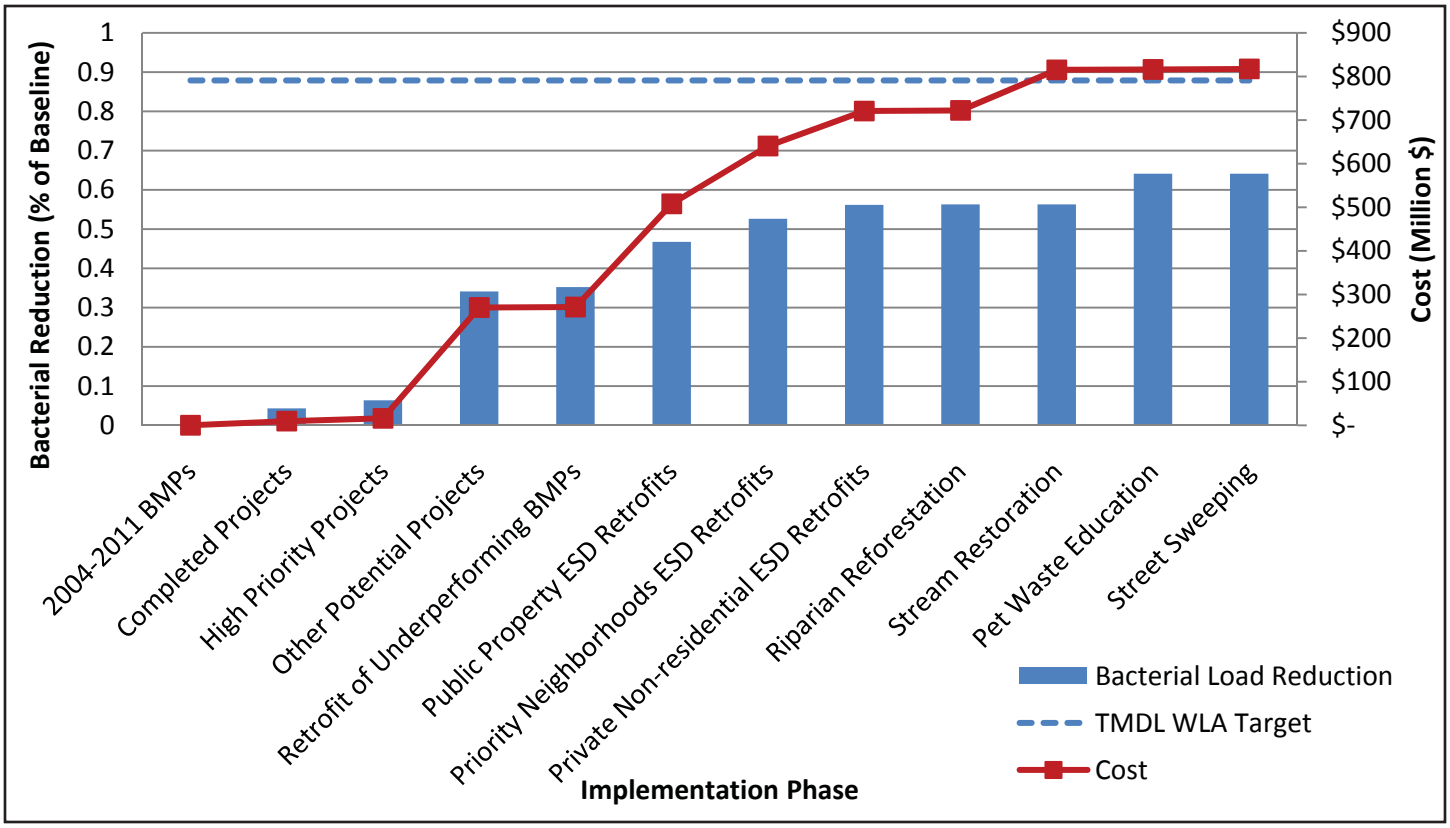
Rank	***Restoration Strategy***	***TP reduction***	***Incremental Cost***	***Unit Cost***
		lbs/yr	Million $	lbs/Million $
1	Pet Waste Education	1,979	0.88	2,243
2	Retrofit of Underperforming BMPs	247	1.20	206
3	Stream Restoration	13,097	93.04	141
4	Completed Projects	915	9.48	96
5	High Priority Projects	451	6.35	71
6	Habitat Restoration	37	1.41	26
7	Other Potential Projects	6,067	254.30	24
8	Public Property ESD Retrofits	2,546	236.55	11
9	Priority Neighborhoods ESD Retrofits	1,294	132.78	10
10	Private Non-residential ESD Retrofits	781	80.18	10
11	Street Sweeping	-	1.24	-

ANACOSTIA



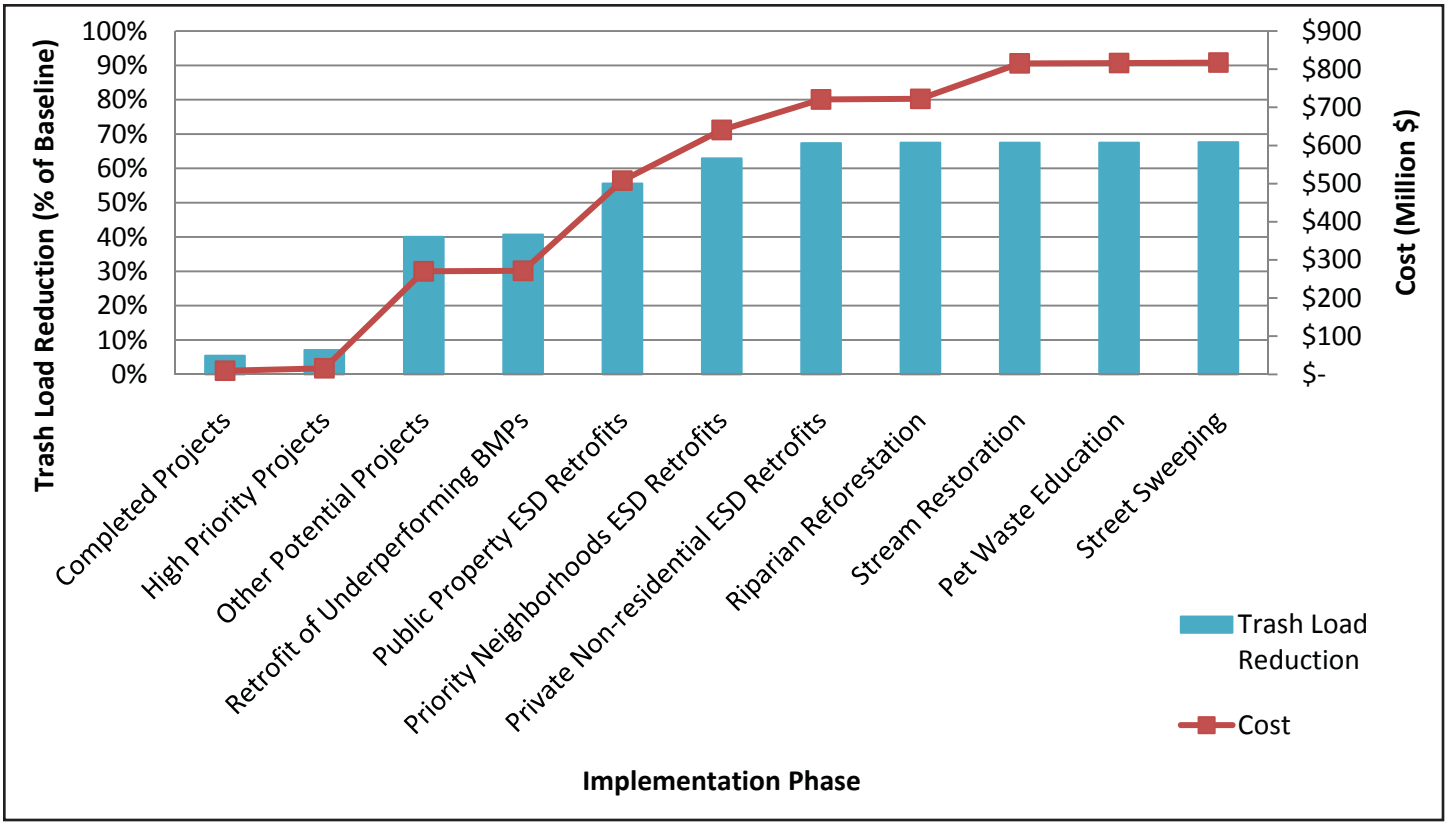
Rank	***Restoration Strategy***	***Sediment reduction***	***Incremental Cost***	***Unit Cost***
		tons/yr	Million $	tons/Million $
1	Street Sweeping	800	1.24	645
2	Stream Restoration	25,057	93.04	269
3	Retrofit of Underperforming BMPs	25	1.20	21
4	Completed Projects	97	9.48	10
5	High Priority Projects	47	6.35	7
6	Other Potential Projects	660	254.30	3
7	Public Property ESD Retrofits	272	236.55	1
8	Priority Neighborhoods ESD Retrofits	139	132.78	1
9	Private Non-residential ESD Retrofits	84	80.18	1
10	Habitat Restoration	2	1.41	1
11	Pet Waste Education	-	0.88	-

ANACOSTIA



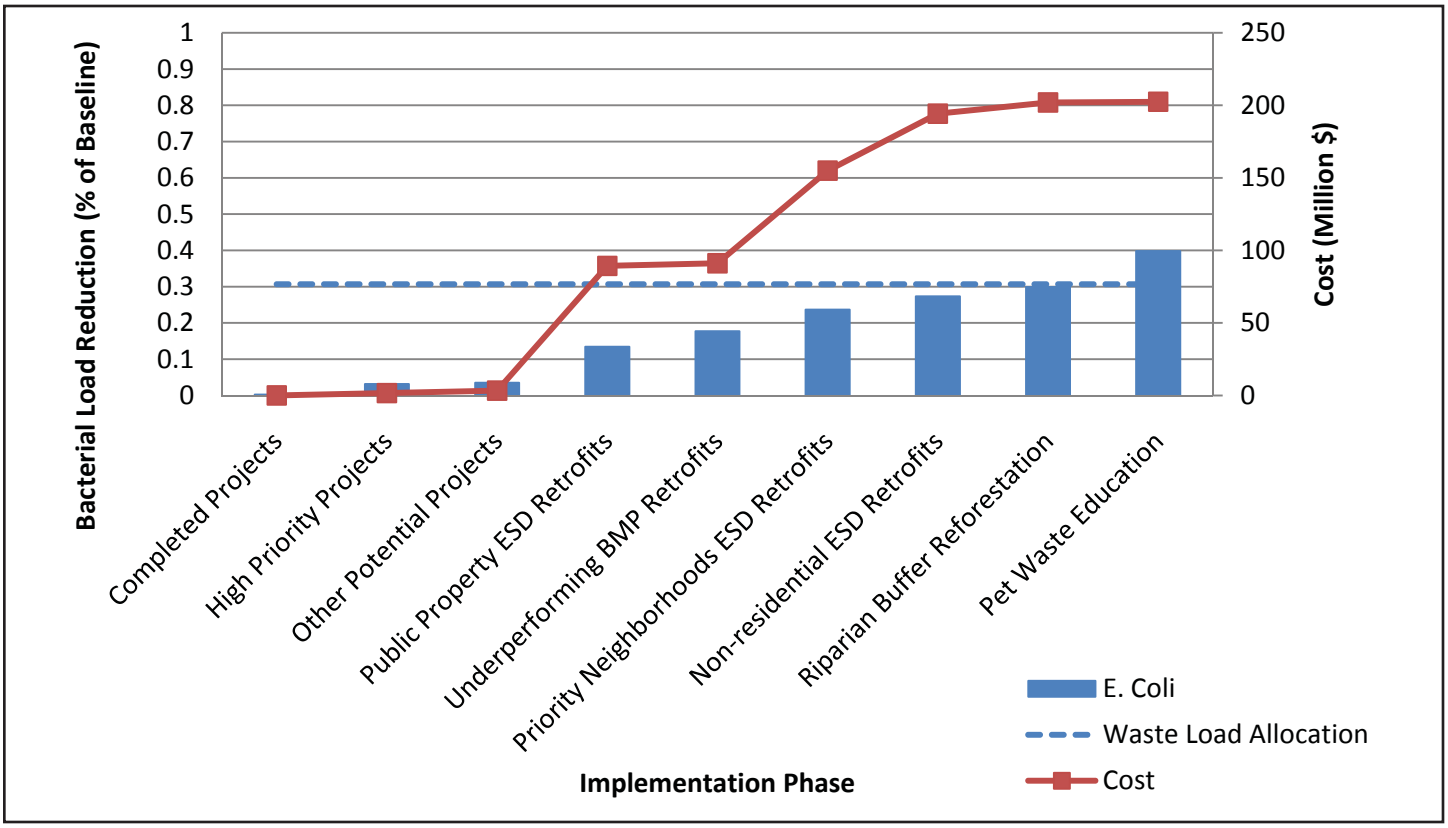
Rank	***Restoration Strategy***	***Enterrococci reduction***	***Incremental Cost***	***Unit Cost***
		Billion MPN/yr	Million $	Billion MPN /Million $
1	Pet Waste Education	19,643	0.88	22,263
2	Retrofit of Underperforming BMPs	2,781	1.20	2,318
3	Completed Projects	10,441	9.48	1,101
4	High Priority Projects	5,120	6.35	806
5	Other Potential Projects	69,895	254.30	275
6	Riparian Reforestation	310	1.41	219
7	Public Property ESD Retrofits	29,025	236.55	123
8	Priority Neighborhoods ESD Retrofits	14,777	132.78	111
9	Private Non-residential ESD Retrofits	8,917	80.18	111
10	Stream Restoration	-	93.04	-
11	Street Sweeping	-	1.24	-

ANACOSTIA



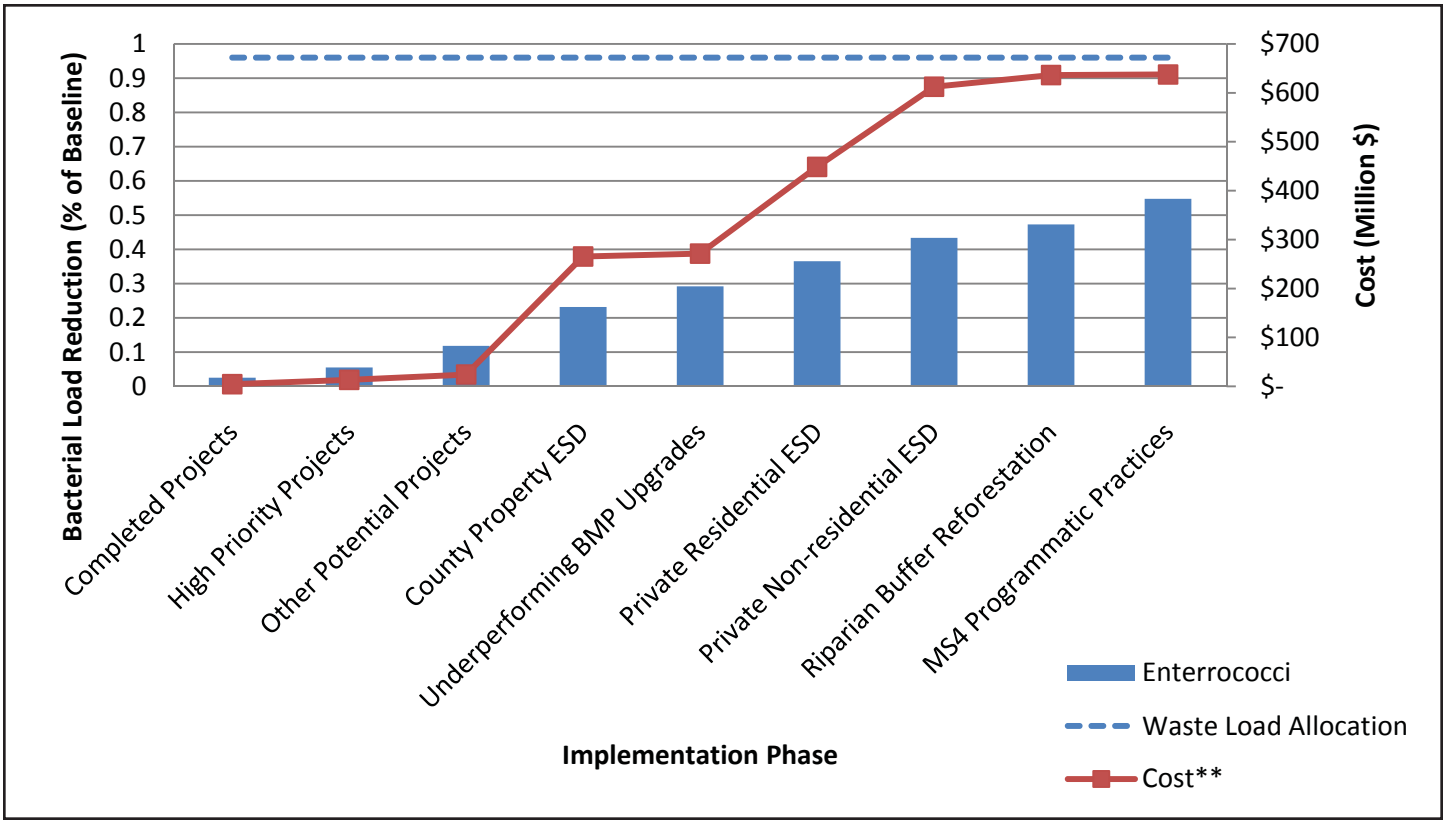
Rank	***Restoration Strategy***	***Potential Trash Reduction***	***Incremental Cost***	***Unit Cost***
		lbs/year	Million $	lbs/Million $
1	Recycling Education and Investigations	51,654	0.2	238,837
2	Plastic Bag Ban, and Misc. Enforcement	63,546	1.3	48,882
3	Anti-litter Campaign, Education	23,761	0.9	26,930
4	Retrofit of Underperforming BMPs	1,144	1.2	954
5	Completed Projects	6,598	9.5	696
6	High Priority Projects	2,786	6.4	439
7	Other Potential Projects	56,341	254.3	222
8	Habitat Restoration	266	1.4	188
9	Street Sweeping	204	1.2	164
10	Public Property ESD Retrofits	25,348	236.6	107
11	Priority Neighborhoods ESD Retrofits	12,529	132.8	94
12	Private Non-residential ESD Retrofits	7,547	80.2	94
13	Stream Restoration	-	93.0	-
14	Pet Waste Education	-	0.9	-

CABIN JOHN



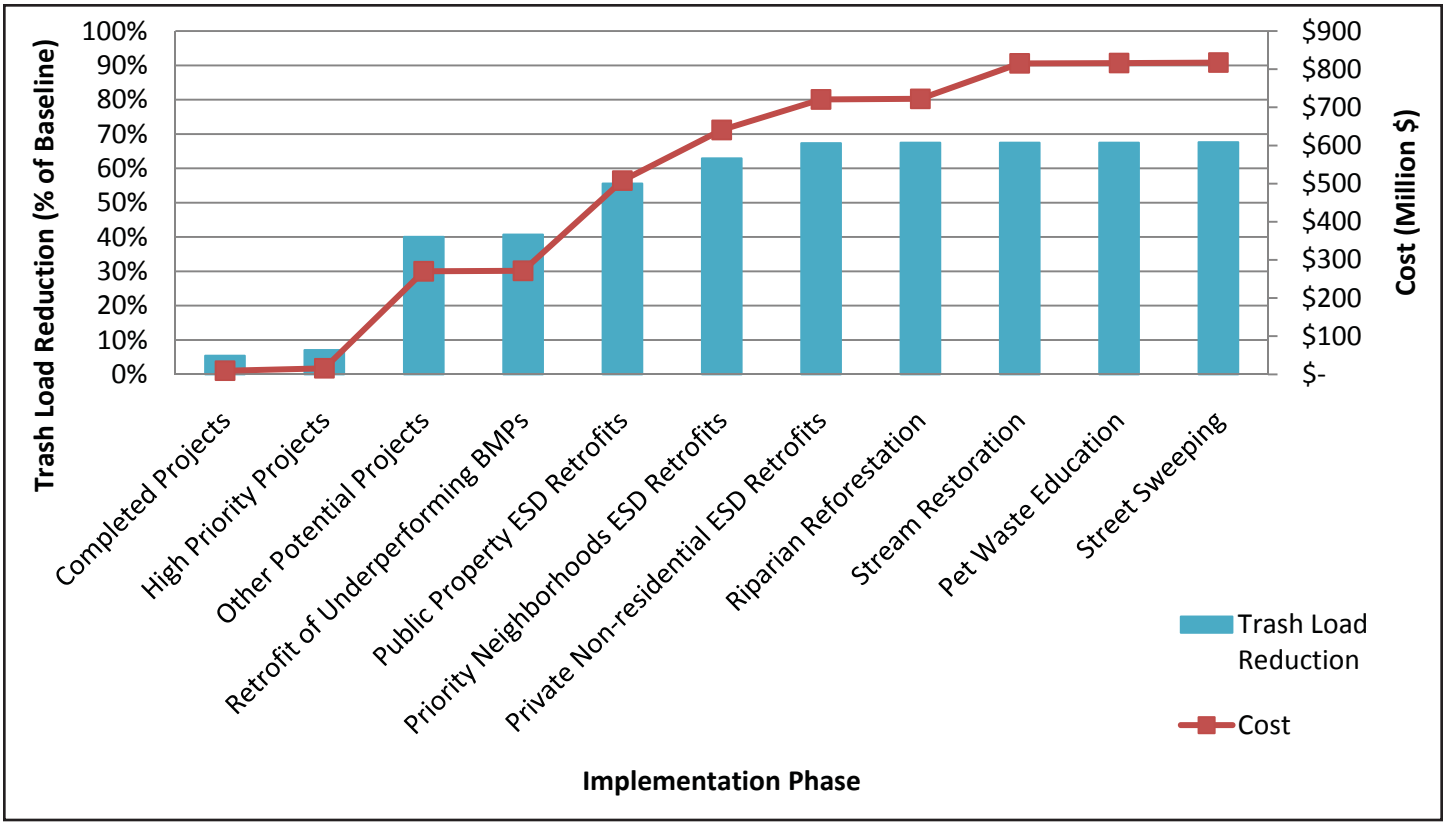
Rank	***Restoration Strategy***	***E. coli reduction***	***Incremental Cost***	***Unit Cost***
		Billion MPN/yr	Million $	Billion MPN /Million $
1	Pet Waste Education	4,388	$0.5	9,436
2	Underperforming BMP Retrofits	1,892	$1.9	1,022
3	High Priority Projects	1,289	$1.6	800
4	Riparian Reforestation	1,133	$7.8	146
5	Other Potential Projects	148	$1.7	86
6	Public Property ESD Retrofits	4,400	$86.0	51
7	Private Non-residential ESD Retrofits	1,618	$39.2	41
8	Priority Neighborhoods ESD Retrofits	2,633	$63.8	41
9	Completed Projects	112	$0.0	0

ROCK CREEK



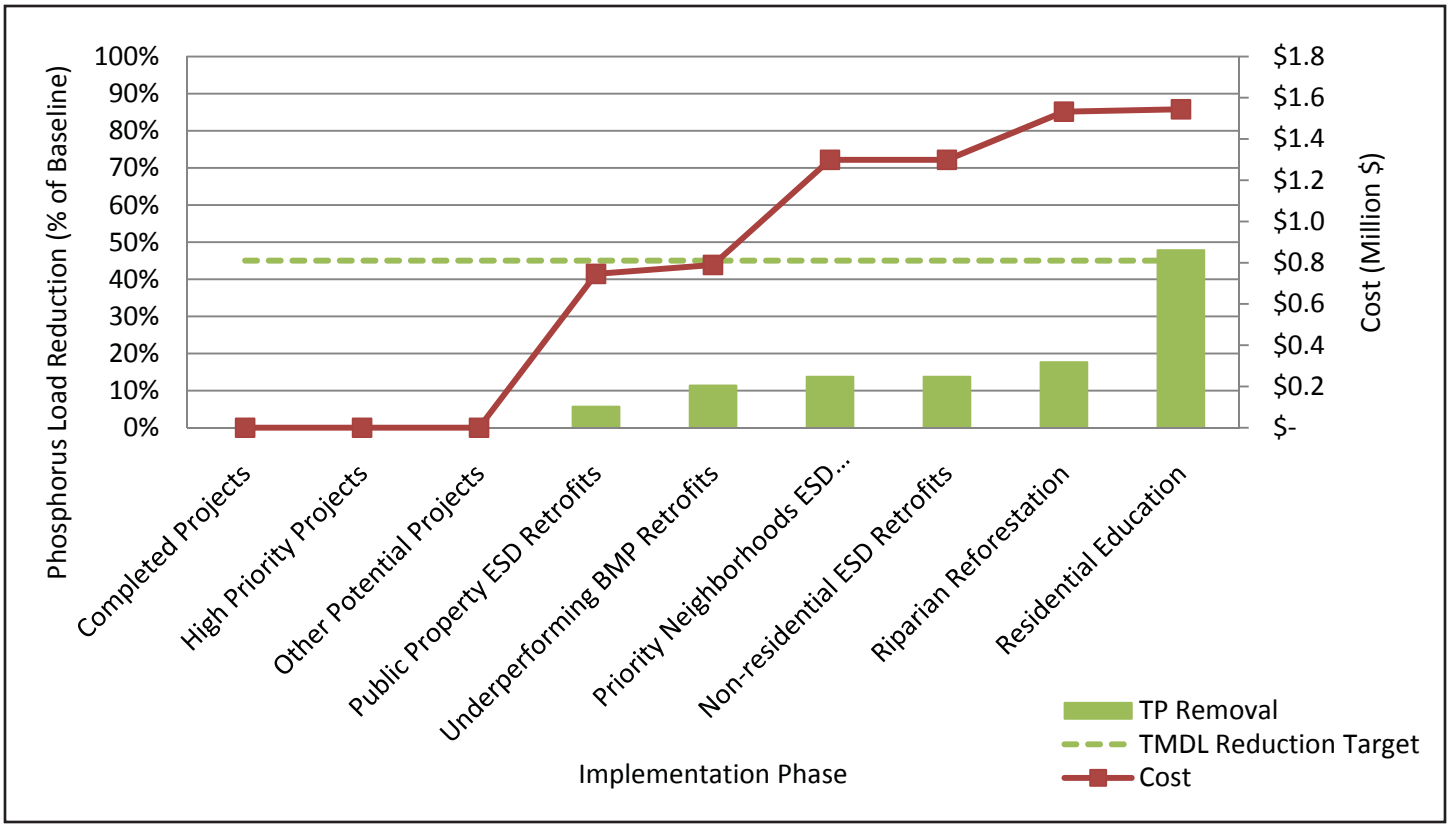
Rank	***Restoration Strategy***	***Enterrococci reduction***	***Incremental Cost***	***Unit Cost***
		Billion MPN/yr	Million $	Billion MPN /Million $
1	Pet Waste Management	35,734	1.18	30,190
2	Underperforming BMP Upgrades	28,800	5.77	4,995
3	Other Potential Projects	30,239	10.83	2,792
4	Completed Projects	12,131	4.44	2,734
5	High Priority Projects	14,239	8.90	1,600
6	Riparian Reforestation	18,999	23.84	797
7	County Property ESD Retrofits	54,519	241.36	226
8	Private Residential ESD Retrofits	35,230	177.37	199
9	Private Non-residential ESD Retrofits	32,486	163.80	198

ROCK CREEK



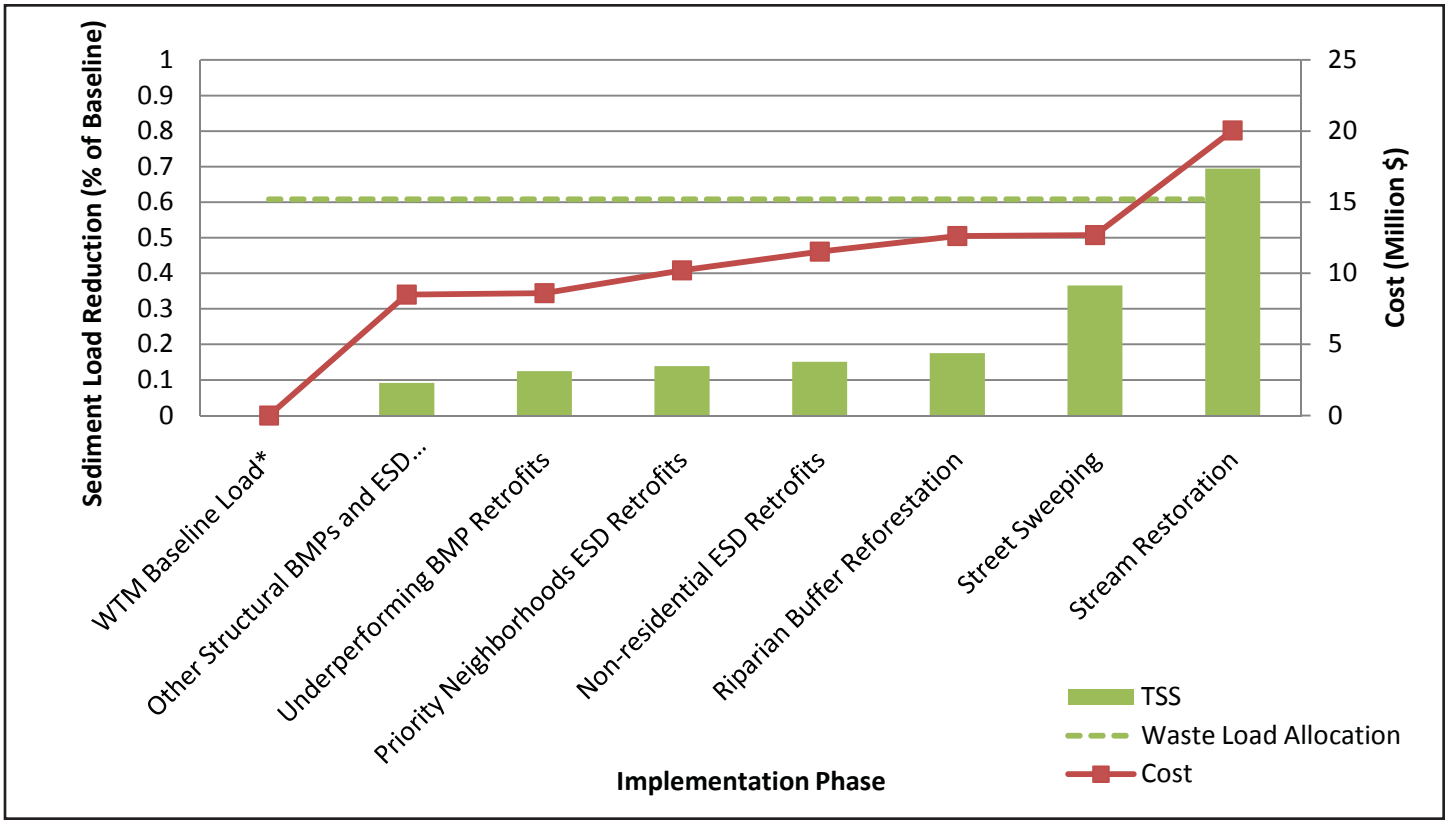
Rank	***Restoration Strategy***	***Trash Reduction***	***Incremental Cost***	***Unit Cost***
		lbs/year	Million $	lbs/Million $
1	Other Potential Projects	16,038	10.85	1,478
2	Underperforming BMP Upgrades	6,756	5.77	1,172
3	Completed Projects	4,217	4.44	950
4	High Priority Projects	6,366	8.90	715
5	Riparian Reforestation	9,237	23.84	387
6	Public Property ESD Retrofits	24,587	241.36	102
7	Priority Neighborhoods ESD Retrofits	16,155	177.37	91
8	Private Non-residential ESD Retrofits	14,793	163.80	90
9	Pet Waste Education	-	1.18	-

SENECA - CLOPPER LAKE



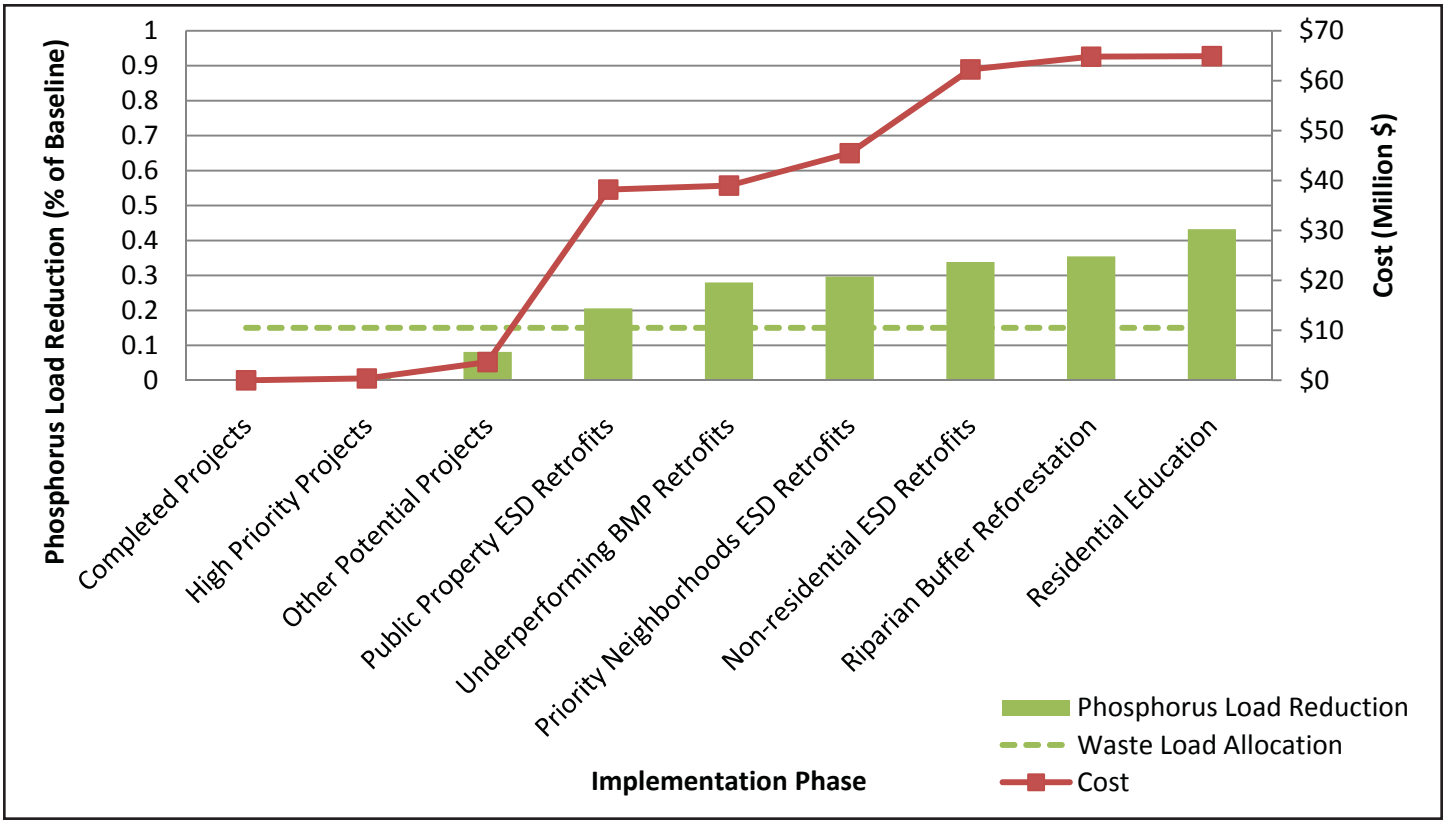
Rank	***Restoration Strategy***	***TP Reduction*** (lbs/yr)	***Incremental Cost*** (Million $)	***Unit Cost*** (lbs/yr/Million $)
1	Residential Education	33	0.01	6,246
2	Underperforming BMP Retrofits	13	0.04	341
3	Riparian Buffer Reforestation	19	0.23	99
4	Priority Neighborhood ESD Retrofits	15	0.51	35
5	Public Property ESD Retrofits	7	0.75	9.9

LOWER MONOCACY



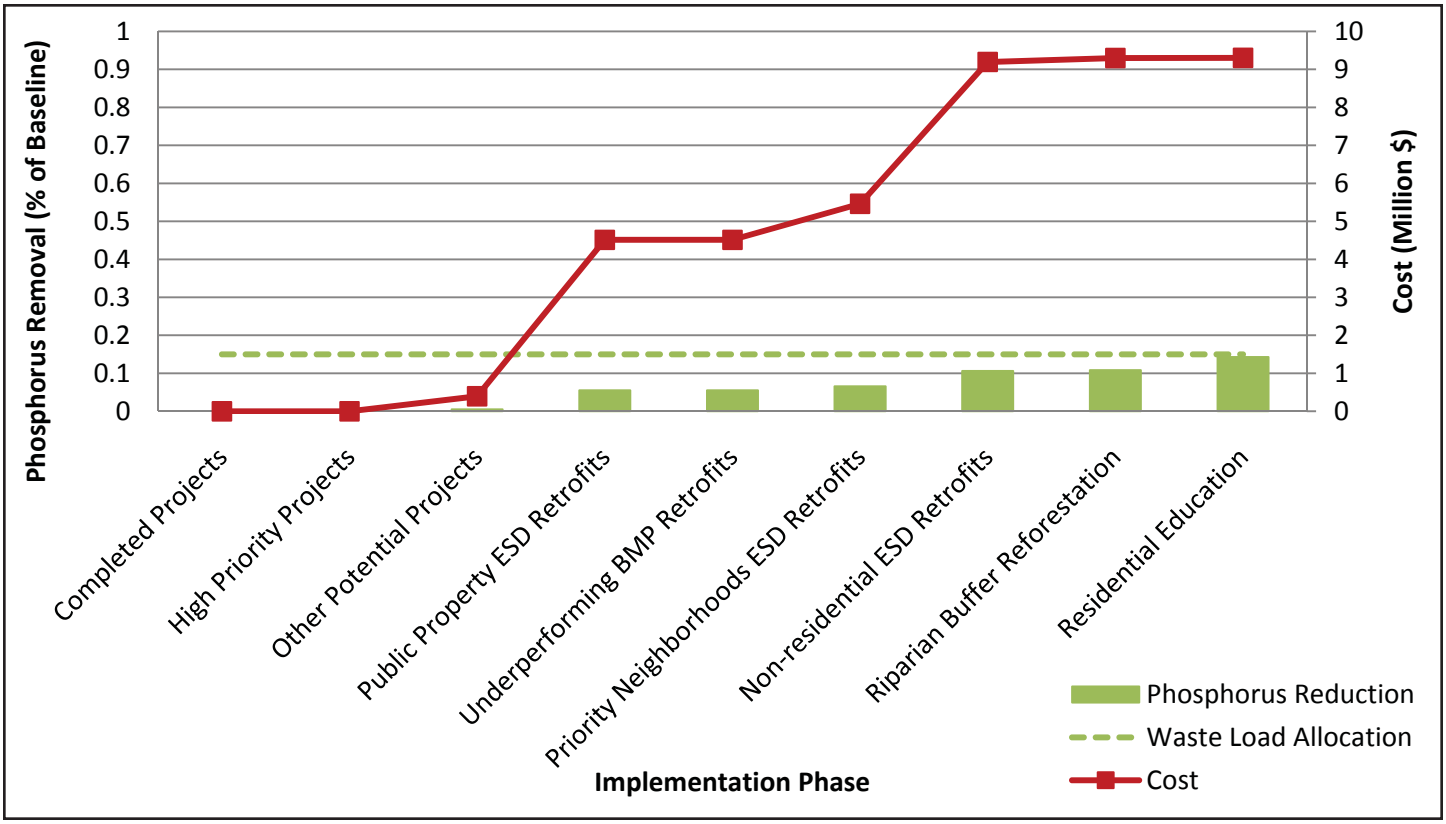
Rank	***Restoration Strategy***	***Sediment reduction***	***Incremental Cost***	***Unit Cost***
		tons/year	Million $	ton/Million $
1	Street Sweeping	22	$0.07	312.1
2	Underperforming BMP Retrofits	4	$0.10	38.9
3	Stream Restoration	37	$7.34	5.1
4	Riparian Buffer Reforestation	3	$1.09	2.5
5	Other Structural BMPs and ESD Strategies	10	$8.51	1.2
6	Priority Neighborhoods ESD Retrofits	2	$1.60	1.0
7	Non-residential ESD Retrofits	1	$1.32	1.0

PATUXENT - ROCKY GORGE RESERVOIR



Rank	Restoration Strategy	TP	Incremental Cost	Unit Cost
		lbs/yr	Million $	lbs/ Million $
1	Lawn Care Education	367.0	0.1	3,739.4
2	Underperforming BMP Retrofits	349.9	0.8	433.8
3	Other Potential Projects	352.4	3.3	107.6
4	High Priority Projects	25.2	0.4	68.5
5	Riparian Reforestation	76.2	2.6	29.8
6	Public Property Retrofits	585.4	34.5	16.9
7	Priority Neighborhoods ESD Retrofits	79.6	6.5	12.3
8	Private Non-residential ESD Retrofits	194.1	16.8	11.6
9	Completed Projects	5.3	0.0	0.0

PATUXENT - TRIADELPHIA RESERVOIR



Rank	Restoration Strategy	TP	Incremental Cost	Unit Cost
		lbs/yr	Million $	lbs/ Million $
1	Lawn Care Education	367.0	0.1	3,739.4
2	Underperforming BMP Retrofits	349.9	0.8	433.8
3	Other Potential Projects	352.4	3.3	107.6
4	High Priority Projects	25.2	0.4	68.5
5	Riparian Reforestation	76.2	2.6	29.8
6	Public Property Retrofits	585.4	34.5	16.9
7	Priority Neighborhoods ESD Retrofits	79.6	6.5	12.3
8	Private Non-residential ESD Retrofits	194.1	16.8	11.6
9	Completed Projects	5.3	0.0	0.0

Appendix 4 – Implementation Strategy by Timeframe

FY2015 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Anacostia	*Completed and High Priority Projects*	$15.8	315	100.0%	315	9%	$16	30%	5.8%	5.9%	1.9%	6.2%	5.5%
	Low Priority Projects	$5.1	194	100.0%	194	8%	$5	61%	2.0%	2.1%	0.7%	2.2%	2.7%
	Other Potential Projects	$249.2	2,217	33.0%	732	20%	$82	24%	7.7%	8.0%	2.6%	8.4%	10.0%
	Public ESD Retrofits	$237.8	956	10.0%	96	100%	$24	100%	1.1%	1.1%	0.4%	1.2%	1.4%
	Private ESD Retrofits	$213.0	857	10.0%	86	100%	$21	100%	1.0%	1.0%	0.3%	1.0%	1.3%
	Riparian Reforestation	$1.4	6	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Stream Restoration	$93.7	-	11.7%	-	0%	$11	0%	5.0%	6.6%	38.1%	0.0%	0.0%
	Programmatic Practices	$3.6	-	25.0%	-	0%	$0.9	0%	2.2%	2.1%	2.6%	2.0%	20.4%
	Subtotal	***$819.6***	***4,544***	***31.3%***	***1,421***	***26.3%***	***$160***	***45.4%***	***24.8%***	***26.8%***	***46.6%***	***21.0%***	***41.3%***
Rock Creek	*Completed and High Priority Projects*	$13.3	585	100.0%	585	1%	$13	13%	4.0%	5.0%	6.0%	5.5%	6.0%
	Low Priority Projects	$8.8	665	100.0%	665	1%	$9	7%	3.9%	3.9%	6.2%	4.9%	7.0%
	Other Potential Projects	$2.0	193	25.0%	48	0%	$1	0%	0.3%	0.3%	0.4%	0.4%	0.5%
	Public ESD Retrofits	$247.1	1,020	10.0%	102	100%	$25	100%	1.3%	1.3%	1.4%	1.3%	1.5%
	Private ESD Retrofits	$341.2	1,407	10.0%	141	100%	$34	100%	1.7%	1.7%	1.9%	1.8%	2.0%
	Riparian Reforestation	$23.8	119	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Stream Restoration	$20.1	-	21.8%	-	0%	$4	0%	2.0%	1.5%	21.9%	0.0%	0.0%
	Programmatic Practices	$1.2	-	100.0%	-	0%	$1	0%	11.0%	11.0%	0.0%	7.5%	0.0%
	Subtotal	***$657.6***	***3,989***	***38.6%***	***1,541***	***16.5%***	***$87***	***70.4%***	***24.1%***	***24.7%***	***37.8%***	***21.4%***	***17.0%***
Cabin John	*Completed and High Priority Projects*	$1.6	88	100.0%	88	2%	$2	19%	2.9%	3.0%	3.3%	3.2%	2.5%
	Low Priority Projects	$1.6	10	100.0%	10	78%	$2	98%	0.2%	0.2%	0.2%	0.2%	0.3%
	Other Potential Projects	$0.1	5	25.0%	1	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$87.8	403	10.0%	40	100%	$9	100%	1.0%	1.0%	1.1%	1.1%	1.3%
	Private ESD Retrofits	$103.1	473	10.0%	47	100%	$10	100%	1.2%	1.2%	1.3%	1.3%	1.5%
	Riparian Reforestation	$7.8	39	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Stream Restoration	$16.2	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Programmatic Practices	$0.5	-	100.0%	-	0%	$0	0%	15.3%	14.4%	0.0%	9.9%	0.0%
	Subtotal	***$218.7***	***1,018***	***18.4%***	***187***	***52.0%***	***$23***	***92.0%***	***20.7%***	***19.9%***	***6.0%***	***15.7%***	***5.6%***
Muddy Watts	*Completed and High Priority Projects*	$4.4	211	100.0%	211	1%	$4	8%	6.0%	6.0%	6.0%	0.0%	6.0%
	Low Priority Projects	$2.0	26	100.0%	26	33%	$2	84%	0.2%	0.3%	1.2%	0.0%	0.2%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$24.2	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$30.6***	***237***	***100.0%***	***237***	***4.3%***	***$6***	***31.6%***	***6.2%***	***6.3%***	***7.2%***	***0.0%***	***6.2%***
Great Seneca (inclusive of Clopper Lake)	*Completed and High Priority Projects*	$18.9	800	100.0%	800	1%	$19	6%	20.0%	20.0%	21.0%	0.0%	26.0%
	Low Priority Projects	$6.6	87	100.0%	87	15%	$7	41%	3.7%	3.7%	4.3%	0.0%	4.3%
	Other Potential Projects	$0.2	53	25.0%	13	0%	$0	0%	0.6%	0.6%	0.7%	0.0%	0.7%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$25.9	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$51.6***	***941***	***95.8%***	***901***	***2.2%***	***$26***	***15.2%***	***24.3%***	***24.3%***	***26.0%***	***0.0%***	***31.0%***
Clopper Lake (subshed of Great Seneca)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$0.8	12	0.0%	-	100%	$0	100%	0.0%	0.0%	0.0%	0.0%	0.0%
	Private ESD Retrofits	$0.5	8	0.0%	-	100%	$0	100%	0.0%	0.0%	0.0%	0.0%	0.0%
	Riparian Reforestation	$0.2	2	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0.01	0%	61.0%	30.0%	0.0%	0.0%	0.0%
	Subtotal	***$1.5***	***22***	***0.0%***	***-***	***0.0%***	***$0.0***	***0.0%***	***61.0%***	***30.0%***	***0.0%***	***0.0%***	***0.0%***

FY2015 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Lower Monocacy	*Completed and High Priority Projects*	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$8.6	40	0.0%	-	100%	$0	100%	0.0%	0.0%	0.0%	0.0%	0.0%
	Private ESD Retrofits	$2.9	13	10.0%	1	100%	$0	100%	0.4%	0.4%	0.4%	0.4%	0.0%
	Riparian Reforestation	$1.1	5	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Stream Restoration	$7.3	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Programmatic Practices	$0.1	-	0.0%	-	0%	$0.0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Subtotal	***$20.0***	***58***	***2.3%***	***1***	***100.0%***	***$0.29***	***100.0%***	***0.4%***	***0.4%***	***0.4%***	***0.4%***	***0.0%***
Patuxent (Rocky Gorge)	*Completed and High Priority Projects*	$0.4	5	100.0%	5	27%	$0	77%	0.7%	0.7%	0.8%	0.8%	1.0%
	Low Priority Projects	$0.9	5	100.0%	5	100%	$1	100%	8.4%	8.2%	8.3%	8.2%	11.6%
	Other Potential Projects	$2.0	-	25.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$31.2	179	0.0%	-	100%	$0	100%	0.0%	0.0%	0.0%	0.0%	0.0%
	Private ESD Retrofits	$18.6	106	1.0%	1	100%	$0	100%	0.1%	0.1%	0.1%	0.1%	0.2%
	Riparian Reforestation	$2.5	12	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Stream Restoration	$19.1	-	2.5%	-	0%	$0	0%	0.3%	0.2%	0.9%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	38.0%	8.2%	0.3%	4.7%	2.0%
	Subtotal	***$74.7***	***307***	***3.6%***	***11***	***64.5%***	***$3***	***54.5%***	***47.5%***	***17.4%***	***10.4%***	***13.8%***	***14.8%***
Patuxent (Triadelphia)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.4	2	100.0%	2	100%	$0	100%	0.5%	0.5%	0.6%	0.5%	1.0%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$4.1	17	0.0%	-	100%	$0	100%	0.0%	0.0%	0.0%	0.0%	0.0%
	Private ESD Retrofits	$4.7	19	5.0%	1	100%	$0	100%	0.3%	0.3%	0.3%	0.3%	0.5%
	Riparian Reforestation	$0.1	1	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	23.4%	3.5%	0.0%	0.0%	0.0%
	Subtotal	***$9.3***	***38***	***7.6%***	***3***	***100.0%***	***$0.6***	***99.1%***	***24.2%***	***4.3%***	***0.9%***	***0.8%***	***1.6%***
Countywide Totals		***$1,884***	***11,154***	***38.6%***	***4,302***	***17.9%***	***$305***	***53.4%***	***17.8%***	***17.1%***	***22.7%***	***10.5%***	***18.0%***

High and Low Priority:	2,993			
20% Targeted Impervious:	*4,292*			
	Chesapeake Bay TMDL, Urban MS4 Reductions (2017):	***9%***	***12%***	***20%***
	Chesapeake Bay TMDL, Urban MS4 Reductions (2020):	***20%***	***34%***	***37%***

Assumptions:
1. 100% Completed and High Priority Projects
2. 25-33% Other potential projects
3. 100% of Public Outreach Potential for all TMDL watersheds
4. 10% of ESD potential in urban watersheds, ~1 acre ESD goal for rural watersheds
5. No riparian reforestation, Completed stream restoration
6. Used watershed area weighing to calculate countywide total pollutant removals

768.0294602

FY2017 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Anacostia	*Completed and High Priority Projects*	$15.8	315	100.0%	315	9%	$16	30%	5.8%	5.9%	1.9%	6.2%	5.5%
	Low Priority Projects	$5.1	194	100.0%	194	8%	$5	61%	2.0%	2.1%	0.7%	2.2%	2.7%
	Other Potential Projects	$249.2	2,217	66.5%	1,474	41%	$166	48%	15.5%	16.0%	5.3%	17.0%	20.2%
	Public ESD Retrofits	$237.8	956	22.5%	215	100%	$54	100%	2.4%	2.5%	0.8%	2.6%	3.2%
	Private ESD Retrofits	$213.0	857	22.5%	193	100%	$48	100%	2.2%	2.2%	0.7%	2.3%	2.9%
	Riparian Reforestation	$1.4	6	37.5%	2	0%	$1	0%	0.0%	0.1%	0.0%	0.0%	0.1%
	Stream Restoration	$93.7	-	17.9%	-	0%	$17	0%	7.6%	10.1%	58.4%	0.0%	0.0%
	Programmatic Practices	$3.6	-	37.5%	-	0%	$1	0%	3.3%	3.2%	3.9%	2.9%	30.6%
	Subtotal	***$819.6***	***4,544***	***52.7%***	***2,393***	***44.2%***	***$307***	***61.7%***	***38.9%***	***42.1%***	***71.7%***	***33.3%***	***65.1%***
Rock Creek	*Completed and High Priority Projects*	$13.3	585	100.0%	585	1%	$13	13%	4.0%	5.0%	6.0%	5.5%	6.0%
	Low Priority Projects	$8.8	665	100.0%	665	1%	$9	7%	3.9%	3.9%	6.2%	4.9%	7.0%
	Other Potential Projects	$2.0	193	62.5%	121	0%	$1	0%	0.7%	0.7%	1.1%	0.9%	1.3%
	Public ESD Retrofits	$247.1	1,020	22.5%	229	100%	$56	100%	2.8%	2.8%	3.1%	3.0%	3.3%
	Private ESD Retrofits	$341.2	1,407	22.5%	317	100%	$77	100%	3.9%	3.9%	4.3%	4.1%	4.6%
	Riparian Reforestation	$23.8	119	37.5%	45	0%	$9	0%	0.7%	0.7%	0.8%	1.5%	1.9%
	Stream Restoration	$20.1	-	28.9%	-	0%	$6	0%	2.6%	2.0%	29.0%	0.0%	0.0%
	Programmatic Practices	$1.2	-	100.0%	-	0%	$1	0%	11.0%	11.0%	0.0%	7.5%	0.0%
	Subtotal	***$657.6***	***3,989***	***49.2%***	***1,961***	***28.5%***	***$172***	***78.5%***	***29.7%***	***30.1%***	***50.5%***	***27.3%***	***24.0%***
Cabin John	*Completed and High Priority Projects*	$1.6	88	100.0%	88	2%	$2	19%	2.9%	3.0%	3.3%	3.2%	2.5%
	Low Priority Projects	$1.6	10	100.0%	10	78%	$2	98%	0.2%	0.2%	0.2%	0.2%	0.3%
	Other Potential Projects	$0.1	5	100.0%	5	0%	$0	0%	0.1%	0.1%	0.1%	0.1%	0.1%
	Public ESD Retrofits	$87.8	403	30.0%	121	100%	$26	100%	3.1%	3.1%	3.4%	3.3%	3.9%
	Private ESD Retrofits	$103.1	473	30.0%	142	100%	$31	100%	3.6%	3.6%	4.0%	3.9%	4.5%
	Riparian Reforestation	$7.8	39	37.5%	15	0%	$3	0%	0.4%	0.6%	0.4%	1.0%	1.0%
	Stream Restoration	$16.2	-	7.4%	-	0%	$1	0%	1.2%	0.7%	5.9%	0.0%	0.0%
	Programmatic Practices	$0.5	-	100.0%	-	0%	$0	0%	15.3%	14.4%	0.0%	9.9%	0.0%
	Subtotal	***$218.7***	***1,018***	***37.4%***	***380***	***71.6%***	***$65***	***90.8%***	***26.8%***	***25.7%***	***17.4%***	***21.5%***	***12.3%***
Muddy Watts	*Completed and High Priority Projects*	$4.4	211	100.0%	211	1%	$4	8%	6.0%	6.0%	6.0%	0.0%	6.0%
	Low Priority Projects	$2.0	26	100.0%	26	33%	$2	84%	0.2%	0.3%	1.2%	0.0%	0.2%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$24.2	-	4.5%	-	0%	$1	0%	0.7%	0.3%	0.6%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$30.6***	***237***	***100.0%***	***237***	***4.3%***	***$8***	***27.0%***	***6.9%***	***6.6%***	***7.8%***	***0.0%***	***6.2%***
Great Seneca (inclusive of Clopper Lake)	*Completed and High Priority Projects*	$18.9	800	100.0%	800	1%	$19	6%	20.0%	20.0%	21.0%	0.0%	26.0%
	Low Priority Projects	$6.6	87	100.0%	87	15%	$7	41%	3.7%	3.7%	4.3%	0.0%	4.3%
	Other Potential Projects	$0.2	53	62.5%	33	0%	$0	0%	1.4%	1.4%	1.7%	0.0%	1.7%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$25.9	-	84.5%	-	0%	$22	0%	16.0%	7.0%	13.8%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$51.6***	***941***	***97.9%***	***921***	***2.2%***	***$48***	***8.2%***	***41.1%***	***32.1%***	***40.8%***	***0.0%***	***32.0%***
Clopper Lake (subshed of Great Seneca)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$0.8	12	25.0%	3	100%	$0	100%	2.1%	2.1%	2.3%	0.0%	2.1%
	Private ESD Retrofits	$0.5	8	25.0%	2	100%	$0	100%	1.4%	1.4%	1.5%	0.0%	1.4%
	Riparian Reforestation	$0.2	2	50.0%	1	0%	$0	0%	2.0%	2.0%	1.0%	0.0%	2.0%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	61.0%	30.0%	0.0%	0.0%	0.0%
	Subtotal	***$1.5***	***22***	***26.9%***	***6***	***85.8%***	***$0.5***	***72.2%***	***66.5%***	***35.5%***	***4.8%***	***0.0%***	***5.5%***

FY2017 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Lower Monocacy	*Completed and High Priority Projects*	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$8.6	40	25.0%	10	100%	$2	100%	2.6%	2.8%	2.8%	2.8%	0.0%
	Private ESD Retrofits	$2.9	13	30.0%	4	100%	$1	100%	1.1%	1.1%	1.1%	1.1%	0.0%
	Riparian Reforestation	$1.1	5	50.0%	3	0%	$1	0%	1.5%	1.5%	1.5%	2.0%	0.0%
	Stream Restoration	$7.3	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Programmatic Practices	$0.1	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Subtotal	***$20.0***	***58***	***28.3%***	***16***	***84.8%***	***$3.57***	***84.7%***	***5.2%***	***5.4%***	***5.4%***	***5.9%***	***0.0%***
Patuxent (Rocky Gorge)	*Completed and High Priority Projects*	$0.4	5	100.0%	5	27%	$0	77%	0.7%	0.7%	0.8%	0.8%	1.0%
	Low Priority Projects	$0.9	5	100.0%	5	100%	$1	100%	8.4%	8.2%	8.3%	8.2%	11.6%
	Other Potential Projects	$2.0	-	62.5%	-	0%	$1	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$31.2	179	25.0%	45	100%	$8	100%	4.1%	4.3%	5.0%	4.7%	7.2%
	Private ESD Retrofits	$18.6	106	25.5%	27	100%	$5	100%	2.5%	2.6%	3.0%	2.8%	4.3%
	Riparian Reforestation	$2.5	12	50.0%	6	0%	$1	0%	0.6%	0.9%	0.8%	1.7%	4.1%
	Stream Restoration	$19.1	-	2.5%	-	0%	$0	0%	0.3%	0.2%	0.9%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	38.0%	8.2%	0.3%	4.7%	2.0%
	Subtotal	***$74.7***	***307***	***28.6%***	***88***	***88.6%***	***$17***	***81.5%***	***54.5%***	***25.1%***	***19.1%***	***22.9%***	***30.2%***
Patuxent (Triadelphia)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.4	2	100.0%	2	100%	$0	100%	0.5%	0.5%	0.6%	0.5%	1.0%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$4.1	17	25.0%	4	100%	$1	100%	1.2%	1.2%	1.3%	1.2%	2.3%
	Private ESD Retrofits	$4.7	19	27.5%	5	100%	$1	100%	1.5%	1.5%	1.6%	1.6%	2.9%
	Riparian Reforestation	$0.1	1	50.0%	0	0%	$0	0%	0.1%	0.1%	0.1%	0.2%	0.2%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	23.4%	3.5%	0.0%	0.0%	0.0%
	Subtotal	***$9.3***	***38***	***30.4%***	***12***	***97.8%***	***$2.8***	***97.9%***	***26.6%***	***6.8%***	***3.6%***	***3.5%***	***6.4%***
Countywide Totals		***$1,884***	***11,154***	***53.9%***	***6,014***	***33.7%***	***$622***	***65.7%***	***25.1%***	***23.3%***	***34.0%***	***15.1%***	***25.6%***

Chesapeake Bay TMDL, Urban MS4 Reductions (2017):	***9%***	***12%***	***20%***
Chesapeake Bay TMDL, Urban MS4 Reductions (2020):	***20%***	***34%***	***37%***

Assumptions:
1. Average implementation % goals between FY2015 and 2020
2. Generally 30% implementation of total potential for all watersheds
3. 100% of Public Outreach Potential for all TMDL watersheds
4. Limited strategies to most cost effective per watershed
5. Completed & High Priority stream restoration
6. Used watershed area weighing to calculate countywide total pollutant removals

FY2020 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Anacostia	*Completed and High Priority Projects*	$15.8	315	100.0%	315	9%	$16	30%	5.8%	5.9%	1.9%	6.2%	5.5%
	Low Priority Projects	$5.1	194	100.0%	194	8%	$5	61%	2.0%	2.1%	0.7%	2.2%	2.7%
	Other Potential Projects	$249.2	2,217	100.0%	2,217	62%	$249	73%	23.3%	24.1%	7.9%	25.5%	30.3%
	Public ESD Retrofits	$237.8	956	35.0%	335	100%	$83	100%	3.8%	3.9%	1.2%	4.1%	5.0%
	Private ESD Retrofits	$213.0	857	35.0%	300	100%	$75	100%	3.4%	3.5%	1.1%	3.6%	4.5%
	Riparian Reforestation	$1.4	6	75.0%	5	0%	$1	0%	0.1%	0.1%	0.0%	0.1%	0.1%
	Stream Restoration	$93.7	-	58.8%	-	0%	$55	0%	24.9%	33.2%	191.8%	0.0%	0.0%
	Programmatic Practices	$3.6	-	50.0%	-	0%	$2	0%	4.4%	4.3%	5.2%	3.9%	40.8%
	Subtotal	***$819.6***	***4,544***	***74.0%***	***3,364***	***61.0%***	***$486***	***71.3%***	***67.8%***	***77.1%***	***100.0%***	***45.7%***	***88.9%***
Rock Creek	*Completed and High Priority Projects*	$13.3	585	100.0%	585	1%	$13	13%	4.0%	5.0%	6.0%	5.5%	6.0%
	Low Priority Projects	$8.8	665	100.0%	665	1%	$9	7%	3.9%	3.9%	6.2%	4.9%	7.0%
	Other Potential Projects	$2.0	193	100.0%	193	0%	$2	0%	1.1%	1.1%	1.8%	1.4%	2.0%
	Public ESD Retrofits	$247.1	1,020	35.0%	357	100%	$86	100%	4.4%	4.4%	4.9%	4.6%	5.1%
	Private ESD Retrofits	$341.2	1,407	35.0%	493	100%	$119	100%	6.1%	6.1%	6.7%	6.4%	7.1%
	Riparian Reforestation	$23.8	119	75.0%	89	0%	$18	0%	1.5%	1.5%	1.5%	3.0%	3.8%
	Stream Restoration	$20.1	-	64.4%	-	0%	$13	0%	5.9%	4.6%	64.7%	0.0%	0.0%
	Programmatic Practices	$1.2	-	100.0%	-	0%	$1	0%	11.0%	11.0%	0.0%	7.5%	0.0%
	Subtotal	***$657.6***	***3,989***	***59.7%***	***2,381***	***36.2%***	***$262***	***79.5%***	***37.9%***	***37.6%***	***91.7%***	***33.3%***	***31.0%***
Cabin John	*Completed and High Priority Projects*	$1.6	88	100.0%	88	2%	$2	19%	2.9%	3.0%	3.3%	3.2%	2.5%
	Low Priority Projects	$1.6	10	100.0%	10	78%	$2	98%	0.2%	0.2%	0.2%	0.2%	0.3%
	Other Potential Projects	$0.1	5	100.0%	5	0%	$0	0%	0.1%	0.1%	0.1%	0.1%	0.1%
	Public ESD Retrofits	$87.8	403	50.0%	201	100%	$44	100%	5.1%	5.2%	5.7%	5.5%	6.4%
	Private ESD Retrofits	$103.1	473	50.0%	236	100%	$52	100%	6.0%	6.1%	6.7%	6.4%	7.5%
	Riparian Reforestation	$7.8	39	75.0%	29	0%	$6	0%	0.8%	1.1%	0.8%	1.9%	2.0%
	Stream Restoration	$16.2	-	53.7%	-	0%	$9	0%	8.9%	4.8%	43.0%	0.0%	0.0%
	Programmatic Practices	$0.5	-	100.0%	-	0%	$0	0%	15.3%	14.4%	0.0%	9.9%	0.0%
	Subtotal	***$218.7***	***1,018***	***56.0%***	***570***	***78.5%***	***$114***	***85.5%***	***39.4%***	***34.9%***	***59.8%***	***27.3%***	***18.9%***
Muddy Watts	*Completed and High Priority Projects*	$4.4	211	100.0%	211	1%	$4	8%	6.0%	6.0%	6.0%	0.0%	6.0%
	Low Priority Projects	$2.0	26	100.0%	26	33%	$2	84%	0.2%	0.3%	1.2%	0.0%	0.2%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$24.2	-	52.2%	-	0%	$13	0%	8.4%	3.6%	6.6%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$30.6***	***237***	***100.0%***	***237***	***4.3%***	***$19***	***10.7%***	***14.5%***	***10.0%***	***13.9%***	***0.0%***	***6.2%***
Great Seneca (inclusive of Clopper Lake)	*Completed and High Priority Projects*	$18.9	800	100.0%	800	1%	$19	6%	20.0%	20.0%	21.0%	0.0%	26.0%
	Low Priority Projects	$6.6	87	100.0%	87	15%	$7	41%	3.7%	3.7%	4.3%	0.0%	4.3%
	Other Potential Projects	$0.2	53	100.0%	53	0%	$0	0%	2.3%	2.3%	2.7%	0.0%	2.7%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$25.9	-	92.2%	-	0%	$24	0%	17.4%	7.6%	15.1%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$51.6***	***941***	***100.0%***	***941***	***2.1%***	***$50***	***7.8%***	***43.4%***	***33.6%***	***43.1%***	***0.0%***	***33.0%***
Clopper Lake (subshed of Great Seneca)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$0.8	12	50.0%	6	100%	$0	100%	4.3%	4.3%	4.6%	0.0%	4.3%
	Private ESD Retrofits	$0.5	8	50.0%	4	100%	$0	100%	2.7%	2.7%	2.9%	0.0%	2.7%
	Riparian Reforestation	$0.2	2	100.0%	2	0%	$0	0%	4.0%	4.0%	2.0%	0.0%	4.0%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	61.0%	30.0%	0.0%	0.0%	0.0%
	Subtotal	***$1.5***	***22***	***53.8%***	***12***	***85.8%***	***$0.9***	***73.0%***	***72.0%***	***41.0%***	***9.5%***	***0.0%***	***11.0%***

FY2020 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Lower Monocacy	*Completed and High Priority Projects*	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$8.6	40	50.0%	20	100%	$4	100%	5.2%	5.6%	5.6%	5.6%	0.0%
	Private ESD Retrofits	$2.9	13	50.0%	7	100%	$1	100%	1.8%	1.9%	1.9%	1.9%	0.0%
	Riparian Reforestation	$1.1	5	100.0%	5	0%	$1	0%	3.0%	3.0%	3.0%	4.0%	0.0%
	Stream Restoration	$7.3	-	50.0%	-	0%	$4	0%	3.5%	5.0%	16.0%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	0.0%	0.0%	19.0%	0.0%	0.0%
	Subtotal	***$20.0***	***58***	***54.3%***	***32***	***84.1%***	***$10.60***	***54.4%***	***13.5%***	***15.5%***	***45.5%***	***11.5%***	***0.0%***
Patuxent (Rocky Gorge)	*Completed and High Priority Projects*	$0.4	5	100.0%	5	27%	$0	77%	0.7%	0.7%	0.8%	0.8%	1.0%
	Low Priority Projects	$0.9	5	100.0%	5	100%	$1	100%	8.4%	8.2%	8.3%	8.2%	11.6%
	Other Potential Projects	$2.0	-	100.0%	-	0%	$2	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$31.2	179	50.0%	89	100%	$16	100%	8.1%	8.6%	10.0%	9.4%	14.3%
	Private ESD Retrofits	$18.6	106	50.0%	53	100%	$9	100%	4.8%	5.1%	5.9%	5.6%	8.5%
	Riparian Reforestation	$2.5	12	100.0%	12	0%	$2	0%	1.3%	1.8%	1.6%	3.5%	8.1%
	Stream Restoration	$19.1	-	51.3%	-	0%	$10	0%	5.3%	3.7%	18.4%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	38.0%	8.2%	0.3%	4.7%	2.0%
	Subtotal	***$74.7***	***307***	***53.6%***	***165***	***90.2%***	***$40***	***64.5%***	***66.6%***	***36.2%***	***45.3%***	***32.1%***	***45.6%***
Patuxent (Triadelphia)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.4	2	100.0%	2	100%	$0	100%	0.5%	0.5%	0.6%	0.5%	1.0%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$4.1	17	50.0%	8	100%	$2	100%	2.3%	2.4%	2.6%	2.5%	4.7%
	Private ESD Retrofits	$4.7	19	50.0%	10	100%	$2	100%	2.6%	2.7%	2.9%	2.8%	5.3%
	Riparian Reforestation	$0.1	1	100.0%	1	0%	$0	0%	0.1%	0.2%	0.1%	0.4%	0.3%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	23.4%	3.5%	0.0%	0.0%	0.0%
	Subtotal	***$9.3***	***38***	***53.3%***	***20***	***97.5%***	***$4.9***	***97.8%***	***29.0%***	***9.2%***	***6.3%***	***6.2%***	***11.3%***
Countywide Totals		***$1,884***	***11,154***	***69.2%***	***7,722***	***46.6%***	***$987***	***70.5%***	***35.6%***	***34.0%***	***54.4%***	***19.8%***	***33.2%***

20% Targeted Impervious: *7,723*

Chesapeake Bay TMDL, Urban MS4 Reductions (2017):	***9%***	***12%***	***20%***
Chesapeake Bay TMDL, Urban MS4 Reductions (2020):	***20%***	***34%***	***37%***

Assumptions:

1. 100% Other Potential Projects
2. 35% Private ESD Retrofits in urban watersheds, 50% in rural due to cost effectiveness
3. 35% Public ESD Retrofits in urban watersheds, 50% in rural due to cost effectiveness
4. General goal to implement 50% of potential in all watersheds
5. 75% Riparian Reforestation Goal in Urban Sheds, 100% Goal for Rural Sheds
6. Completed, High Priority, and 50% Other Potential Stream Restoration Projects to meet phosphorus Baywide TMDL

FY2025 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Anacostia	*Completed and High Priority Projects*	$15.8	315	100.0%	315	9%	$16	30%	5.8%	5.9%	1.9%	6.2%	5.5%
	Low Priority Projects	$5.1	194	100.0%	194	8%	$5	61%	2.0%	2.1%	0.7%	2.2%	2.7%
	Other Potential Projects	$249.2	2,217	100.0%	2,217	62%	$249	73%	23.3%	24.1%	7.9%	25.5%	30.3%
	Public ESD Retrofits	$237.8	956	85.0%	813	100%	$202	100%	9.2%	9.4%	3.0%	9.9%	12.2%
	Private ESD Retrofits	$213.0	857	85.0%	728	100%	$181	100%	8.2%	8.4%	2.7%	8.9%	11.0%
	Riparian Reforestation	$1.4	6	100.0%	6	0%	$1	0%	0.1%	0.2%	0.0%	0.1%	0.2%
	Stream Restoration	$93.7	-	79.2%	-	0%	$74	0%	33.6%	44.8%	258.5%	0.0%	0.0%
	Programmatic Practices	$3.6	-	75.0%	-	0%	$3	0%	6.7%	6.4%	7.8%	5.9%	61.1%
	Subtotal	***$819.6***	***4,544***	***94.0%***	***4,272***	***69.2%***	***$732***	***78.2%***	***88.9%***	***100.0%***	***100.0%***	***58.7%***	***100.0%***
Rock Creek	*Completed and High Priority Projects*	$13.3	585	100.0%	585	1%	$13	13%	4.0%	5.0%	6.0%	5.5%	6.0%
	Low Priority Projects	$8.8	665	100.0%	665	1%	$9	7%	3.9%	3.9%	6.2%	4.9%	7.0%
	Other Potential Projects	$2.0	193	100.0%	193	0%	$2	0%	1.1%	1.1%	1.8%	1.4%	2.0%
	Public ESD Retrofits	$247.1	1,020	85.0%	867	100%	$210	100%	10.7%	10.7%	11.8%	11.3%	12.5%
	Private ESD Retrofits	$341.2	1,407	85.0%	1,196	100%	$290	100%	14.8%	14.8%	16.3%	15.5%	17.3%
	Riparian Reforestation	$23.8	119	100.0%	119	0%	$24	0%	2.0%	2.0%	2.0%	4.0%	5.0%
	Stream Restoration	$20.1	-	82.2%	-	0%	$17	0%	7.5%	5.8%	82.5%	0.0%	0.0%
	Programmatic Practices	$1.2	-	100.0%	-	0%	$1	0%	11.0%	11.0%	0.0%	7.5%	0.0%
	Subtotal	***$657.6***	***3,989***	***90.9%***	***3,625***	***57.2%***	***$566***	***88.8%***	***55.0%***	***54.3%***	***100.0%***	***50.0%***	***49.8%***
Cabin John	*Completed and High Priority Projects*	$1.6	88	100.0%	88	2%	$2	19%	2.9%	3.0%	3.3%	3.2%	2.5%
	Low Priority Projects	$1.6	10	100.0%	10	78%	$2	98%	0.2%	0.2%	0.2%	0.2%	0.3%
	Other Potential Projects	$0.1	5	100.0%	5	0%	$0	0%	0.1%	0.1%	0.1%	0.1%	0.1%
	Public ESD Retrofits	$87.8	403	100.0%	403	100%	$88	100%	10.3%	10.4%	11.4%	11.0%	12.8%
	Private ESD Retrofits	$103.1	473	100.0%	473	100%	$103	100%	12.0%	12.1%	13.4%	12.9%	15.1%
	Riparian Reforestation	$7.8	39	100.0%	39	0%	$8	0%	1.1%	1.5%	1.1%	2.6%	2.7%
	Stream Restoration	$16.2	-	76.8%	-	0%	$12	0%	12.7%	6.9%	61.5%	0.0%	0.0%
	Programmatic Practices	$0.5	-	100.0%	-	0%	$0	0%	15.3%	14.4%	0.0%	9.9%	0.0%
	Subtotal	***$218.7***	***1,018***	***100.0%***	***1,018***	***87.0%***	***$215***	***89.7%***	***54.6%***	***48.6%***	***91.0%***	***39.8%***	***33.5%***
Muddy Watts	*Completed and High Priority Projects*	$4.4	211	100.0%	211	1%	$4	8%	6.0%	6.0%	6.0%	0.0%	6.0%
	Low Priority Projects	$2.0	26	100.0%	26	33%	$2	84%	0.2%	0.3%	1.2%	0.0%	0.2%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$24.2	-	76.1%	-	0%	$18	0%	12.2%	5.3%	9.7%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$30.6***	***237***	***100.0%***	***237***	***4.3%***	***$25***	***8.2%***	***18.4%***	***11.6%***	***16.9%***	***0.0%***	***6.2%***
Great Seneca (inclusive of Clopper Lake)	*Completed and High Priority Projects*	$18.9	800	100.0%	800	1%	$19	6%	20.0%	20.0%	21.0%	0.0%	26.0%
	Low Priority Projects	$6.6	87	100.0%	87	15%	$7	41%	3.7%	3.7%	4.3%	0.0%	4.3%
	Other Potential Projects	$0.2	53	100.0%	53	0%	$0	0%	2.3%	2.3%	2.7%	0.0%	2.7%
	Public ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	0.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$25.9	-	96.1%	-	0%	$25	0%	18.2%	7.9%	15.7%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$51.6***	***941***	***100.0%***	***941***	***2.1%***	***$51***	***7.7%***	***44.2%***	***33.9%***	***43.7%***	***0.0%***	***33.0%***
Clopper Lake (subshed of Great Seneca)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$0.8	12	100.0%	12	100%	$1	100%	8.5%	8.5%	9.1%	0.0%	8.5%
	Private ESD Retrofits	$0.5	8	100.0%	8	100%	$1	100%	5.5%	5.5%	5.9%	0.0%	5.5%
	Riparian Reforestation	$0.2	2	100.0%	2	0%	$0	0%	4.0%	4.0%	2.0%	0.0%	4.0%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	61.0%	30.0%	0.0%	0.0%	0.0%
	Subtotal	***$1.5***	***22***	***100.0%***	***22***	***92.3%***	***$1.5***	***84.4%***	***79.0%***	***48.0%***	***17.0%***	***0.0%***	***18.0%***

FY2025 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Lower Monocacy	*Completed and High Priority Projects*	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$8.6	40	100.0%	40	100%	$9	100%	10.5%	11.2%	11.2%	11.2%	0.0%
	Private ESD Retrofits	$2.9	13	100.0%	13	100%	$3	100%	3.5%	3.8%	3.8%	3.8%	0.0%
	Riparian Reforestation	$1.1	5	100.0%	5	0%	$1	0%	3.0%	3.0%	3.0%	4.0%	0.0%
	Stream Restoration	$7.3	-	75.0%	-	0%	$6	0%	5.3%	7.5%	24.0%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	0.0%	0.0%	19.0%	0.0%	0.0%
	Subtotal	***$20.0***	***58***	***100.0%***	***58***	***91.4%***	***$18.20***	***63.4%***	***22.3%***	***25.5%***	***61.0%***	***19.0%***	***0.0%***
Patuxent (Rocky Gorge)	*Completed and High Priority Projects*	$0.4	5	100.0%	5	27%	$0	77%	0.7%	0.7%	0.8%	0.8%	1.0%
	Low Priority Projects	$0.9	5	100.0%	5	100%	$1	100%	8.4%	8.2%	8.3%	8.2%	11.6%
	Other Potential Projects	$2.0	-	100.0%	-	0%	$2	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$31.2	179	100.0%	179	100%	$31	100%	16.2%	17.1%	19.9%	18.7%	28.7%
	Private ESD Retrofits	$18.6	106	100.0%	106	100%	$19	100%	9.6%	10.2%	11.8%	11.1%	17.1%
	Riparian Reforestation	$2.5	12	100.0%	12	0%	$2	0%	1.3%	1.8%	1.6%	3.5%	8.1%
	Stream Restoration	$19.1	-	75.6%	-	0%	$14	0%	7.8%	5.4%	27.1%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	38.0%	8.2%	0.3%	4.7%	2.0%
	Subtotal	***$74.7***	***307***	***100.0%***	***307***	***94.7%***	***$70***	***72.8%***	***82.0%***	***51.6%***	***69.9%***	***47.0%***	***68.5%***
Patuxent (Triadelphia)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.4	2	100.0%	2	100%	$0	100%	0.5%	0.5%	0.6%	0.5%	1.0%
	Other Potential Projects	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$4.1	17	100.0%	17	100%	$4	100%	4.6%	4.7%	5.2%	5.0%	9.4%
	Private ESD Retrofits	$4.7	19	100.0%	19	100%	$5	100%	5.3%	5.4%	5.9%	5.6%	10.7%
	Riparian Reforestation	$0.1	1	100.0%	1	0%	$0	0%	0.1%	0.2%	0.1%	0.4%	0.3%
	Stream Restoration	$0.0	-	0.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	23.4%	3.5%	0.0%	0.0%	0.0%
	Subtotal	***$9.3***	***38***	***100.0%***	***38***	***98.7%***	***$9.3***	***98.8%***	***33.9%***	***14.3%***	***11.8%***	***11.5%***	***21.3%***
Countywide Totals		***$1,884***	***11,154***	***94.3%***	***10,518***	***60.4%***	***$1,687***	***79.8%***	***46.0%***	***44.2%***	***60.4%***	***27.6%***	***41.4%***

20% Targeted Impervious: *10,470*

Assumptions:
1. 100% Other Potential Projects
2. 85% Private ESD in urban watersheds, 100% in rural due to cost effectiveness
3. 85% Public ESD in urban watersheds, 100% in rural due to cost effectiveness
4. General goal to implement 90 to 100% of potential in all watersheds
5. 100% Riparian Reforestation goal in all watersheds
6. Completed, High Priority, and 75% Other Potential Stream Restoration Projects

FY2030 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Anacostia	*Completed and High Priority Projects*	$15.8	315	100.0%	315	9%	$16	30%	5.8%	5.9%	1.9%	6.2%	5.5%
	Low Priority Projects	$5.1	194	100.0%	194	8%	$5	61%	2.0%	2.1%	0.7%	2.2%	2.7%
	Other Potential Projects	$249.2	2,217	100.0%	2,217	62%	$249	73%	23.3%	24.1%	7.9%	25.5%	30.3%
	Public ESD Retrofits	$237.8	956	100.0%	956	100%	$238	100%	10.8%	11.1%	3.6%	11.6%	14.4%
	Private ESD Retrofits	$213.0	857	100.0%	857	100%	$213	100%	9.7%	9.9%	3.2%	10.4%	12.9%
	Riparian Reforestation	$1.4	6	100.0%	6	0%	$1	0%	0.1%	0.2%	0.0%	0.1%	0.2%
	Stream Restoration	$93.7	-	100.0%	-	0%	$94	0%	42.4%	56.5%	326.2%	0.0%	0.0%
	Programmatic Practices	$3.6	-	100.0%	-	0%	$4	0%	8.9%	8.5%	10.4%	7.8%	81.5%
	Subtotal	***$819.6***	***4,544***	***100.0%***	***4,544***	***71.1%***	***$820***	***78.0%***	***100.0%***	***100.0%***	***100.0%***	***63.9%***	***100.0%***
Rock Creek	*Completed and High Priority Projects*	$13.3	585	100.0%	585	1%	$13	13%	4.0%	5.0%	6.0%	5.5%	6.0%
	Low Priority Projects	$8.8	665	100.0%	665	1%	$9	7%	3.9%	3.9%	6.2%	4.9%	7.0%
	Other Potential Projects	$2.0	193	100.0%	193	0%	$2	0%	1.1%	1.1%	1.8%	1.4%	2.0%
	Public ESD Retrofits	$247.1	1,020	100.0%	1,020	100%	$247	100%	12.6%	12.6%	13.9%	13.2%	14.7%
	Private ESD Retrofits	$341.2	1,407	100.0%	1,407	100%	$341	100%	17.4%	17.4%	19.1%	18.3%	20.3%
	Riparian Reforestation	$23.8	119	100.0%	119	0%	$24	0%	2.0%	2.0%	2.0%	4.0%	5.0%
	Stream Restoration	$20.1	-	100.0%	-	0%	$20	0%	9.1%	7.1%	100.4%	0.0%	0.0%
	Programmatic Practices	$1.2	-	100.0%	-	0%	$1	0%	11.0%	11.0%	0.0%	7.5%	0.0%
	Subtotal	***$657.6***	***3,989***	***100.0%***	***3,989***	***61.2%***	***$658***	***89.8%***	***61.1%***	***60.1%***	***100.0%***	***54.8%***	***55.0%***
Cabin John	*Completed and High Priority Projects*	$1.6	88	100.0%	88	2%	$2	19%	2.9%	3.0%	3.3%	3.2%	2.5%
	Low Priority Projects	$1.6	10	100.0%	10	78%	$2	98%	0.2%	0.2%	0.2%	0.2%	0.3%
	Other Potential Projects	$0.1	5	100.0%	5	0%	$0	0%	0.1%	0.1%	0.1%	0.1%	0.1%
	Public ESD Retrofits	$87.8	403	100.0%	403	100%	$88	100%	10.3%	10.4%	11.4%	11.0%	12.8%
	Private ESD Retrofits	$103.1	473	100.0%	473	100%	$103	100%	12.0%	12.1%	13.4%	12.9%	15.1%
	Riparian Reforestation	$7.8	39	100.0%	39	0%	$8	0%	1.1%	1.5%	1.1%	2.6%	2.7%
	Stream Restoration	$16.2	-	100.0%	-	0%	$16	0%	16.5%	9.0%	80.1%	0.0%	0.0%
	Programmatic Practices	$0.5	-	100.0%	-	0%	$0	0%	15.3%	14.4%	0.0%	9.9%	0.0%
	Subtotal	***$218.7***	***1,018***	***100.0%***	***1,018***	***87.0%***	***$219***	***88.1%***	***58.4%***	***50.7%***	***100.0%***	***39.8%***	***33.5%***
Muddy Watts	*Completed and High Priority Projects*	$4.4	211	100.0%	211	1%	$4	8%	6.0%	6.0%	6.0%	0.0%	6.0%
	Low Priority Projects	$2.0	26	100.0%	26	33%	$2	84%	0.2%	0.3%	1.2%	0.0%	0.2%
	Other Potential Projects	$0.0	-	100.0%	-	0%	$0	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$0.0	-	100.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	100.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$24.2	-	100.0%	-	0%	$24	0%	16.0%	7.0%	12.7%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$30.6***	***237***	***100.0%***	***237***	***4.3%***	***$31***	***6.6%***	***22.2%***	***13.3%***	***19.9%***	***0.0%***	***6.2%***
Great Seneca (inclusive of Clopper Lake)	*Completed and High Priority Projects*	$18.9	800	100.0%	800	1%	$19	6%	20.0%	20.0%	21.0%	0.0%	26.0%
	Low Priority Projects	$6.6	87	100.0%	87	15%	$7	41%	3.7%	3.7%	4.3%	0.0%	4.3%
	Other Potential Projects	$0.2	53	100.0%	53	0%	$0	0%	2.3%	2.3%	2.7%	0.0%	2.7%
	Public ESD Retrofits	$0.0	-	100.0%	-	100%	$0	100%	-	-	-	-	-
	Private ESD Retrofits	$0.0	-	100.0%	-	100%	$0	100%	-	-	-	-	-
	Riparian Reforestation	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Stream Restoration	$25.9	-	100.0%	-	0%	$26	0%	18.9%	8.2%	16.3%	0.0%	0.0%
	Programmatic Practices	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Subtotal	***$51.6***	***941***	***100.0%***	***941***	***2.1%***	***$52***	***7.5%***	***44.9%***	***34.2%***	***44.3%***	***0.0%***	***33.0%***
Clopper Lake (subshed of Great Seneca)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$0.8	12	100.0%	12	100%	$1	100%	8.5%	8.5%	9.1%	0.0%	8.5%
	Private ESD Retrofits	$0.5	8	100.0%	8	100%	$1	100%	5.5%	5.5%	5.9%	0.0%	5.5%
	Riparian Reforestation	$0.2	2	100.0%	2	0%	$0	0%	4.0%	4.0%	2.0%	0.0%	4.0%
	Stream Restoration	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	61.0%	30.0%	0.0%	0.0%	0.0%
	Subtotal	***$1.5***	***22***	***100.0%***	***22***	***92.3%***	***$1.5***	***84.4%***	***79.0%***	***48.0%***	***17.0%***	***0.0%***	***18.0%***

FY2030 Permit Cycle

Watershed	Strategies	Total Potential Cost	Total Restoration Potential (acres)	% Implementation in Permit Cycle	Impervious Treated (acres)	ESD (% Impervious)	Cost (Million $)	ESD (% Cost)	Nitrogen	Phosphorus	Sediment	Bacteria	Trash
Lower Monocacy	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Other Potential Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$8.6	40	100.0%	40	100%	$9	100%	10.5%	11.2%	11.2%	11.2%	0.0%
	Private ESD Retrofits	$2.9	13	100.0%	13	100%	$3	100%	3.5%	3.8%	3.8%	3.8%	0.0%
	Riparian Reforestation	$1.1	5	100.0%	5	0%	$1	0%	3.0%	3.0%	3.0%	4.0%	0.0%
	Stream Restoration	$7.3	-	100.0%	-	0%	$7	0%	7.0%	10.0%	32.0%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	0.0%	0.0%	19.0%	0.0%	0.0%
	Subtotal	***$20.0***	***58***	***100.0%***	***58***	***91.4%***	***$20.03***	***57.6%***	***24.0%***	***28.0%***	***69.0%***	***19.0%***	***0.0%***
Patuxent (Rocky Gorge)	*Completed and High Priority Projects*	$0.4	5	100.0%	5	27%	$0	77%	0.7%	0.7%	0.8%	0.8%	1.0%
	Low Priority Projects	$0.9	5	100.0%	5	100%	$1	100%	8.4%	8.2%	8.3%	8.2%	11.6%
	Other Potential Projects	$2.0	-	100.0%	-	0%	$2	0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Public ESD Retrofits	$31.2	179	100.0%	179	100%	$31	100%	16.2%	17.1%	19.9%	18.7%	28.7%
	Private ESD Retrofits	$18.6	106	100.0%	106	100%	$19	100%	9.6%	10.2%	11.8%	11.1%	17.1%
	Riparian Reforestation	$2.5	12	100.0%	12	0%	$2	0%	1.3%	1.8%	1.6%	3.5%	8.1%
	Stream Restoration	$19.1	-	100.0%	-	0%	$19	0%	10.3%	7.1%	35.8%	0.0%	0.0%
	Programmatic Practices	$0.1	-	100.0%	-	0%	$0	0%	38.0%	8.2%	0.3%	4.7%	2.0%
	Subtotal	***$74.7***	***307***	***100.0%***	***307***	***94.7%***	***$75***	***68.3%***	***84.5%***	***53.3%***	***78.6%***	***47.0%***	***68.5%***
Patuxent (Triadelphia)	*Completed and High Priority Projects*	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Low Priority Projects	$0.4	2	100.0%	2	100%	$0	100%	0.5%	0.5%	0.6%	0.5%	1.0%
	Other Potential Projects	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Public ESD Retrofits	$4.1	17	100.0%	17	100%	$4	100%	4.6%	4.7%	5.2%	5.0%	9.4%
	Private ESD Retrofits	$4.7	19	100.0%	19	100%	$5	100%	5.3%	5.4%	5.9%	5.6%	10.7%
	Riparian Reforestation	$0.1	1	100.0%	1	0%	$0	0%	0.1%	0.2%	0.1%	0.4%	0.3%
	Stream Restoration	$0.0	-	100.0%	-	0%	$0	0%	-	-	-	-	-
	Programmatic Practices	$0.01	-	100.0%	-	0%	$0	0%	23.4%	3.5%	0.0%	0.0%	0.0%
	Subtotal	***$9.3***	***38***	***100.0%***	***38***	***98.7%***	***$9.3***	***98.8%***	***33.9%***	***14.3%***	***11.8%***	***11.5%***	***21.3%***
Countywide Totals		***$1,884***	***11,154***	***100.0%***	***11,154***	***62.6%***	***$1,884***	***79.7%***	***50.5%***	***45.9%***	***62.1%***	***29.6%***	***42.4%***

Assumptions:
1. 100% of all restoration potential in all watersheds

Appendix 5 – Outreach and Stewardship Practice Sheets

January 2012

Public Outreach and Stewardship Practice No. 1

PET WASTE PICK UP OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

Several of the watersheds in Montgomery County are required to reduce bacteria loading. The restoration implementation strategy is geared to target the sources of bacteria. Stormwater management in general only targets overland flow sources of bacteria, such as runoff containing waste from domestic pets, wildlife, and potentially livestock. The Maryland Department of the Environment (MDE) determined the bacteria loading in certain watersheds to be from a distribution of sources including domestic animals, human, livestock, wildlife, and unknown based on bacterial source tracking (BST). Consequently, aggressive outreach on the importance of picking up pet waste has been identified as an important component of the County's stewardship outreach work plan within its urban areas. It seems the most cost effective way to achieve the intended goals is to adapt content from one of the many effective pet waste education campaigns that has been developed in other portions of the country and disseminate that through a mixture of existing and new county distribution mechanisms.

Intended Outcome:

Behavior change throughout the county such that individuals find it wrong to leave pet waste unattended and are careful to dispose of pet waste properly, thereby reducing bacteria in streams.

Measures:

- Increase in awareness and self-reporting of improved behavior and users of pet waste disposal stations
- Increase per year in mass of waste in pet waste disposal stations or frequency of cleanouts/emptying.
- Increase in number of requests for pet waste disposal stations.
- Reduction in citations after initial baseline year where enforcement is stepped up.
- Meet water quality bacteria standards based on MDE's Biennial assessments.

New Partnerships to Develop:

- Veterinarians
- Pet Stores
- Groomers
- Kennels and in-home care providers
- Pet rescue leagues, Humane Society, SPCA

Key Messages

- Pet waste contains bacteria and excess nutrients which harms our streams and endangers human health
- Rain and snow can carry the pet waste into our streams
- Dogs are not the only pets that produce waste
- Removal is required by county law
- Picking up after your pet is the law [Chapter 5-203(a)], and the law applies to both dogs and cats. Noncompliance can result in a $100 fine.

Existing Partnerships to Nurture:

- Homeowners
- Homeowners associations
- Business organizations
- Schools
- Watershed organizations
- Public land stewardship organizations
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, etc.

Delivery Techniques:

Pet waste pick up messages should be delivered at the neighborhood level by HOAs and businesses. They should be delivered on public lands by the citizen groups that support those lands. Delivery should clarify that the pet waste problem is more than aesthetics, it causes water quality degradation.

These techniques are presented in order of the simplest and most likely to be effective, to those techniques that would marginally affect behavior change when used alone, but may have a significant affect when used cumulatively with the other listed techniques.

Target / Technique	Dog walkers	Those who own land where pets live	Those who purchase pet food	Those who care for pets in any other way
HOA newsletter inserts	*	*		
Signage at pet supply stores	*		*	*
Signage at feed stores	*		*	*
Signage at veterinarian offices	*		*	*
Neighborhood pet waste pick up stations	*	*		*
Business center pet waste pick up stations	*			*
Walking trail and public park pet waste pick up stations	*			*
Messages on receipts	*		*	

Prioritization should be given to those watersheds with specific bacteria reduction goals: Anacostia, Rock Creek, Cabin John, and Lower Monocacy

Target Audience:

- Pet owners – including those with dogs, cats, larger caged animals such as rabbits and ferrets, and hobby farm pets such as horses or llamas
- In-home pet care providers – including dog walking services, lawn services that remove pet waste, or in-home visit veterinarians (particularly used by those with larger animals or multiple animals)
- Public lands stewards—such as "friends of" organizations, hiking clubs, and sports clubs
- Businesses and Nonprofits frequented by pet owners
- Home Owners Associations (HOAs)-to encourage social stigma against pet waste left unattended
- Schools

Approximate Program Start-Up Cost – $240,500

Comprised of the following elements:

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Develop list of all potential new partners ($2,500)
- Develop campaign logo/slogan* ($2,500)
- Install 25 demonstration pet waste disposal stations ($10,000)

Program Development

- Initiate contact with all potential partners (guesstimate of 500 letters = $1,000)
- Develop program description document ($3,750)
- Develop sign template for partners ($1,250)

Program Implementation

- Distribute program materials electronically ($1,250)
- Distribute print program materials (1000 sets @ $2.00 per set = $2,000)
- Execute 50% rebate program ($200,000)
- Measure program implementation ($7,500)

*campaign design can range in costs from the bare minimum suggested here to tens of thousands of dollars depending on the level of market research conducted before concept development and the number of concepts developed for consideration. This budget assumes that an existing campaign design will be adapted for use in Montgomery County.

**The above list of cost elements and approximate pricing was derived from experiences reported in 2009 from the Arundel on the Bay neighborhood in Anne Arundel County Maryland and from the US EPA Office of Wastewater Sustainable Infrastructure (SI) campaign development in 2009.

Delivery Technique Description

- HOA newsletter inserts – to be distributed through Solid Waste's "newsletter helper" which is distributed electronically on a regular basis to HOAs throughout the county
- Signage at pet supply stores – poster templates to be downloadable from County website with key messages
- Signage at Veterinarian offices – poster templates to be downloadable from County website with key messages
- Neighborhood pet waste pickup stations – a county assistance program for HOAs to receive assistance in the cost of installation of pet waste stations
- Business center pet waste pickup stations – a county assistance program for businesses to receive assistance in the cost of installation of a pet waste station outside their place of business.
- Walking trail and public park pet waste pick up stations – a county assistance program for public land stewardship organizations to receive assistance in the cost of installation of a pet waste pickup station in parks and on trails.
- Messages on receipts – an e-mail campaign urging pet care providers and veterinarians to print program messages on the bottom of customer receipts.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from experiences reported in 2009 from the Arundel on the Bay neighborhood in Anne Arundel County Maryland and from development and implementation of business and resident shoreline improvement assistance with the Spa Creek Conservancy in 2005 – 2007

Months 1-3

- **Program Planning**
  - Develop lists
  - Develop campaign
  - Install demonstrations

Months 4 - 6

- **Program Development**
  - Initiate contact with partners
  - Develop program plan
  - Develop sign template

Months 7 - 12

- **Program Implementation**
  - Distribute program materials
  - Execute rebates

Through the Year 2025

- Program Sustainment
  - Measure success
    - 2015
    - 2017
    - 2025

Implementation locations:

- Neighborhoods with walking trails
- Pet-friendly business areas
- Watersheds with bacteria reduction targets

Measuring Program Success

- Before and after attitude surveys
- Tracking and reporting of disposal quantities from disposal service providers
- Tracking and reporting requests for stations
- Number of pet waste citations issued by year

January 2012

Public Outreach and Stewardship Practice No. 2

LAWN STEWARDSHIP OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

Montgomery County's third-round National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requires that the County meet total nitrogen and total phosphorus load reductions in certain watersheds. In those watersheds, it seems that the greatest load reduction for the lowest cost can be achieved through lawn care education. Although the focus of the implementation plans is on residential lawn care education, it seems cost effective to facilities managers who may care for large lawns in high density residential units or private clubs and schools. Focus should also be applied to Montgomery County Departments that maintain public facilities in the targeted watershed areas to reach these load reductions.

Intended Outcome:

Behavior change throughout the county such that fertilizer application is reduced resulting in reductions in nitrogen and phosphorus in streams

Measures:

- Reduction in pounds of fertilizer sold by hardware stores each year after first baseline year established
- Increase in awareness and self-reporting of improved behavior for lawn care practices
- Increase each year in number of homeowner associations and community groups actively requesting and receiving lawn care awareness literature and information.
- Reduction in instream nutrient concentration for impaired watersheds (e.g., Patuxent).

New Partnerships to Develop:

- Lawn care companies
- Lawn care supply retailers
- Commercial facilities with large tracts of turf such as country clubs, schools, or privately owned playing fields
- Montgomery College

Key Messages

- Fertilization of home lawns is becoming a significant source of pollution to our waterways
- Turf should be replaced with native plants as much as possible
- Avoid over cutting grass
- Leaving grass clippings in place reduces the need for fertilizers
- Have your soil tested before applying fertilizer
- Fertilizer should never be applied on dormant lawns or after October 1
- Slow release or organic fertilizers should be used in place of quick-release fertilizers
- Overfertilization of flower and vegetable gardens is also a hazard to neighboring streams.

Existing Partnerships to Nurture:

- Montgomery County Code Enforcement
- Montgomery County Division of Solid Waste Services (Grasscycling & Composting programs
- Maryland -National Capital Park and Planning Commission (MNCPPC)
- Neighborhood and Homeowners Associations
- Watershed Organizations
- Nurseries and garden centers
- University of Maryland Cooperative Extension including Master Gardeners
- Homeowners
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, etc., etc.

Delivery Techniques:

Messages should be developed based on information gathered and disseminated by the Choptank Riverkeeper in 2010 and found on the MD DNR web page and the USFWS BayScapes web page. Recommended to look like Puget Sound Action Team fertilizer campaign to make it "sexier." Use existing content from County Grasscycling program and the MD DNR and USFWS BayScapes program. Extensively disseminate key messages to create a strong awareness of watershed friendly lawn care practices.

These techniques are presented in order of the simplest and most likely to be effective, to those techniques that would marginally affect behavior change when used alone, but may have a significant affect when used cumulatively with the other listed techniques.

Target / Technique	Homeowner	Lawn Care Provider	Facilities Operations Manager	Lawn care supply retailers
HOA newsletter inserts	*			
Multi-language fact sheets	*	*		
Certification program		*	*	
Posters for display				*
PSA campaign	*	*	*	
Social media campaign	*	*	*	

Prioritization should be given to those watersheds with specific nutrient and phosphorus reduction goals such as Anacostia, Patuxent (Rocky Gorge), and areas surrounding Clopper Lake.

Target Audience:

- Homeowners – especially those with turf grass yards
- Lawn Care Providers -- including larger landscaping services as well as individual service providers
- Facilities operation managers – including country club, golf course, private sports fields (i.e., Olney boys and girls club), and corporate centers with large lawns
- Lawn supply retailers – including large chains (i.e., Home Depot) and small neighborhood nurseries or hardware stores.

Approximate Program Start-Up Cost -- $30,600

Comprised of the following elements:

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Coordinate with Solid Waste on the specifications for "newsletter helper" submissions ($250)
- Gather information currently available to provide for translation ($250)
- Initiate contact with Montgomery College and Anne Arundel Community College regarding a landscape design LID certification program ($750)
- Discuss with Parks and Public Works the possibility of appropriate county maintenance staff seeking certification in the Professional Landscape series ($250)

Program Development

- Draft newsletter helper and PSA and social media campaign content ($2,500)
- Have Spanish and Korean versions of needed fact sheets and posters prepared ($1,250)
- Design and develop fact sheets, posters, PSA and social media campaign materials ($3,750)
- Work with Anne Arundel Community College and Montgomery College to facilitate curriculum development for the certification program ($2,500)
- Draft announcements of the availability of the certification program ($250)

Program Implementation

- Distribute newsletter helper, PSA and social media campaign ($1,000)
- Post all fact sheets and posters to website ($250)
- Publicize availability of certification program at Montgomery College to facilitate enrollment ($250)
- Celebrate first graduating class of certification program (2 staff for 4 hrs @$1,000 plus small celebration item budget of $100)
- Measure Success ($7,500)

* This list of cost elements and approximate pricing was derived from experience with the CERCLA Education Center, US EPA Watermark campaign, and Annapolis Green.

Delivery Technique Description

- HOA newsletter inserts – to be distributed through Solid Waste's "newsletter helper" which is distributed electronically on a regular basis to HOAs throughout the county – to include information on the grasscycling program, fertilizer use, and compost bin availability
- Multi-language fact sheets posted to county web site – to include the same information as currently available on the grasscycling portion of the county web page, plus additional information on fertilizers.
- Certification program – in partnership with Montgomery College to offer a program similar to Anne Arundel Community College's Professional Landscape Series
- Posters for display that can be distributed electronically and downloaded for printing – to encourage participation in the grasscycling program
- PSA campaign – to encourage participation in the grasscycling program
- Social media campaign – to encourage participation in the grasscycling program and possibly demonstrate BMPs.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from the same experiences cited in development of the cost for this program.

Months 1-2

- **Program Planning**
  - Coordination and meeting tasks
  - Information gathering

Months 3 - 7

- **Program Development**
  - Drafting, design, and development of materials
  - Facilitate curriculum development

Months 8 - 18

- **Program Implementation**
  - Distribute and post materials
  - Celebrate graduates

Through the Year 2025

- **Program Sustainment**
  - Measure success
    - 2015
    - 2017
    - 2025

Implementation locations:

- Countywide
- Targeted residential neighborhoods in watershed, based on lot size, income and neighborhood age.

Measuring Program Success

- Reduction in sales of high nitrogen fertilizers
- Before and after attitude surveys
- Number of posters downloaded
- Number of newsletter articles included
- Stream Monitoring

January 2012

Public Outreach and Stewardship Practice No. 3

ANTI-LITTERING OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

In 2006, Montgomery County committed to the goal of a trash free Potomac River by 2013 and signed the *Potomac River Watershed Trash Treaty* with other Washington, D.C. metropolitan area jurisdictions. Activities to meet obligations under the Treaty include trash abatement program implementation, education, enforcement, and evaluation. In addition, the Anacostia River watershed has a specific trash load reduction requirement that has been established by the Maryland Department of the Environment. These two major commitments mean that anti-littering education is needed across the County to reduce trash in its watersheds. There are a range of stakeholder groups to target for education, which requires a number of messages in multiple languages that are delivered in multiple formats.

Under existing initiatives, the Anacostia Watershed Society, in conjunction with the Alice Ferguson Foundation (AFF), has begun thorough development of an outreach campaign to affect littering behavior in Montgomery and Prince Georges counties and in the District of Columbia. Montgomery County DEP staff is participating in this campaign development process. This stewardship outreach work plan should build on the messaging of the AFF effort and therefore use materials already under development to educate the public on the dangers of litter beyond just the Anacostia watershed.

Intended Outcome:

Behavior change throughout the county such that individuals find it repulsive to leave litter unattended resulting in less litter in streams

Measures:

- Reduction in citations after initial baseline year where enforcement is stepped up.
- Reduction in hotline reports after initial baseline years where hotline is advertised and promoted.
- Increase in number of volunteers participating in trash cleanup days after initial baseline year.
- Increase in awareness and self-reporting of improved behavior for trash control
- Positive behavior change for trash can management through before and after surveys in neighborhoods which have received targeted outreach.
- Rating based on visual assessment surveys of public recreational areas before and after increased effort with education and maintenance

New Partnerships to Develop:

- Faith-based organizations
- Central Business Districts and Chambers of Commerce
- Youth athletics organizations and groups like Boys Scouts and Girl Scouts
- Neighborhood and homeowner associations
- Montgomery County Police Department

Key Messages

- Taking care of trash at its source
- Trash cans need proper maintenance
- Dumpsters need proper management
- Littering laws can be enforced
- Pick up the litter from playing fields to keep it out of your neighborhood and the nearby rivers and streams
- Allowing Trash to accumulate near businesses and neighborhoods personifies unhealthy conditions and creates a negative public image reducing economic benefits and property values.

Existing Partnerships to Nurture:

- Alice Ferguson Foundation
- Recycling services
- County littering enforcement staff
- Watershed Organizations (especially Friends of Rock Creek's Environment's (FORCE) Stream Teams
- Nonprofit Organizations
- Department of Transportation (DOT)
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, etc.

Delivery Techniques:

Building on the work of the Alice Ferguson Foundation, the county should assist with information dissemination using already established county information dissemination networks to reinforce AFF's campaign. At this time it appears the campaign is considering billboards, bumper stickers, decals, flyers, on-line advertisements, posters, print advertisements, radio public services announcements, and web page.

These techniques are presented in order of the simplest and most likely to be effective, to those techniques that would marginally affect behavior change when used alone, but may have a significant affect when used cumulatively with the other listed techniques.

Target / Technique	Playing field owners and users	Trash can/ dumpster owners or users	Waste removal contractors	Enforcement officials
e-mail blasts	*	*	*	
Web page link to AFF campaign	*	*		
Event presence	*	*		
County staff training			*	*
Increased enforcement of littering violations	*	*	*	*

Prioritization should be given to the Anacostia which has a specific litter reduction goal as well as the tributaries to the Potomac: Cabin John, Great Seneca, Lower Monocacy, Muddy/Watts Branch, and Rock Creek.

Target Audience

- Those who maintain athletic fields
- Those who use athletic fields
- Those who maintain trash receptacles (cans and dumpsters – including independent trash haulers)
- Those who use trash receptacles (cans and dumpsters)
- Enforcement officials
- County residents in the targeted watersheds
- Residents living in and businesses located within identified trash & dumping "hotspots"

Approximate Program Start-Up Cost -- $175,050

Comprised of the following elements

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Coordinate with Solid Waste and Public Works and Transportation regarding number of e-mails that can be sent and length of message to be developed ($500)
- Coordinate with AFF and DEP Web manager to identify parameters for web posting ($500)
- Develop a list of targeted festivals and events (coincidental to practices number 5 and 6 ($1,000)
- Coordinate with Solid Waste to plan agenda for county employee training ($750)
- Coordinate with enforcement and parks maintenance to increase activity ($500)

Program Development

- Develop e-mail messages ($1,500)
- Obtain AFF materials for web posting ($500)
- Coordinate staffing and materials for festivals and events ($2,000)
- Develop powerpoint and handouts for 1 hour training program ($2,000)
- Schedule additional staff hours for increased enforcement and playing field maintenance ($1,000)

Program Implementation

- Queue e-mails for distribution ($500)
- Post AFF messages to DEP web site ($250)
- Post advertisements inside and outside of County Ride-on buses and bus shelters = ($43,500) , $15,500 for County Ride-On bus ads, 25 priority bus shelters ads at hot spots $28,000.
- Post large signs on Solid Waste collection trucks = ($16,800) Implement on 15 trucks servicing priority areas)
- Staff festivals and events (1 paid staff with volunteers for 15 events = $15,000 plus print materials/handouts @ $5,000)
- Conduct training for collection personnel (est. 30 people @ 2hrs/person = $7,500)
- Increase staffing for stepped up maintenance and enforcement (est. 2 half-FTE for 1 FTE @60,000)
- Measure Success ($7,500)

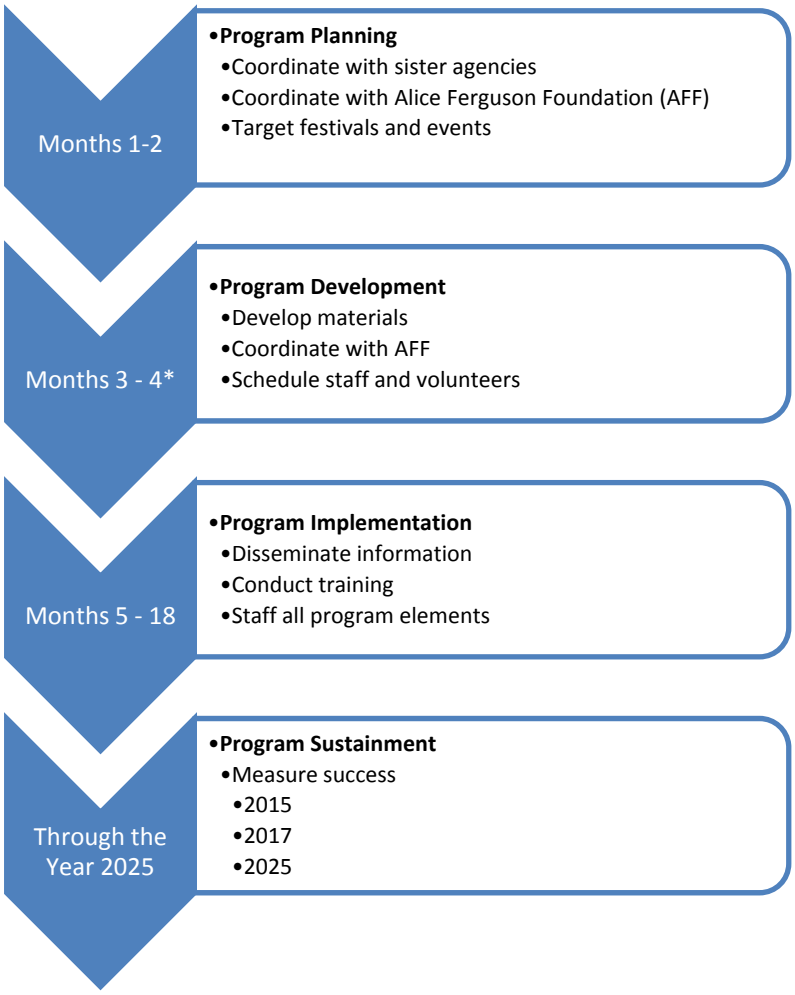
*This list of cost elements and approximate pricing was derived from experiences working with the US Navy in development and delivery of pollution prevention outreach, working with the City of Annapolis training maintenance staff on watershed education, and support to the MD Port Administration Safe Passages program.

Delivery Technique Description

- Using existing county e-mail systems increase littering-related messages
- Posting AFF PSAs and other materials on the county web page and a link to the AFF campaign web page
- Increased presence at events such as the Spanish festival in September each year
- Expanded anti-litter training to all County employees with a renewed emphasis for collection personnel to clean up any spillage during collection and to properly secure the load on the collection vehicle before moving it
- Increased maintenance of trash receptacles on county playing fields
- Increased enforcement activity for littering violations to include increased issuance of citations and subsequent dissemination of those littering enforcement statistics until behavior changes are achieved.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from experience with developing hundreds of employee training programs for the US EPA, planning and participating in festivals and events for over 25 years, coordinating internet-based outreach for dozens of clients for over 14 years, and experience in hazardous waste enforcement nationwide.



*timing can be affected by availability of AFF materials

Implementation Points

- Medium and high density residential areas
- Commercial and industrial areas
- Roadways
- Parks and playing fields

Measuring Program Success

- Tracking and reporting the number of littering citations issued
- Tracking and reporting the number of littering reports on the hotline
- Tracking and reporting the number of volunteers at clean up days
- Before and after attitude surveys
- Tracking and reporting of visual assessments of park litter and roadway median and swale litter.

January 2012

Public Outreach and Stewardship Practice No. 4

INNOVATIVE STORMWATER MANAGEMENT OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

The County's preferred restoration strategy to treat 20% of the inadequately treated impervious surface consists of a balanced mix of Environmental Site Design (ESD) and non-ESD restoration practices, linked to opportunities that are known to exist and building on existing watershed restoration plans (e.g., Sligo Creek, Rock Creek, etc.). Specifically, the County's preferred restoration strategy consists of the following key elements:

- Retrofit of existing BMPs;
- Construction of retrofits identified as priorities in current County inventories;
- Targeted ESD retrofits of County owned buildings;
- Targeted ESD retrofits of County roads;
- Targeted ESD retrofits of County schools;
- Voluntary programs and educational efforts targeting pollutants of concern (e.g., nutrients, bacteria, and trash).

To garner continued public understanding and public support for these elements of the restoration strategy, it is recommended that signs and awareness activities are used to facilitate recognition of ESD restoration practices throughout the county, especially on public sites and other locations where foot traffic is expected to be the highest.

Intended Outcome:

Behavior change throughout the county such that citizens and elected officials advocate to increase funding for ESD capital improvements.

Measures:

- Increase in number of media hits after initial baseline year.
- Increase in number of map downloads after initial baseline year.
- Increase in awareness of public property retrofits through public attitude surveys.
- Increase in requests from community groups to have similar projects in their communities

New Partnerships to Develop:

- Maryland Geocaching Society
- Montgomery County STEM Academy
- Private businesses
- Real estate professionals

Key Messages

- There are new ways to manage stormwater
- This is what ESD practices look like, including rainwater harvesting , green roofs, rooftop disconnection, dry swales, etc
- This is an increased street sweeping location
- This is an impervious cover reduction site

Existing Partnerships to Nurture:

- Department of Recreation
- Montgomery County Public Works and Transportation Department (including Keep Montgomery County Beautiful (KMCB) program
- Watershed Organizations
- Those who have successfully used the County RainScapes Program or live in an area where ESD has been implemented
- Private and Parochial Schools
- Nonprofit organizations such as Bethesda Green and Poolesville Green
- University of Maryland Cooperative Extension
- Montgomery County Public Schools (MCPS)
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, etc.

Delivery Techniques:

The recommended delivery techniques were developed based on thirteen years of experience with educational stormwater management signage design and installation in Annapolis, MD and other locations throughout Anne Arundel county.

These techniques are presented in order of the simplest and most likely to be effective, to those techniques that would marginally affect behavior change when used alone, but may have a significant affect when used cumulatively with the other listed techniques.

Target / Technique	Voting public	Passers by	Elected officials
Signage	*	*	
Geo-data points	*	*	
Pdf maps and phone applications of bike and walk routes of sites	*	*	*
County council bus tour			*
Clean up/maintenance events	*	*	*

Prioritization should be given to those watersheds with ESD goals: Anacostia, Cabin John, Rock Creek, Lower Monocacy and Patuxent.

Target Audience:

- Those who work or live near the improvement site
- Walkers and runners who may pass by the site and see the signage
- Bicyclists who may ride past the site and see the signage
- Voting public in general
- Elected officials such as County Council members

Approximate Program Start-Up Cost -- $50,450

Comprised of the following elements:

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Identify locations of BMPs ($1,000)
- Identify and obtain permits needed for signage ($5,000)
- Coordinate bus tour with council offices ($500)

Program Development

- Design signs ($4,000)
- Procure sign manufacture ($14,000)
- Coordinate with geocaching organization to incorporate sites ($500)
- Design map ($1200)
- Plan event for bus tour ($2,500)
- Schedule and plan clean up/maintenance events ($2,500)

Program Implementation

- Install signs (1 hr – including travel time – for 20 signs = $2,500)
- Upload sign locations ($250)
- Upload map ($250)
- Hold County Council event (4 hrs for 4 staff = $2,000 – does not include cost of elected official's time and shuttle bus)
- Hold clean up/maintenance events (4 hrs for 1 manager, 1 outreach staff and 1 public works crew of 3, plus truck and supplies use @ $500 = $3,000)
- Measure Success ($2,500)

*This list of cost elements and approximate pricing was derived from experience at Back Creek Nature Park in Annapolis, MD.

Delivery Technique Description

- Signage to be developed and installed describing the BMP and its intended result.
- Standardized signs could be developed for each BMP (resulting in approximately 8 different sign types)
- Geo-data point development for inclusion on geocaching web sites and pamphlets
- Biking and walking tour maps of the BMP sign locations to be developed and designed for easy download from the DEP website onto hand held devices. Availability of the maps to be announced via press releases
- Two hour County council bus tour to be an organized weekend event for county council members, hosted by a senior DEP official or the County Executive, with press coverage to increase public awareness of the capital improvements already made in the county and what future improvements will look like.
- Clean up and maintenance events to be held at the BMP locations in conjunction with stream stewards and other watershed organizations, to increase a sense of community ownership of the BMPs and to increase understanding of the maintenance process.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from experience coordinating similar projects in Anne Arundel county.

Months 1-2

- **Program Planning**
  - Permit Signs
  - Coordinate tour with County Council

Months 3 - 6

- **Program Development**
  - Design and manufacture signs
  - Design maps
  - Plan events

Months 7 - 8

- **Program Implementation**
  - Install signs
  - Upload electronic information
  - Hold events

Through the Year 2025

- **Program Sustainment**
  - Measure success
    - 2015
    - 2017
    - 2025

Implementation locations:

- Countywide

Measuring Program Success:

- Track and report media hits on specific improvement sites after each program element is implemented
- Track and report number of hits to download the 2 maps
- Before and after attitude surveys
- Track and report requests for High priority projects.
- Observe and track increases in budget allowances for installation of ESD practices.

January 2012

Public Outreach and Stewardship Practice No. 5

STREAM STEWARDS OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

Although the County currently implements a public education and outreach program to reduce stormwater pollutants, to assure compliance with the third-round Permit will require a significant increase in effective public stewardship and local stream protection.

An important goal will be to create champions for each neighborhood's streams as a cost-effective way to exponentially increase the effectiveness of county outreach to landowners and businesses or organizations with streams on their property, or in their community. Establishing a group of champions for the streams to help implement practices identified in the watershed implementation plans and a continuous volunteer corps to help disseminate information will be key to the plans' success. Two possible models to meet both aspects include that of the Solid Waste's Recycling Volunteer Program and Friends of Rock Creek's Environment's (FORCE) Stream Teams program. Success in adopting these for multiple watersheds in the County will aid the efforts to achieve the significant increase in outreach needed to fulfill the MS4 permit requirements. These models can also forge the creation of additional watershed groups throughout the County.

Intended Outcome:

Behavior change throughout the county such that a diverse group of individuals are actively participating in the care and education about neighborhood streams.

Measures:

- Increase in stream miles adopted by groups each year
- Increase in volunteer hours dedicated to each adopted stream segment, to which load reductions are achieved.
- Increase in awareness and self-reporting of improved behavior for trash control
- Increase in watershed group formations and volunteer participation at public events.

New Partnerships to Develop:

- Homeowners associations
- Ethnic organizations (social, business or religious)
- High schools that are certified Green Schools
- Local colleges environmental studies or watershed-related field program members

Key Messages:

- Every county resident must accept responsibility for the quality of our streams
- There are individuals in every neighborhood who can help coordinate care for county streams
- The county government cannot protect and restore the county streams without residents' help
- County residents of all ages and cultures are encouraged to help protect and restore county streams

Existing Partnerships to Nurture:

- Solid Waste's Recycling Volunteer Program
- Friends of Rock Creek's Environment – Stream Team Program
- Other watershed and environmental organizations (including Izaak Walton League, Audubon Naturalist Society, and Trout Unlimited)
- Other nonprofit organizations such as Bethesda Green and Poolesville Green
- Montgomery County Volunteer Services (Service Learning)
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, etc.

Delivery Techniques:

A stream stewards program should be modeled after the two mentioned programs. Solid Waste's *Recycling Volunteer Program* and FORCE's Stream Teams can create champions for each neighborhood's streams. The *Recycling Volunteer Program* provides volunteers that can be called upon to help the County disseminate county watershed outreach material. Information dissemination can include all of the topics prioritized in the watershed implementation plans (pet waste, litter, lawn care, imperviousness reduction, and riparian buffer restoration). Unlike the *Recycling Volunteer Program*, FORCE's Stream Teams provides leadership opportunities for hands-on stewardship projects in addition to disseminating watershed education material. Adopting aspects from both models can significantly make strides towards meeting MS4 permit requirements.

Ideally, the stream stewards will include representatives from all county ethnic and cultural groups, as well as representation from all watersheds. Outreach associated with recruiting, training and eventually maintaining the stream stewards comprise the majority of this campaign effort.

Target Technique	Home Owners and Renters	Students	Faith and Cultural Organizations
HOA newsletter inserts	*	*	*
Direct mail to faith and cultural organizations			*
Press release on program	*	*	*
Web site presence	*	*	*
Festival and event booth presence	*	*	*
List serve/yahoo group communication mechanism	*	*	*

Prioritization should be given to the following watersheds: Anacostia, Rock Creek, Cabin John, and Muddy/Watts

Target Audience:

- County residents to include both homeowners and renters with an interest in the topic and a small amount of volunteer time available
- Students at local high schools, community colleges and universities, either looking for practical experience or community service credit.
- Faith organizations with environmental stewardship committees or missions, to include all faiths represented in the County (i.e., church organizations, temple groups, mosque groups, and others).
- Cultural organizations to include as many of the cultural identities in the county as possible (i.e., Korean, Chinese, Latin American, African American, and etc.)

Approximate Program Start-Up Cost -- $74,825

Comprised of the following elements:

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Coordinate with Solid Waste on the specifications for "newsletter helper" submissions ($250)
- Obtain and refine faith and cultural organization mailing lists ($1,000)
- Coordinate press release timing with County Public Affairs ($75)
- Coordinate with DEP website manager to identify parameters for web posting ($500)
- Develop list of targeted festivals and events ($1,000)
- Develop scoping document for list serve/communication tool for Stream Stewards ($1,000)

Program Development

- Draft "newsletter helper" content ($250)
- Draft letter to faith and cultural organizations ($750)
- Draft press release on program ($250)
- Develop website content and list serve/communication tool (contractor estimate of $35,000)

Program Implementation

- Distribute newsletter helper piece and press release ($500)
- Mail letter to faith and cultural organizations (approximately 500 letters for printing, supplies and postage = $1,000)
- Post and trouble shoot to DEP web page ($2,000)
- Launch list-serve/communication tool (included in contractor estimate above)
- Staff festivals and events (1 paid staff with volunteers for 8 hrs for 15 events = $15,000 – handouts printing costs included in other outreach practices)
- Measure success ($7,500)

* This list of cost elements and approximate pricing was derived from experience with the Columbia Association Watershed Advisory Committee, the US EPA Recycling Partnership, and quotes obtained from web designers for the NOAA CBIBs website.

Delivery Technique Description

- HOA newsletter inserts – to be distributed through Solid Waste's "newsletter helper" which is distributed electronically on a regular basis to HOAs throughout the county
- Direct mail to faith and cultural organizations – to include encouragement to strengthen the diversity of groups protecting and enhancing county watersheds
- Press release on program – describing the need for volunteers and how to volunteer
- Posting of program information on the DEP web site with on-line registration, training, and scheduling
- Festival and event booth presence to include 2 or more trained volunteers handing out watershed education information and speaking with festival and event attendees about stormwater outreach initiatives at events like the interfaith green fair, Hispanic Heritage and Latino American events, Muslim community center events, and the Asian American resource fair and festivals.
- Creation of a list-serve or other communication tool for stream stewards, which would allow members to post and respond to messages and connect without county assistance.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from professional experience working with numerous organizations to recruit volunteers.*

Months 1-2

- **Program Planning**
  - Develop lists
  - Coordinate with other County offices
  - Develop scoping document for communication tool

Months 3 - 6

- **Program Development**
  - Draft content
  - Develop tool

Months 7 - 24

- **Program Implementation**
  - Distribute material
  - Schedule staff and events
  - Improve tool

Through the Year 2025

- **Program Sustainment**
  - Measure success
    - 2015
    - 2017
    - 2025

*example organizations include the Columbia Association, Friends of Back Creek Nature Park, Maryland Recyclers Coalition, Waterfowl Festivals Inc., Maryland Maritime Heritage Festival, and Friends of the Light House Shelter.

Implementation locations:

- Countywide

Measuring Program Success

- Track and report number of stream miles adopted each year
- Track and report number and diversity of volunteers recruited, hours volunteered by stream, watershed and/or event.
- Before and after attitude surveys
- Track and report number of violations reported on hotline
- Track and report number of watershed groups created and membership trends.
- Track and report number of events staffed annually.

January 2012

Public Outreach and Stewardship Practice No. 6

RIPARIAN REFORESTATION OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

Montgomery County's third-round National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requires that the County restore the County's watersheds through runoff management, and reduce pollutants as required by the watershed TMDLs. In addition the county seeks to reduce stormwater volume and velocity and cool riparian environments, all to improve stream conditions and habitat.

To encourage this habitat restoration and pollutant reduction on private property, stakeholder outreach is recommended for landowners and patrons of businesses or organizations with streams on their property, and covering the important roles of riparian buffers in the landscape.

Intended Outcome:

Behavior change throughout the county such that landowners are actively involved in riparian buffer installation and maintenance on and near their property

Measures:

- Increase in trees planted each year
- Increase in linear feet of buffer restored each year
- Increase in number of HOAs actively involved in buffer program each year.

New Partnerships to Develop:

- Homeowner and landowners associations
- Nurseries and garden centers
- Chambers of Commerce
- Facilities and businesses that border streams lacking adequate buffers

Key Messages:

- Riparian forests play an important role in protecting and restoring the streams and lakes in Montgomery County
- Trees and shrubs should extend 100 feet on each side of a stream for adequate nitrogen and sedimentation removal. The County should promote as much riparian buffer establishment as possible for ideal stream protection.
- Riparian buffers catch sediment and debris—preventing them from entering streams.
- Riparian buffers provide shade and cool streams, creating healthier habitat for fish and other biota in the streams.
- Establishing an adequate riparian buffer on a landowner's property is essential to protecting water quality and stream ecology in the County.

Existing Partnerships to Nurture:

- Watershed Organizations
- Montgomery County Volunteer Center
- Angler groups including Trout Unlimited
- Montgomery Soil Conservation District (MSCD) (including Natural Resource conservation Service - NRCS)
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, Township of Olney, etc.

Delivery Techniques:

In an effort to expand the riparian buffer restoration and maintenance message significantly throughout the county the message of its importance should be delivered and demonstrated through partnerships with existing programs and established dissemination capabilities.

These techniques are presented in order of the simplest and most likely to be effective, to those techniques that would marginally affect behavior change when used alone, but may have a significant affect when used cumulatively with the other listed techniques.

Target / Technique	Land owners with streams	Patrons of lands with streams
HOA newsletter inserts	*	
Partnership on grant applications and planting material assistance for riparian buffer installation projects	*	*
Press releases on availability of existing programs	*	*
Existing program information displays at nurseries	*	
Existing program information at booths at festivals and events	*	*

Prioritization should be given to those watersheds with specific buffer installation goals: Lower Monocacy, Patuxent, and Muddy/Watts

Target Audience*:*

- Private land owners with streams on their property
- Members of organizations with private lands which include streams
- Patrons of businesses with private lands which include streams
- Employees of organizations with private lands which include streams

Approximate Program Start-Up Cost -- $30,575

Comprised of the following elements:

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Coordinate with Solid Waste on the specifications for "newsletter helper" submissions ($250)
- Develop what assistance and how many trees will be offered for grant partnerships ($500)
- Coordinate press release timing with County Public Affairs ($75)
- Determine how many handouts will be needed on current programs to ensure thorough distribution at festivals and events ($500)

Program Development

- Draft "newsletter helper" content ($250)
- Draft press release on program ($250)
- Draft web site content on in-kind offer ($250)
- Have Spanish and Korean versions of needed handouts prepared ($1,250)
- Print needed handouts to ensure thorough distribution of current program materials at festivals and events ($5,000 printing budget)

Program Implementation

- Distribute newsletter helper piece and press releases periodically ($500)
- Post web site content on in-kind offer ($250)
- Provide print materials to stream stewards coordinator ($250)
- Provide in-kind and plant material assistance ($10,000)
- Measure Success ($2,500)

* This list of cost elements and approximate pricing was derived from experience with similar projects in Anne Arundel County and Montgomery County

Delivery Technique Description

- HOA newsletter inserts – to be distributed through Solid Waste's "newsletter helper" which is distributed electronically on a regular basis to HOAs throughout the county
- Partnership on riparian buffer grant applications – advertised through county website, stating that if a non-profit is seeking grant funding for riparian buffer installation that the county will offer in-kind and plant material assistance as a match, to strengthen grant applications.
- Press releases on availability of existing programs – to augment advertising done by other tree-friendly programs the County can distribute press releases when those programs become available to county residents. Example programs include DNR training programs such as Backyard forests, Private woodlands owners, and Woods in your backyard; Marylanders plant trees; and MNCPPC Leaves for Neighborhoods
- Existing program information at booths at festivals and events – whenever DEP watershed outreach staff or volunteers are staffing a booth at a festival or event, riparian buffer program information should be included in the booth display.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from the same experiences cited in development of the cost for this program.

Months 1-2

- **Program Planning**
  - Coordination activities
  - Research activities

Months 3 - 5

- **Program Development**
  - Drafting activities
  - Printing activities

Months 6 - 18

- **Program Implementation**
  - Distribute materials
  - Participate in tree planting

Through the Year 2025

- **Program Sustainment**
  - Measure success
    - 2015
    - 2017
    - 2025

Implementation locations:

- Unbuffered streams in private lands
- Industrial areas
- Private clubs and schools

Measuring Program Success

- Tracking and reporting number of trees planted each year
- Tracking and reporting linear feet and average width of riparian buffer installed each year
- Tracking and reporting number of HOAs actively involved with buffer program each year
- Before and after attitude surveys of landowners in targeted watersheds
- Tracking and reporting number of requests for information on tree planting programs and requests for use in newsletter inserts.

January 2012

Public Outreach and Stewardship Practice No. 7

ROOF RUNOFF REDUCTION OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

Montgomery County's third-round National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requires that the County restore an additional 20% of the total untreated impervious acres to the maximum extent practicable (MEP) on a county-wide basis during the five year permit cycle. Moreover, watersheds throughout the county have total maximum daily load (TMDL) requirements necessitating reduction in sediments throughout county streams. Lastly, stream scour has been identified as a contributory factor to stream habitat impairment.

Residential roofs, commercial roofs, and other hard surfaces such as driveways are all sources of imperviousness. To reduce stormwater pollution on private property, stakeholder outreach is recommended explaining the need for watershed stakeholders to capture some of the precipitation that falls on their roof. Capture allows for groundwater recharge and slows the flow of surface waters reducing associated erosion impacts. It is recommended that this can be accomplished by expanding existing County programs that help to get ESD practices installed as a result of County education and incentive programs (e.g., RainScapes incentives and green roof subsidies).

Intended Outcome:

Behavior change throughout the county such that landowners consider it necessary to disconnect rooftops resulting in prevention of detrimental environmental harm.

Measures:

- Increase in number of attendees at workshops each year
- Increase in number of rooftop disconnections in targeted neighborhoods
- Increase in number of HOAs participating in disconnection program each year
- Increase in number of commercial properties achieving rooftop disconnection each year

New Partnerships to Develop:

- Civic, homeowners, and neighborhood associations
- Property management professionals
- Real estate professionals
- Neighboring county roof runoff social media programs

Key Messages

- Roofs are a source of high volumes of stormwater runoff
- It is important to capture some of the precipitation that falls on roofs to reuse as a water source
- It is important to slow the flow of precipitation from roofs to allow groundwater recharge and prevent detrimental environmental harm such as increased flooding, streambank erosion and stream scour.

Existing Partnerships to Nurture:

- Those who have successfully used the County RainScapes Program
- Watershed Organizations
- County Office of Consumer Protection
- Center for Watershed Protection seminar providers
- Utilities
- Commission on Common Ownership of Communities
- Montgomery County Office of Community Partnerships
- Montgomery County Department of Housing and Community Affairs
- Non-Profit Organizations such as Bethesda Green, Poolesville Green and Rebuilding Together
- Chambers of Commerce
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, etc.

Delivery Techniques:

The existing county RainScapes program should be expanded targeting the mapped areas in the implementation plans. Outreach to real estate professionals and homeowner assistance businesses should be used to help expand the program. Advertising materials already developed on EPA and other government web sites can be readily adapted to save costs. Service organizations with existing grant funding to educate should be invited to offer programs in Montgomery County specifically on topics such as rooftop disconnection and residential source assessments.

These techniques are presented in order of the simplest and most likely to be effective to those techniques that would marginally affect behavior change when used alone, but may have a significant affect when used cumulatively with the other listed techniques.

Target / Technique	Home Owners and renters	Commercial Property Managers	Real Estate Professionals, landscaping firms, and roofing/gutter firms
HOA newsletter inserts	*		*
Signage at home improvement stores	*	*	*
Consumer Protection Office presentation materials	*		*
Informational materials to realtors via e-mail and web site		*	
DEP Web page videos or links to videos of RainScaping installation	*	*	*
Media kit adaptation and use	*	*	*
Targeted educational seminars/programs	*	*	*

Prioritization should be given to those watersheds with specific runoff reduction goals: Anacostia, Cabin John, and Rock Creek

Target Audience:

- Homeowners
- Commercial property owners to include property owners with roofs suitable for the RainScapes program
- Residential renters who might be able to make non-structural changes to their property or to convince the landowner to make RainScapes improvements
- Commercial renters who might be able to make non-structural changes to their property or to convince the landowner to make RainScapes improvements.
- Realtors who would be comfortable explaining to clients the opportunities for RainScapes and the merits of already-installed RainScapes.
- Landscaping, roofing, and gutter firms capable of encouraging customers to consider Rainscape alternatives on their property

Approximate Program Start-Up Cost -- $101,400

Comprised of the following elements:

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Coordinate with Solid Waste on the specifications for "newsletter helper" submissions ($250)
- Coordinate with Consumer Protection Office on presentation and handout specifications ($250)
- Develop distribution process for communicating with home improvement stores, realtors, and Landscaping, roofing, and gutter firms ($1000)
- Coordinate with neighboring counties and governments on specifications of available PSAs and conditions for their use ($1000)
- Coordinate with Center for Watershed Protection or other educational resources on processes for identifying and offering targeted seminars ($1000)

Program Development

- Write copy for "newsletter helper" submissions, CPO presentation and handout, and realtor and contractor informational materials ($2,500)
- Schedule targeted educational seminars and programs ($2,000)
- Obtain and if needed modify existing PSAs and other available videos for posting on DEP webpage ($2,500 plus $5,000 allowance for PSA modification)

Program implementation

- Distribute written materials ($1000 plus printing and postage allowance of $2,000)
- Post web materials and distribute PSA ($500)
- Conduct targeted seminars (20 2 hr seminars for 30 people each at $119/person = $71,400)
- Measure success ($2,500)

* This list of cost elements and approximate pricing was derived from experience with the Maryland Recyclers Coalition, Anne Arundel Rainscaping Education program, the Waterfowl Foundation, Inc., and the Center for Watershed Protection current seminar pricing.

Delivery Technique Description

- HOA newsletter inserts – to be distributed through Solid Waste's "newsletter helper" which is distributed electronically on a regular basis to HOAs throughout the county
- Signage at home improvement stores – to be distributed as electronically via e-mail and website posting as downloadable posters with key messages
- Consumer Protection Office presentation materials – to include a few power point slides and a handout that can be included in their speaker's bureau's speaker kits after speaker training by DEP
- Informational materials to realtors via email and website providing them the tools to speak informatively when showing a home with rainscape features or potential.
- Enhancement of the DEP web page to include video or links to video of rainscape installation
- Media PSA campaign using existing media kits, with small adaptations to make it watershed-specific
- Targeted educational seminars and programs that go into specific neighborhoods and target specific audiences from the list of targets above.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from the same experiences cited in development of the cost for this program.

Months 1-2

- **Program Planning**
  - Coordination with other County agencies
  - Coordination with partners external to County government

Months 3 - 4

- **Program Development**
  - Write copy
  - Schedule programs
  - Coordinate PSA

Months 5 - 18

- **Program Implementation**
  - Distribute and post materials
  - Conduct seminars

Through the Year 2025

- **Program Sustainment**
  - Measure success
    - 2015
    - 2017
    - 2025

Implementation Points

- Targeted watersheds

Measuring Program Success

- Tracking and reporting number of attendees at workshops each year
- Tracking and reporting number of rooftop disconnections in targeted neighborhoods each year
- Tracking and reporting number of HOAs participating in rooftop disconnection programs each year
- Tracking and reporting number of commercial properties participating in rooftop disconnection each year
- Tracking and reporting number of rooftop disconnection specific video hits on DEP website and requests for PSA use by other organizations in Montgomery County.

January 2012

Public Outreach and Stewardship Practice No. 8

PARKING LOT RUNOFF WATER QUALITY OUTREACH AND STEWARDSHIP CAMPAIGN

Summary:

Montgomery County must add stormwater management for runoff from untreated impervious acres, to the maximum extent practicable during the five year permit cycle. There is a significant amount of impervious acreage associated with non-residential properties which lacks adequate stormwater treatment. Stakeholder outreach is recommended in partnership with chambers of commerce, and business associations to educate landowners on BMPs that can be implemented to reduce runoff from private parking lots on these non-residential properties. Recommended Practices should include those in Chapter 5 of the MDE Design Manual which focus on harvesting and infiltrating rainwater as well as practices that mitigate large areas of imperviousness such as pavement removal or installation of porous pavement and sidewalks. Additional practices to consider include parking lot retrofits such as installation of conservation landscaping. Encouraging these practices in areas where parking lots simply cannot be removed or retrofitted will assist in stormwater pollution prevention.

The County even offers assistance through the RainScapes Rewards program with rebates to commercial, multi-family residential, and institutional (religious facilities, private schools).

Intended Outcome:

Behavior change throughout the county such that property owners prefer to treat and disconnect impervious cover.

Measures:

- Increase in parking lot impervious cover area treated or disconnected
- Increase in number of locations where parking lot treatment occurs each year
- Increase in area associated with permeable paving in parking lots each year.

New Partnerships to Develop:

- Business organizations
- Private schools
- Places of worship
- Neighborhood and homeowner associations
- Athletic organizations
- Commercial real estate professionals

Key Messages

- Large impervious parking lots prevent groundwater recharge
- Large impervious parking lots cause precipitation to move rapidly when it comes off the lot, potentially causing damage to the property, neighboring properties and accelerated erosion in local streams .
- Encouraging rainwater harvesting, green roofs, upland reforestation, soil compost amendments, rooftop disconnection, “green street” retrofits can all help groundwater recharge and assist in stormwater pollution prevention near parking lots, in areas where parking lots simply cannot be removed or retrofitted.

Existing Partnerships to Nurture:

- Watershed Organizations
- Chambers of Commerce
- Montgomery County Department of Economic Development
- Commission on Common Ownership of Communities (CCOC)
- Montgomery County Office of Community Partnerships
- Nonprofit Organizations such as Bethesda Green and Poolesville Green
- Local municipalities, as appropriate, such as City of Gaithersburg, City of Rockville, City of Takoma Park, etc.

Delivery Techniques:

Messages concerning the problems associated with large tracts of impervious surface that are caused by large parking lots should be delivered directly to landowners with large parking lots and those who patronize the organizations located on that land. Messages with solutions such as the commercial/schools/multifamily RainScapes program should also be delivered.

These techniques are presented in order of the simplest and most likely to be effective to those techniques that would marginally affect behavior change when used alone, but may have a significant affect when used cumulatively with the other listed techniques.

Target / Technique	Landowners with large parking lots	Tenants of properties with large parking lots	Patrons of organizations located on properties with large parking lots
Direct communication with green business program participants	*	*	
Direct contact with business groups representing targets	*	*	
PSA campaign	*	*	*
Sending Imperviousness grading system or posting online	*	*	*

Prioritization should be given to those watersheds with specific imperviousness reduction goals: Anacostia, Cabin John, and Rock Creek

Target Audience*:*

- Landowners with large parking lots such as auto dealers, private schools, places of worship, professional office buildings, shopping malls, hospitals, or private clubs
- Tenants of properties with large parking lots to include those tenants who specify site design and build-out of property
- Patrons of organizations with private parking lots such as congregation members, club members, school students, business patrons and business employees

Approximate Program Start-Up Cost -- $41,500

Comprised of the following elements:

Pre-Program Planning

- Identify funding/sponsorship sources ($3,750)
- Secure funding from grantors, sponsors and county sources ($5,000)

Program Planning

- Coordinate with green business program team ($500)
- Develop a good distribution list of the groups that represent targets ($2,000)
- Coordinate with Public Affairs regarding the PSA campaign ($250)

Program Development

- Draft content and layout of messages to both green business program participants and groups that represent targets ($2,500)
- Print messages for where e-mail contact is not possible ($1,000 allowance)
- Research available PSA campaigns, identify preferred campaign, contact campaign owner to arrange for use of campaign ads, modify ads as needed ($10,000)
- Develop imperviousness grading system program ($5,000)

Program Implementation

- Distribute messages periodically to both green business program participants and groups that represent targets (2 hrs per month = $ 3,000 plus postage allowance of $500)
- Disseminate PSA campaign ($500)
- Implement imperviousness grading system program ($5,000)
- Measure Success ($2,500)

* This list of cost elements and approximate pricing was derived from experience with several advocacy non-profit organizations state-wide.

Delivery Technique Description

- Direct communication with green business program participants to include emails and newsletter inserts on the importance of installing BMPs in parking lots to reduce imperviousness county-wide.
- Direct contact with business groups representing targets to include presentations at periodic meetings and inserts for newsletters. Groups envisioned include Chambers of Commerce, interfaith councils, private school associations, hospital and medical associations.
- PSA campaign -- using a portion of one of the many stormwater PSA campaigns available nationwide, DEP would post the PSA on its website and disseminate its posting through a series of press releases
- An imperviousness grading system (A= little imperviousness; F = Large tracts of imperviousness) should be modeled after the Recycling Grading system created by Solid Waste services or Energy analytical tools in use by Utility companies to compare neighbors/neighborhoods energy use. Creates a presence for friendly competition.

Timeline for Start-Up and Early Implementation:

The following timeline was derived from the same experiences cited in development of the cost for this program.

Months 1-2

- **Program Planning**
  - Coordination activities
  - Research activities

Months 3 - 6

- **Program Development**
  - Message preparation
  - PSA research
  - Impervious grading program design

Months 7 - 18

- **Program Implementation**
  - Distribution and dissemination
  - Impervious grading program implementation

Through the Year 2025

- **Program Sustainment**
  - Measure success
    - 2015
    - 2017
    - 2025

Implementation locations:

- Commercial areas
- Industrial areas
- Private clubs and schools

Measuring Program Success

- Tracking and reporting area of parking lot impervious cover treated or disconnected
- Tracking and reporting the number of locations where parking lot treatment occurs each year
- Tracking and reporting area associated with permeable paving in parking lots each year
- Tracking and reporting trends in impervious grading system.