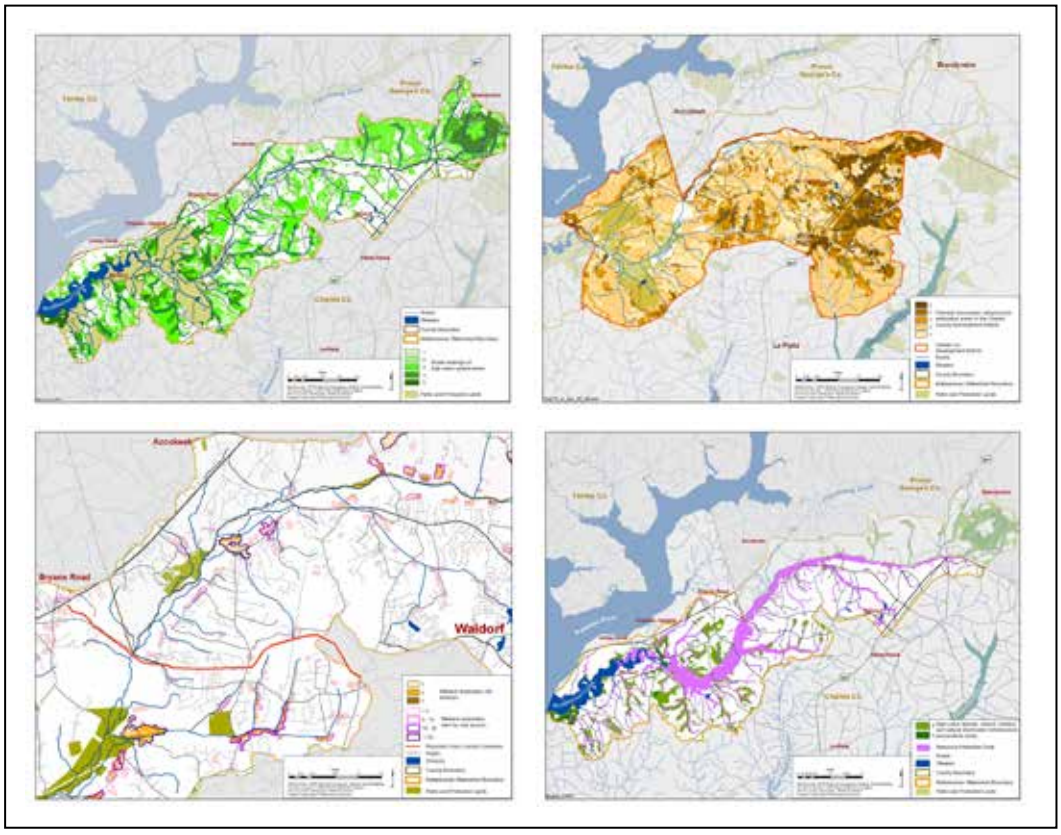
Integrating Priorities and Achieving a Sustainable Watershed Using the Watershed Resources Registry in the Mattawoman Creek Watershed



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List of Acronyms

BEA	Buffer Exemption Area
BMP	Best Management Practice
BRI	Biological Restoration Initiative
CCC	Cross County Connector
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
CWA	Clean Water Act
DDD	Deferred Development District
DNR	Maryland Department of Natural Resources
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESD	Environmental Site Design
FHWA	Federal Highway Administration
GI	Green Infrastructure
GIS	Geographic Information System
GPD	Gallons per Day
IBI	Indices of Biologic Integrity
LPPRP	Land Preservation, Parks, and Recreation Plan
MBSS	Maryland Biological Stream Survey
MDE	Maryland Department of the Environment
MDOT	Maryland Department of Transportation
MEP	Maximum Extent Practicable
MEPA	Maryland Environmental Policy Act
MDG	Million Gallons per Day
MS4	Municipal Separate Storm Sewer System
NEA	Natural Environmental Area
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NTWSSC	Nontidal Wetland of Special State Concern
PFA	Priority Funding Area
RPZ	Resource Protection Zone
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act
SHA	Maryland State Highway Administration
SSA	Science Services Administration
TDR	Transferable Development Right
TEA	Targeted Ecological Area
TEA-21	Transportation Equity Act for the 21st Century
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
WIP	Watershed Implementation Plan
WMA	Water Management Administration
WMA	Wildlife Management Area
WQC	Water Quality Certification
WRE	Water Resources Element
WRR	Watershed Resources Registry
WSSC	Washington Suburban Sanitary Commission
WWTP	Wastewater Treatment Plant

1 Watershed Resources Registry

The Maryland Watershed Resources Registry (WRR) is the latest tool for identifying environmental restoration and preservation sites. The tool uses spatial datasets that represent both natural characteristics and priorities of government agencies.[1] Specifically, the WRR uses georeferenced data to identify opportunities for riparian, wetland, upland, and stormwater restoration and preservation projects. The WRR builds off of previous targeting and watershed planning tools, particularly the 2006 Maryland Department of the Environment document, *Prioritizing Areas for Wetland Restoration, Preservation, and Mitigation*.[2]

The WRR is the latest iteration in the evolution of environmental targeting tools. Historically, most government agencies have focused on limiting negative environmental impacts through a permitting process. The WRR is the most recent comprehensive management approach for proactively targeting valuable natural resources for preservation and restoration.

It also ushers in a new level of transparency between regulators and the regulated community and provides an opportunity to streamline the various decision-making processes. This is achieved by using many of the same data and criteria in the tool as are used by regulatory agencies for decision making. Though, this does not imply that the WRR is intended to be the sole source of information considered when making permitting decisions as many other factors need to be weighed.

Additionally, the WRR reflects the recognition of watersheds as the preferred unit of analysis and implementation to protect land and water resources. Inherent in this is a move toward a watershed approach for protection and restoration. Taking the watershed approach acknowledges that many factors contribute to whether or not a watershed is a functioning system. A healthy watershed supports a diversity of land and aquatic flora and fauna. These systems also provide services to humans including water filtration, flood protection, and recreational opportunities.

An unhealthy watershed can be identified by conditions such as poor water quality, eroded stream banks, and low species diversity. In this scenario, the "needs" of a watershed can be identified. These needs constitute the actions required to return it to a functioning system.

In this context, the Maryland WRR contains eight opportunity analyses that identify potential locations to address a watershed's needs. In addition to identifying suitable sites, the WRR ranks them by the level of need and whether or not it is in a priority area for one or more government agency.

The eight opportunity analyses that comprise the WRR are:

- Wetland preservation,
- wetland restoration,
- upland preservation,

[1] More information on the history and development of the WRR can be found in Bryson, Ellen, et al. Achieving Ecosystem Health Using a Watershed Approach. *National Wetlands Newsletter*. Environmental Law Institute: Washington, D.C. 2010.

[2] Maryland Department of the Environment. "Prioritizing Areas for Wetland Restoration, Preservation, and Mitigation." (2006) <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/prioritizingareas.aspx > Accessed June 28, 2010.

- upland restoration,
- riparian zone preservation,
- riparian zone restoration,
- natural stormwater infrastructure preservation, and
- compromised stormwater infrastructure restoration.

This report is a case study of how the WRR can be used and applied in a specific watershed. The Charles County, Maryland, portion of the Mattawoman Creek watershed is used as the study area. This portion of the Mattawoman was selected because it holds significant ecological value for the region and, at the same time, faces increasing development pressure.

The report provides an overview of conditions in the watershed and summarizes state, federal, and local regulations and non-regulatory initiatives. The final section of the report provides examples of how the tool can be used in Charles County and the Mattawoman watershed.

1.1 Problem Statement

Identifying watershed needs and priorities

The WRR was developed to address common challenges facing regulators, developers, environmental groups, and other stakeholders. One of these challenges is identifying the needs of a watershed that would help restore it to a healthy system. These stakeholders also need to be able to prioritize sites and the types of projects that would meet these needs.

Resources available for environmental projects are limited for both governmental and non-governmental organizations. Therefore, it is essential to select the most valuable sites and those that reap multiple ecological benefits.

This is especially important for agencies responsible for implementing regulations. Programs are often run in isolation from one another without realizing common goals. This can lead to duplicative efforts and missed opportunities. Agencies would benefit from efforts to integrate data and projects to meet multiple objectives.

Permitting processes

Another challenge faced by stakeholders is the permitting processes. Applicants submit detailed plans for projects knowing that they are to avoid impacts to wetlands and waterways, but do not always achieve the avoidance and minimization requirements of the permitting agencies.

This process is a common stumbling block in highway projects. Highways tend to cover a large land area and can cause permanent ecological damage. Thus, road alignments are often contested and extensive wetland and waterway mitigation and stormwater management projects are required.

Identifying locations for these projects is not simple. Permitting agencies are responsible for ensuring that impacts are mitigated. Transportation agencies are responsible to the public for constructing safe roads within an approved budget. For the transportation agencies, projects would

ideally be located on land it already owns that has the potential to meet multiple environmental goals. This may not coincide with sites that will address the watershed's most pressing needs.

The Chesapeake Bay Total Maximum Daily Load (TMDL) is drawing more attention to the need to preserve and protect natural resources. Maryland is facing large nutrient and sediment load reductions under the TMDL. Meeting these will require more extensive mitigation and stormwater management projects.

Land use planning

The overarching challenge is how to strike an appropriate balance between protecting natural resources and the desire for communities to grow. Often local jurisdictions are aware that natural resources are valuable and should be protected, but do not know exactly where or how to go about doing this.

Also at the local level, developers want local governments to maintain straight-forward and efficient application processes for plans and permits. At the same time, environmental groups and other stakeholders want timely information and the ability to weigh-in on decisions. Both groups want a transparent process through which informed decisions are made.

1.2 Indentifying Solutions

To address these challenges, the Watershed Resources Registry was developed to help streamline information collection and preparation for permit processes, prioritize watershed needs, and help stakeholders use limited resources to achieve multiple goals.

Watershed approach and ranking priorities

Of the datasets included in the WRR, some were used to judge the physical suitability of a location for a specific project type (wetland preservation, wetland restoration, upland preservation, upland restoration, riparian zone preservation, riparian zone restoration, natural stormwater infrastructure preservation, or compromised stormwater infrastructure restoration). Others represent preferred conditions and agency priorities. For instance, to identify upland preservation opportunities, developed land was excluded, but land in a Maryland Tier II/High Quality watershed received one point. Therefore, sites that are physically better are ranked higher, as are those that meet more agency priorities.

Other datasets, such as the one identifying areas that drain into a water quality-impaired stream, highlight the needs of a watershed. Incorporating these types of factors allowed for the watershed approach to be considered when prioritizing sites.

Furthermore, the WRR can locate sites that provide multiple benefits (i.e. preservation of wetlands and natural stormwater infrastructure). This allows for further prioritization of sites and hopefully translates to a greater return on investment.

Integrating regulations and programs

A key driver behind the WRR was the desire to integrate regulatory and non-regulatory authorities across agencies and levels of government. Specifically, the Environmental Protection Agency (EPA) hoped to identify sites that would address Clean Water Act (CWA) provisions covering wetlands, stormwater, and in-stream water quality. This is achieved by the WRR in two ways. The first is by including CWA requirements into the scoring rubric for each analysis. The second is by identifying sites that meet the requirements for multiple opportunity analyses.

For example, Clean Water Act Sections 303 and 305, covering water quality standards, monitoring, and TMDLs, are reflected in the ranking of sites. Locations are scored based on the designated use of nearby streams and on whether or not it is near an impaired stream. These factors are included in all eight opportunity analyses.

Sections of the CWA covering stormwater discharges (402) and wetland mitigation (404) are addressed in dedicated opportunity analyses. While each can be used individually, users of the WRR can choose to select results that would have both wetland and stormwater benefits. These sites could represent an opportunity to preserve an existing wetland that is part of the natural stormwater infrastructure system.

The WRR also addresses the watershed planning requirements of CWA Section 319 by identifying and prioritizing potential restoration and preservation project sites.

In addition to integrating CWA authorities, the WRR includes data from the Maryland Department of the Environment and Department of Natural Resources. These data are used as ranking factors in the scores for each opportunity analysis. This means, for example, that riparian zones with habitat for rare, threatened, or endangered species receive a higher score.

Improving permitting processes

Ideally, the WRR will save time and money by streamlining information collection and preparation required through various permit processes. Many permits require joint review by multiple federal and state agencies. Now that many of these agencies have put their priorities into the WRR, both applicants and reviewers can access the same information in one place, increasing consistency and efficiency.

The tool also provides permit applicants an easy way to identify priority natural resource areas in the planning phase before the review process is initiated. Developers know that impacts to wetlands and waters are supposed to be avoided. The WRR's online tool will hopefully provide them with more data in one location that can assist in selecting less sensitive locations from the outset. In the event that environmental damage is unavoidable, using the WRR can facilitate the selection of a mitigation site.

The tool does not preclude the need to consider other information when planning projects or making permit decisions. The WRR is meant to provide an initial set of potential options, the suitability of which will have to be verified with field reviews.

Land use planning

At the local level, the WRR provides access to state and federal natural resource expertise that could otherwise be difficult to compile. County planners can use the tool to inform resource protection measures, open space networks, zoning, and comprehensive land use plans. It can also inform decisions about where to direct or avoid development and transportation projects.

1.3 Creating the Watershed Resources Registry

Interagency Process

The collaborative process used to create the Watershed Resources Registry grew out of the Green Highways Partnership and a proposed highway project in southern Maryland. The goal of this effort was to design a green highway with reduced environmental impacts. Stakeholders in this effort recognized a broader need to easily identify watershed needs, prioritize project sites, and integrate agency priorities. Thus, the WRR initiative got its start.

The WRR effort started with an interagency team that met consistently over the course of several years and continues to do so. Agencies involved in the process include:

- U.S. Environmental Protection Agency Region 3,
- U.S. Army Corps of Engineers, Baltimore District,
- U.S. Fish and Wildlife Service,
- National Marine Fisheries Service,
- Natural Resources Conservation Service,
- Federal Highway Administration,
- Maryland State Highways Administration,
- Maryland Department of Natural Resources,
- Maryland Department of the Environment,
- Maryland Environmental Service,
- Charles County, Maryland, and
- Prince George's County, Maryland.

The group met to determine the opportunity analyses that could be conducted and which would be most valuable. They also deliberated over which factors would be included in each analysis and how they would be scored. Once the analyses were finalized, the group decided how best to disseminate and display the information.

Each agency contributed data and extensive staff time to the project. The contributions from each agency signal their commitment to developing a robust tool that can be used to meet their own needs. This dedication has translated into a truly interagency product.

The next steps for the interagency team include a desktop review and ground-truthing to verify the results. The agencies are also working to finalize an interagency agreement that will solidify use of the WRR and guarantee that it remains up to date.

Technical Development

The interagency process resulted in eight opportunity analyses for Maryland. Each one identifies sites where a restoration or preservation project could potentially be located. The list below states the purpose for each analysis:

1. Wetland preservation: Identify high-value wetlands that are not permanently preserved. 'Permanently preserved' means lands that are owned by a public agency or conservation organization or lands that are protected by conservation easement.
2. Wetland restoration: Identify areas that are not currently wetlands but have conditions that would support wetland creation.
3. Upland preservation: Identify areas where the natural upland ecosystem remains substantially intact and healthy.
4. Upland restoration: Identify areas where the natural upland ecosystem is stressed or weakened and there is the potential to return it to a healthy system.
5. Riparian zone preservation: Identify areas adjacent to streams that are important to preserving stream health.
6. Riparian zone restoration: Identify areas adjacent to a stream where the natural condition of the riparian zone has been compromised.
7. Natural stormwater infrastructure preservation: Identify natural areas where current conditions support maximum groundwater recharge and/or minimal stormwater runoff.
8. Compromised stormwater infrastructure restoration: Identify areas where the stormwater system is compromised or failing.

Each opportunity analysis contains a set of absolute and relative (preferred) factors (Figure 1-1). Absolute factors are required or prohibited physical characteristics. These determine the basic suitability of a location for a given project category. Relative factors are preferred physical characteristics and federal and state agency priority areas. If a site was deemed suitable given the absolute factors, the relative factors were then summed to assign a score to each site.

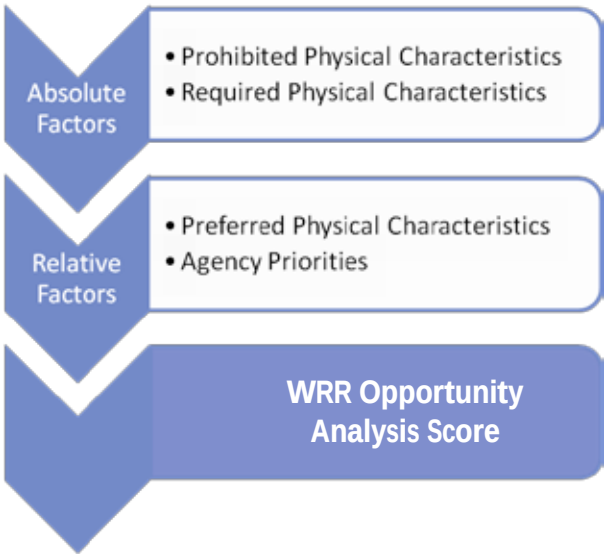


Figure 1-1. Each opportunity analysis contains a set of absolute and relative factors that are used to determine the suitability of a site and its priority. Absolute factors are required or prohibited. Relative factors determine the score a site received in each analysis.

Twenty-three spatial data layers were used in the development of the WRR, though not all were used in every analysis. Table 1-1 lists the datasets used, who created them, and the information contained in them. Table 1-2 indicates which layers were used and how they were scored in each analysis.

ESRI geographic information system (GIS) software was used to score 30-by-30 meter cells across the state of Maryland. This analysis unit was selected because it was the lowest resolution among all the datasets used. This results in each cell in the state having a raw score for each opportunity analysis.

In order to put the scores in the same context between the analyses, the raw scores were converted into a percentage. For example, if a cell met all the absolute factors and met seven of ten relative factors, it would get a new score of 70. Doing this was important because the analyses had varying numbers of factors that were considered.

These new scores were then translated into the final one-to-five ranking system. The classification method selected for this was Jenks Natural Breaks. This method minimizes the difference within a class of scores and maximizes the difference between classes. The ESRI software automates this process.

Doing this allowed for a simple ranking system that could be used for all the analyses. It also grouped the percent values together in a way that eliminated trivial differences. For instance, if the percent values were used, a site with a 55 might be selected over a site with a 50 even though there is not that much difference between the two. The natural breaks method classifies the scores so that there are genuine differences between a cell that ranks as a three and one that ranks as a four.

GIS shapefiles were created to identify the rank of all suitable sites in Maryland for each opportunity analysis.

Figure 1-2 through Figure 1-9 show the ranking of parcels within the Mattawoman watershed for each analysis. Larger versions of these maps can be found in the appendix.

It is important to note that site visits are required before a specific site can be selected and a project be put on the ground. Additionally, because these maps were generated prior to the desktop review and ground-truthing effort, results may change in future versions of the tool.

Online Tool

An online tool was developed as the public interface for the WRR.[3] It includes the site rankings for each analysis. It also serves as a hub of spatial data available for Maryland.

Many other features were built into the tool making it dynamic and user-friendly. Features include:

- Additional data of interest (i.e. sea level rise);
- option for aerial views of the landscape to verify what is on the ground;
- links to tax parcel information that can help determine land ownership;
- ability to search for sites in a specific watershed or county, sites of a certain size or rank, or for a location given longitude and latitude or a street address;
- summary of site characteristics and analysis ranks; and
- the option to print a map of selected areas, the print out includes analysis ranks and site characteristics as well.

Ultimately, users will be able to feed information back into the tool, making it a true registry. It is anticipated that photos and comments from site visits can be uploaded to the website and be available to other users. It will also incorporate information on projects that have been completed.

Users looking for potential sites in a specific watershed for a given purpose are likely consumers of the online version of the results. Others may find the GIS shapefiles more appropriate for their needs. These files allow for more complicated analyses and the incorporation of additional information. Results using the one-through-five ranking system are exactly the same regardless of the interface used to view them.

[3] The registry is online at http://watershedresourcesregistry.com.

Table 1-1: Spatial data used in the Watershed Resources Registry opportunity analyses.[4]

Layer	Source	Description	Date
Land Use/Land Cover	Maryland Department of Planning	Land use/land cover designations	2008
National Hydrography Dataset	U.S. Geological Survey and Environmental Protection Agency	Streams and waterbodies	1999
DNR Wetlands	Maryland Department of Natural Resources – Geographic Information Services Division	Maryland wetlands	1993
National Wetlands Inventory	U.S. Fish and Wildlife Service	Nationwide wetlands	2009
Floodplain	FEMA Q3 Digital Flood Plain Data	Floodplain	Various
Soil Type	U.S. Department of Agriculture – Natural Resources Conservation Service	Soil types and characteristics	Unknown
Impervious Surfaces	Maryland	Impervious and pervious surfaces	Unknown
Protected Lands	Maryland Department of Natural Resources - Wildlife and Heritage Division	Federal and state-owned lands	2002
Maryland Stream Use Class	Maryland Department of the Environment	Designated uses for Maryland streams	Unknown
303(d) Listed Streams – MD 2008 Integrated Report	Maryland Department of the Environment – Science Services Administration	Streams not meeting water quality standards for designated use	2009
Development Era	USACE Baltimore District Geographer, using the USGS Chesapeake Bay Land Cover 1984 and 2001 datasets	Time period during which development (defined as a change from forested or farmed to an urban, suburban, commercial or industrial use) occurred; used to approximate stormwater management characteristics	1984; 2001
Forest Interior Dwelling Species Habitat	Maryland Department of Natural Resources, Landscape and Watershed Division and Natural Heritage Program	Identifies potential habitat for forest interior dwelling bird species	2003
Wetlands of Special State Concern*	Maryland Department of the Environment and Maryland Department of Natural Resources	Wetlands with rare, threatened, or endangered species or unique habitat	1998
Tier II High Quality Stream Watershed	Maryland Department of the Environment – Science Services Administration	High quality waters that exceed the water quality standards for their designated use	2009
Stronghold Watershed*	Maryland Department of Natural Resources – Monitoring and Non-tidal Assessment Division	Identifies watersheds that are most important for the protection of aquatic biodiversity, specifically areas where rare, threatened, or endangered freshwater fish, amphibians, reptiles, or mussels are in the highest numbers	Unknown
Sensitive Species Project Review Areas	Maryland Department of Natural Resources, Wildlife & Heritage Service	General locations of rare, threatened, and endangered species	2003
Green Infrastructure*	Maryland Department of Natural Resources	Maryland network of undeveloped land, includes hubs, corridors, and gaps	2001

[4] Bryson, Ellen. Army Corps of Engineers. Personal communication. June 30, 2011.

Blue Infrastructure*	Maryland Department of Natural Resources	High priority habitats and natural resources in coastal watersheds	Unknown
GreenPrint - Targeted Ecological Areas*	Maryland Department of Natural Resources	Areas that have extremely high ecological value and meet other state priorities for preservation	2008
Trust Fund Watersheds*	Unknown	Designated by the Chesapeake and Atlantic Coastal Bays Trust Fund as the watersheds contributing the largest amounts of nitrogen and phosphorus to the Bay	Unknown
Biological Restoration Initiative Watersheds*	Unknown	Watersheds with streams on the 303(d) list with the highest potential for removal from the list after restoration activities	Unknown
Chesapeake Bay Critical Area*	Chesapeake Bay Critical Area Commission, Maryland Department of Natural Resources	All land and water within 1,000 feet of the boundaries of state and private wetlands and the heads of tides	2001
Priority Funding Areas*	Maryland Department of Planning	Existing communities where the state will invest to support growth	2003

*These layers are specific to the state of Maryland. While similar information may be available for other states and locations, these layers were developed by Maryland state agencies. Full metadata is available on the WRR website.

Table 1-2. Scoring rubric for the eight Watershed Resources Registry's opportunity analyses.[5]

Factors (Either absolute or relative. Points are listed for relative factors.)	Preserving Wetlands	Restoring Wetlands	Preserving Uplands	Restoring Uplands	Preserving the Riparian Zone	Restoring the Riparian Zone	Preserving Natural Stormwater Infrastructure	Restoring Compromised Stormwater Infrastructure
Wetlands	Required	Prohibited	Prohibited	Prohibited			+1	x0.3
Water			Prohibited	Prohibited		Prohibited	Prohibited	
Protected land	Prohibited		Prohibited		Prohibited		Prohibited	
Developed			Prohibited	Prohibited				
Karst geology								x0.3
Forested	+1	Prohibited	+1	Prohibited	+1	Prohibited		x0.3
Forested (not farmed, urban)							+1	
Forested within 125 feet, 250 feet, or 500 feet of a stream or waterbody							125: +1 250: +2/3 500: +1/3	
Forested in or near (200 feet) an impervious surface							+1	
Poorly drained soil (somewhat poorly, poorly, or very poorly)		Required						
Well drained soils							+1	

[5] Bryson, Ellen. Army Corps of Engineers. Personal communication. June 30, 2011.

Near (100 feet) but not in a stream or waterbody			+1	+1				
Near (200 feet) but not in a stream, waterbody, or wetland		+1						
Near (500 feet) but not in a stream or waterbody					Required	Required		
Within 125 feet, 250 feet, or 500 feet of a stream					125: +1 250: +2/3 500: +1/3	125: +1 250: +2/3 500: +1/3		
In a floodplain							+1	x0.3
In a 100-year or 500-year floodplain		100-year: +1 500-year: +1/2			100-year: +1 500-year: +1/2	100-year: +1 500-year: +1/2		
Drains to a Stream Classification Use II, III, or IV stream		+1	+1	+1	+1	+1	+1	+1
Drains to a Stream Classification Use II, III, or IV stream, but is not a waterbody	+1							
Within 100 feet or 500 feet of a 303(d) listed stream		100 ft: +1 500 ft: +1/2	100 ft: +1 500 ft: +1/2	100 ft: +1 500 ft: +1/2		100 ft: +1 500 ft: +1/2		100 ft: +1 500 ft: +1/2
In a Blue Infrastructure priority watershed	+1	+1	+1	+1	+1	+1	+1	+1
In a Tier II watershed	+1	+1	+1	+1	+1	+1	+1	+1
In a Biological Restoration Initiative watershed		+1				+1		+1
In a High Priority or Medium Priority Trust Fund Watershed		High: +1 Medium: +1/2		High: +1 Medium: +1/2		High: +1 Medium: +1/2		
In a Stronghold Watershed 1 or 2	1: +1 2: +1/2	1: +1 2: +1/2			1: +1 2: +1/2	+1	+1	+1
In the Chesapeake Bay Commission Critical Area		+1	+1	+1	+1	+1		
In the Chesapeake Bay Commission Critical Area's Limited Development Area or Resource Conservation Area	+1							
In a Wetland of Special State Concern	+1				+1	+1		

Near (200 feet) but not in a Wetland of Special State Concern		+1	+1	+1				
In a Green Infrastructure hub or corridor	Hub: +1 Corridor: +1/2		Hub: +1 Corridor: +1/2	Hub: +1 Corridor: +1/2	Hub: +1 Corridor: +1/2	Hub: +1 Corridor: +1/2		
In a Green Infrastructure gap		+1						
Near (200 feet) or in Green Infrastructure hub or corridor		+1						
In Potential Forest Interior Dwelling Species Habitat			+1	+1				
In a Sensitive Species Project Review Area	+1		+1	+1	+1	+1		
Near (200 feet) but not in a Sensitive Species Project Review Area		+1						
In a Targeted Ecologic Area, protected or unprotected				+1				
In or near (200 feet) a Targeted Ecologic Area, protected or unprotected		+1						
Near (200 feet) but not in a protected Targeted Ecologic Area			+1	+1	+1		+1	
Near (200 feet) but not in a Targeted Ecologic Area, protected or unprotected						+1		
In an unprotected Targeted Ecologic Area	+1		+1		+1		+1	
Near (200 feet) but not in a protected area	+1	+1 (includes TEAs)	+1		+1			
In or near (200 feet) a protected area				+1				
In a Priority Funding Area					+1	+1	+1	
NOT in a Priority Funding Area	+1							
Within an area likely developed before 1985, between 1985 and 2000, undeveloped or developed after 2000								before 1985: +1 between 1985 and 2000: +1/2 after 2000: 0
In an area of relatively large amount of impervious surfaces								+1

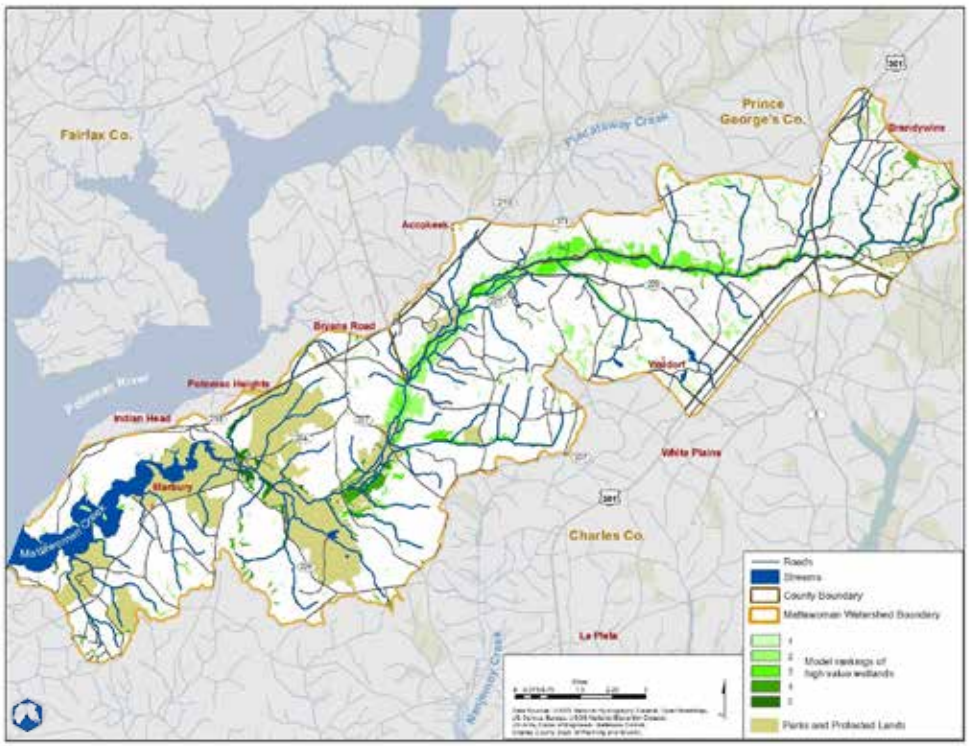
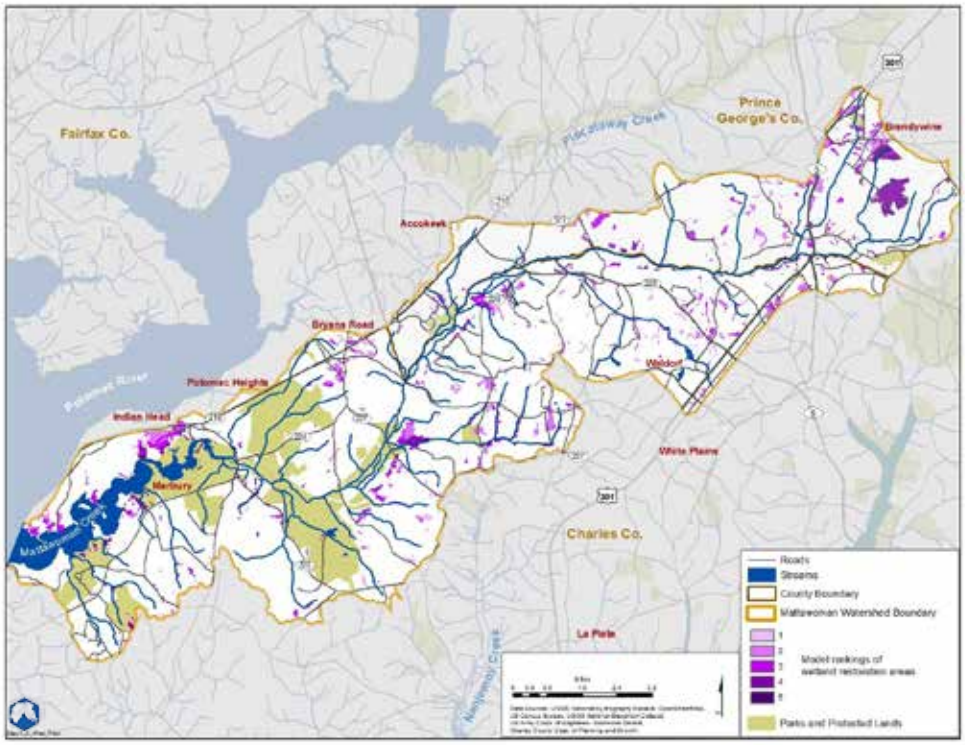


Figure 1-2. WRR rankings for wetland preservation sites in the Mattawoman watershed. (WRR - June 2011)



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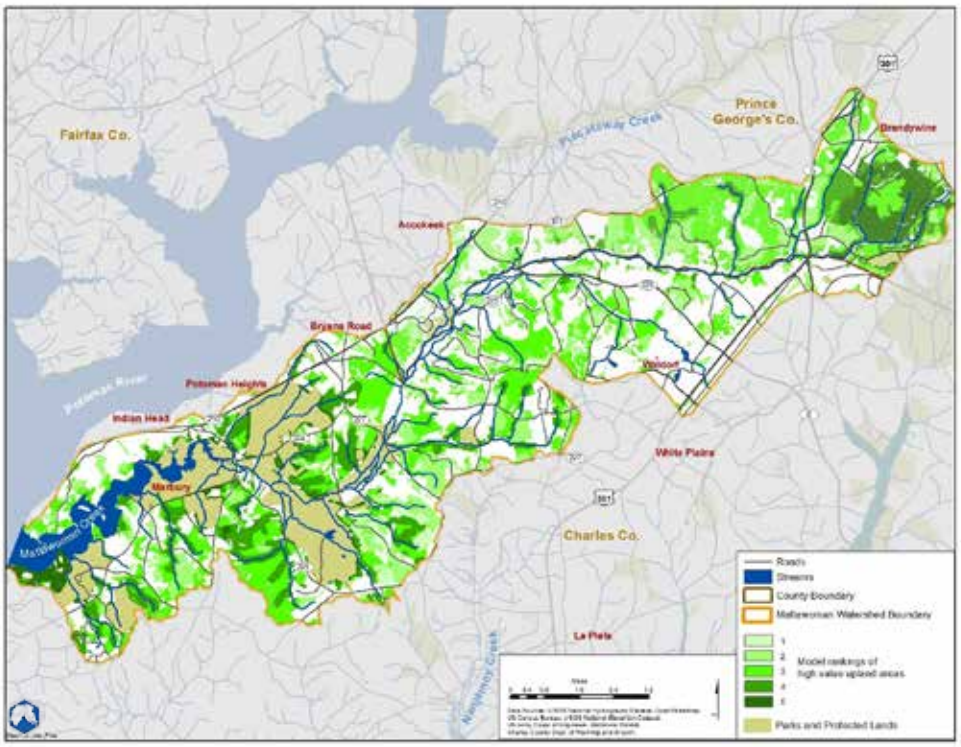

Figure 1-4. WRR rankings for upland preservation sites in the Mattawoman watershed. (WRR - June 2011)

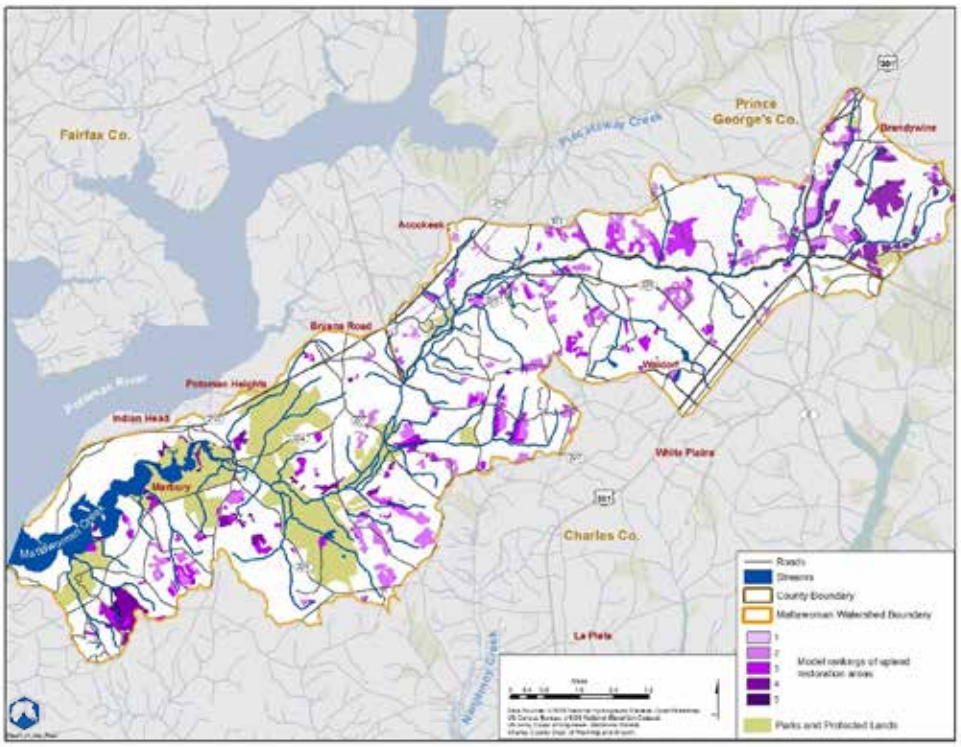

Figure 1-5. WRR rankings for upland restoration sites in the Mattawoman watershed. (WRR - June 2011)

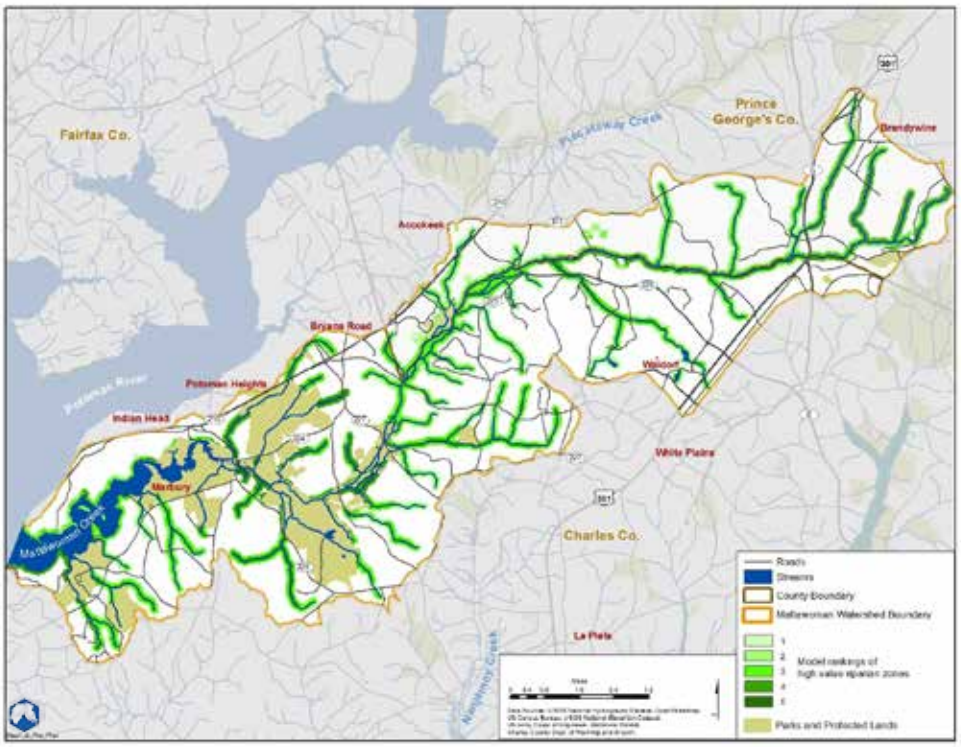

Figure 1-6. WRR rankings for riparian zone preservation sites in the Mattawoman watershed. (WRR - June 2011)

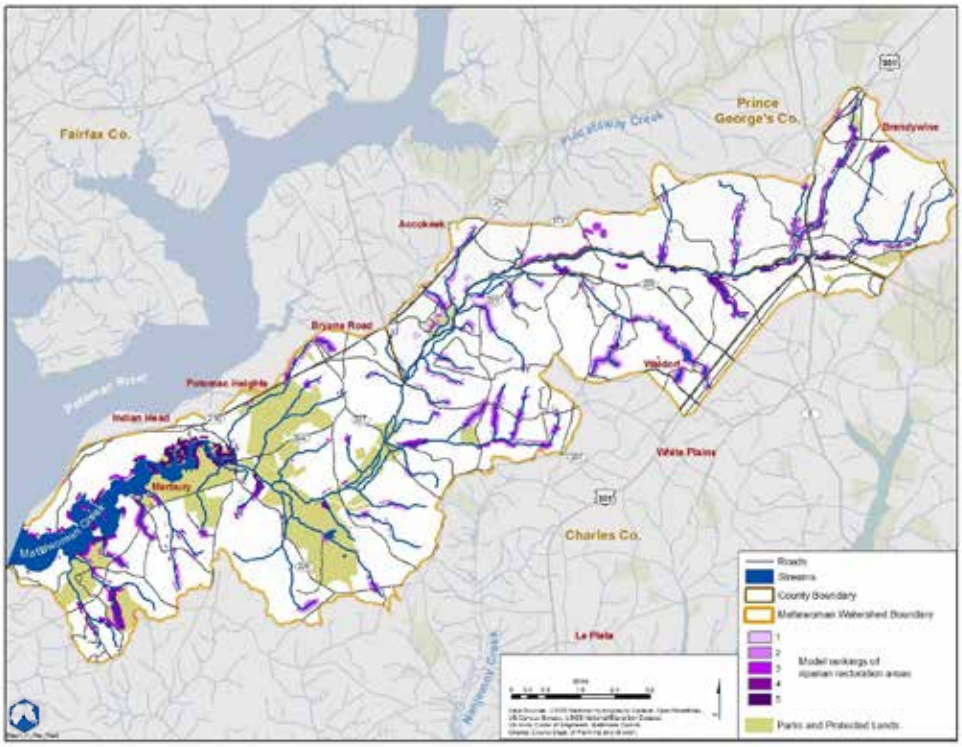

Figure 1-7. WRR rankings for riparian zone restoration sites in the Mattawoman watershed. (WRR - June 2011)

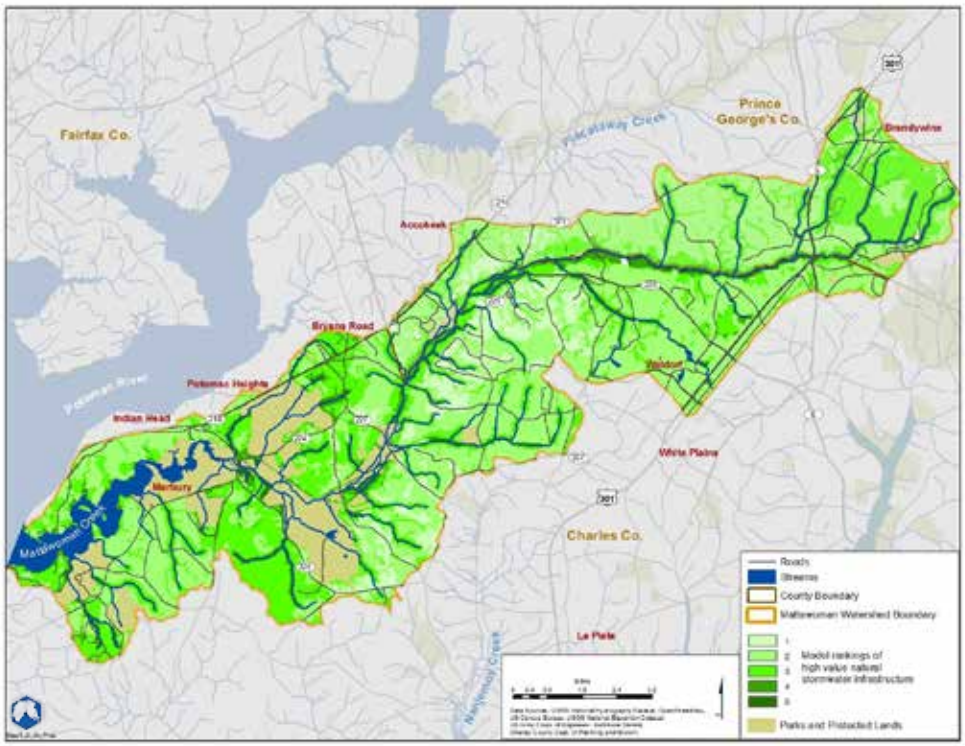

Figure 1-8. WRR rankings for natural stormwater infrastructure preservation sites in the Mattawoman watershed. (WRR - June 2011)

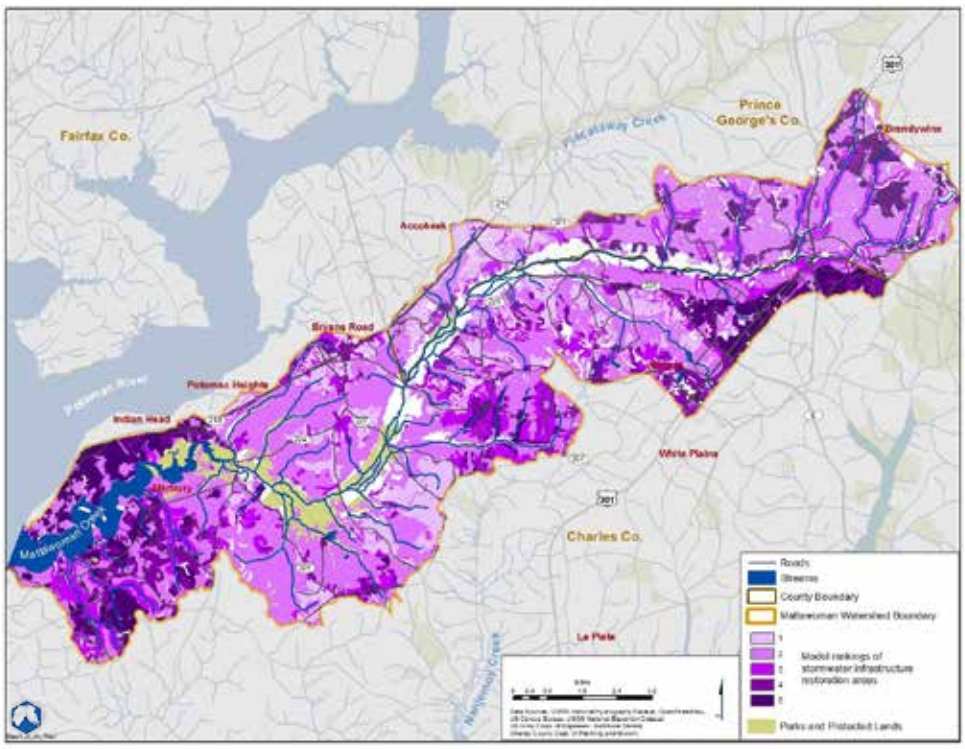

Figure 1-9. WRR rankings for compromised stormwater infrastructure restoration sites in the Mattawoman watershed. (WRR - June 2011)

2 Mattawoman Creek Watershed

Many factors affect the health and productivity of a watershed. In the Mattawoman Creek watershed land use decisions have and will continue to have a significant impact on the quality and conditions of aquatic and terrestrial resources.

For a long time, the Mattawoman has been recognized as one of the healthiest watersheds in Maryland. More recently, data have begun to indicate that the system is stressed and that conditions may be deteriorating. To provide a snapshot of the watershed's current conditions this section includes a description of land use and land cover, the area's valued natural resources, water quality conditions, and recent development trends.

Most of the information covered here is represented spatially as part of the WRR's web interface. While a description like the one that follows is invaluable for understanding conditions in a given watershed, it can be cumbersome to integrate all of the data and information for decision-making purposes. The WRR aids in the integration by combining this spatial information with a decision-support tool that can be used both by regulators and the regulated community. The value of the WRR online interactive tool is enhanced by the ability to view opportunity results alongside individual datasets.

The WRR is not meant to replace the need for written watershed characterizations. Instead, it is meant to improve one's understanding of current conditions and opportunities for improvement by combining disparate data.

2.1 Physical Description

Mattawoman Creek is a unique resource of immense value to the southwestern portion of Maryland (Figure 2-1). The Mattawoman watershed (MD 8-digit code - 02140111) covers more than 60,000 acres, in parts of both Charles County (44,479 acres[6]) and Prince George's County. The headwaters of the stream lie in the most developed part of Charles County, including the growing Waldorf area.

The elevation in the watershed ranges from zero to approximately 200 feet above sea level (Figure 2-2). The 13.5 mile stream meanders across the relatively flat coastal plain, though over time the creek has carved out a steep stream valley. This valley is characterized by slopes greater than 15 percent.

Figure 2-3 below shows the stream valley as delineated by Maryland Department of Natural Resources (DNR). This distinct stream valley is an important aspect of the watershed. It helps contain flood waters, cycles biological and nutrient material, filters pollutants, and provides valuable habitat areas.[7] A key feature of the valley is the associated network of wetlands and the productive estuary that drains into the Potomac River.

[6] Charles County Government. "Charles County Comprehensive Plan." (2006) <http://www.charlescounty.org/pgm/planning/plans/commplanning/compplan/index.html> Accessed April 1, 2010.

[7] U.S. Army Corps of Engineers Baltimore District. "Mattawoman Creek Watershed Management Plan." (2003) <http://www.charlescounty.org/pgm/planning/plans/environmental/mattawoman/plan/plan.pdf> Accessed April 1, 2010.

Figure 2-1. Location of the Mattawoman Creek watershed.

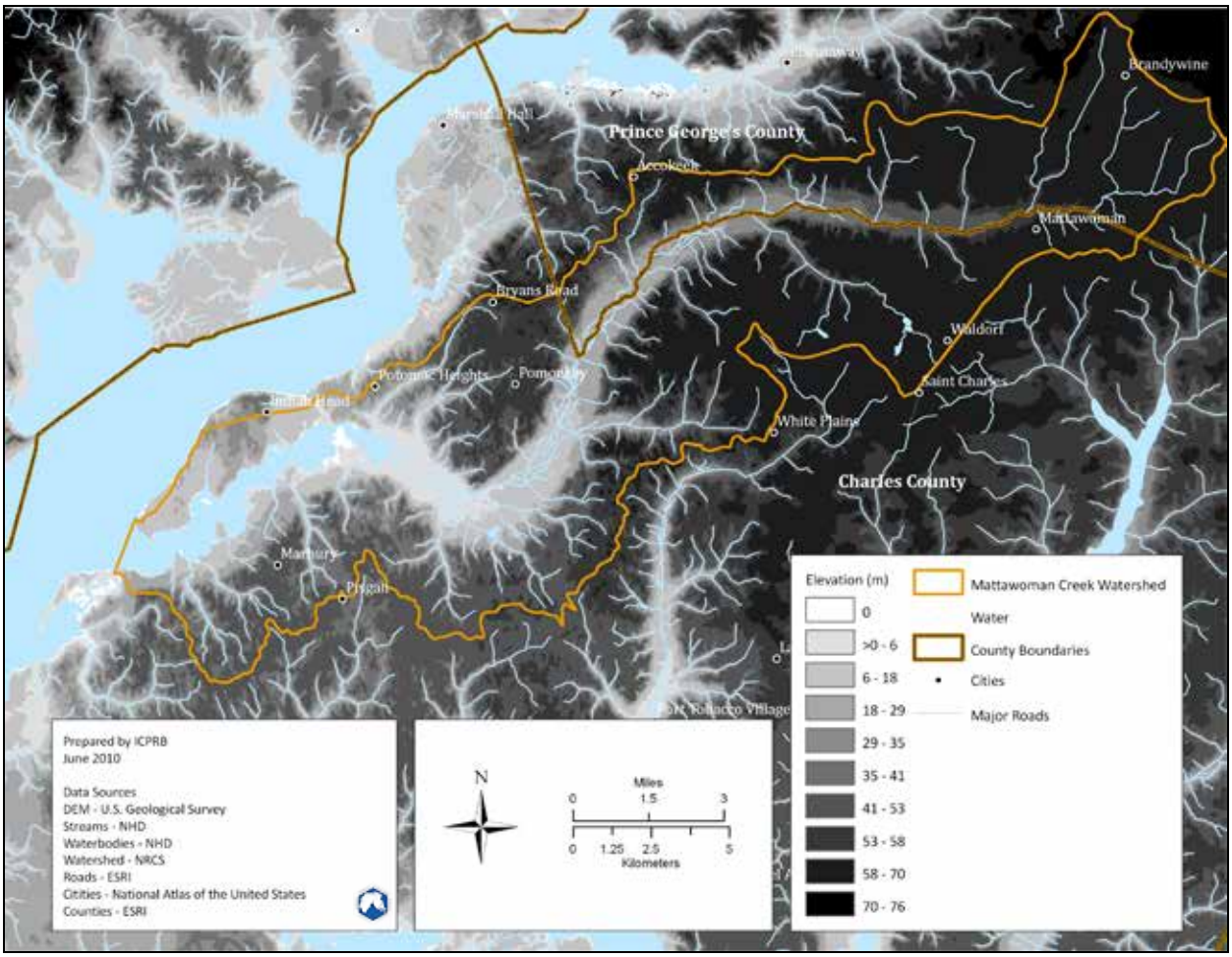

Figure 2-2. Elevation of the Mattawoman Creek watershed.

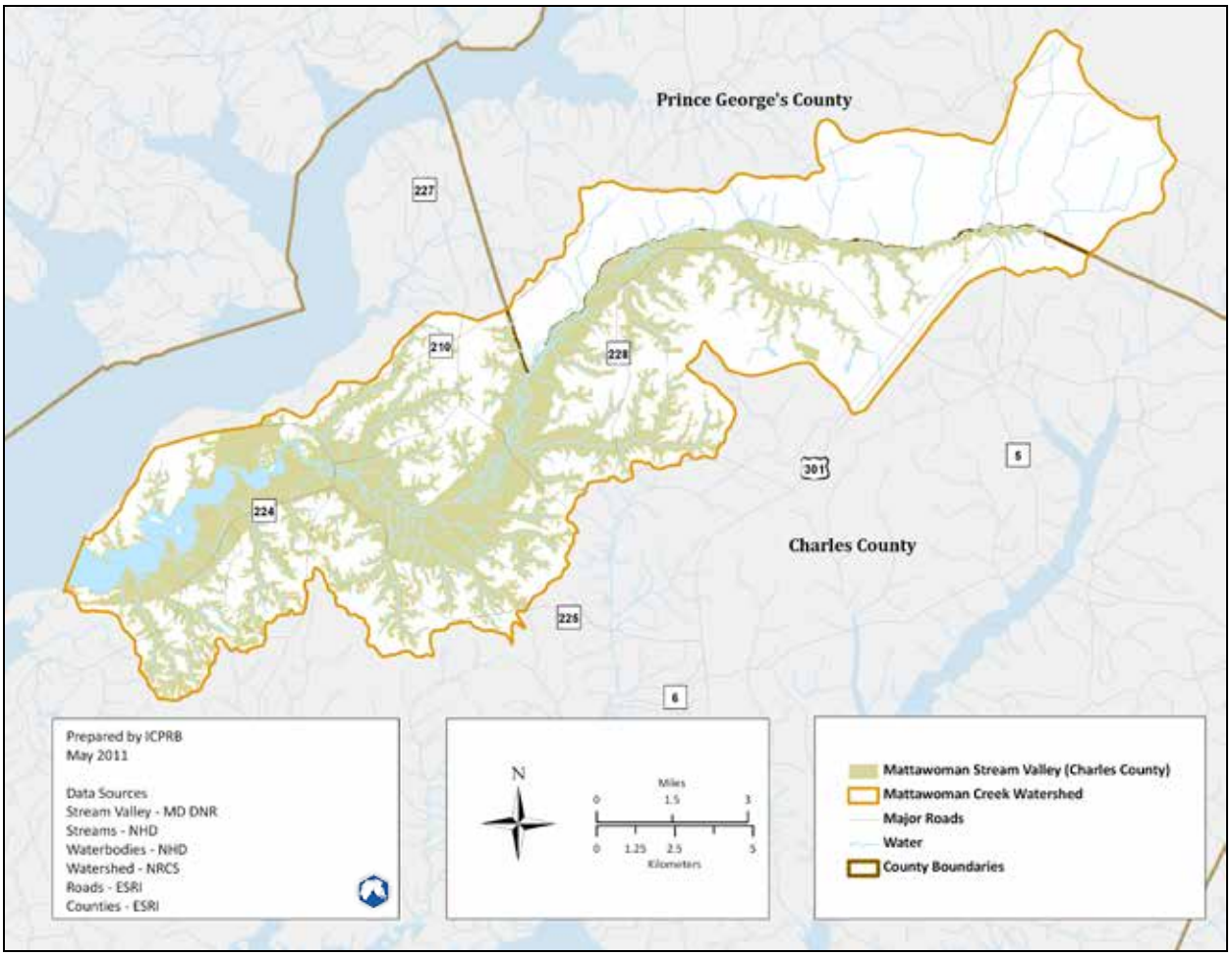

Figure 2-3. Delineation of the Mattawoman Creek stream valley.

2.2 Land Cover and Land Use

According to 2008 land cover and land use data, approximately 50 percent of the watershed is forested and 30 percent is developed for residential and commercial uses (Figure 2-4). Open water in the watershed covers 1,860 acres in Charles County and 32 acres in Prince George's County. The most developed portions of the watershed are in Waldorf and St. Charles along Route 301 and in the Indian Head area along Route 210. Over time, the area has shifted from a mainly forested and agricultural land cover to an increasingly urban environment.[8]

Figure 2-5 shows the areas of impervious cover in the watershed.

[8] U.S. Army corps of Engineers Baltimore District. "Mattawoman Creek Watershed Management Plan." (2003) <http://www.charlescounty.org/pgm/planning/plans/environmental/mattawoman/plan/plan.pdf> Accessed April 1, 2010.

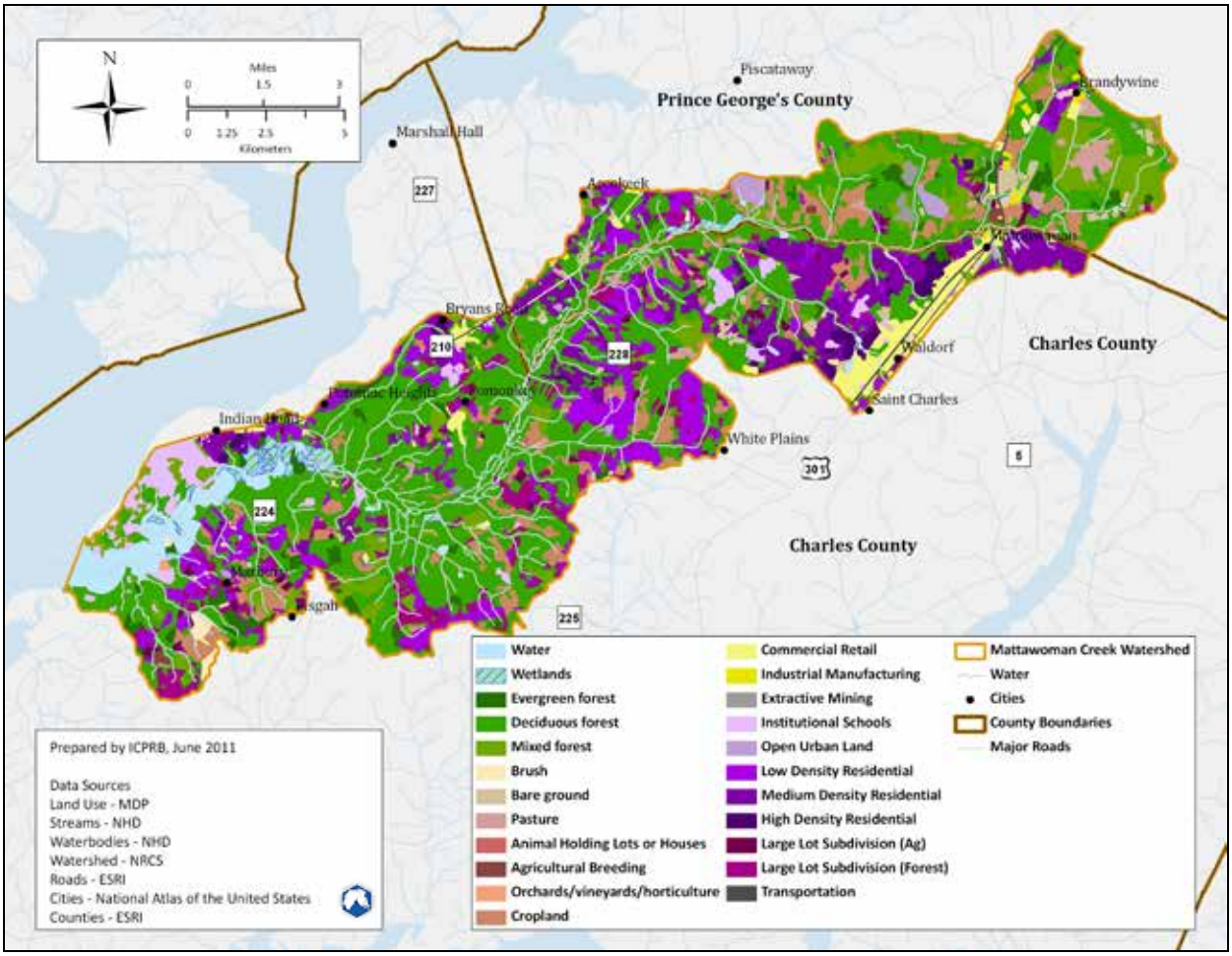

Figure 2-4. Land cover in the Mattawoman Creek watershed.

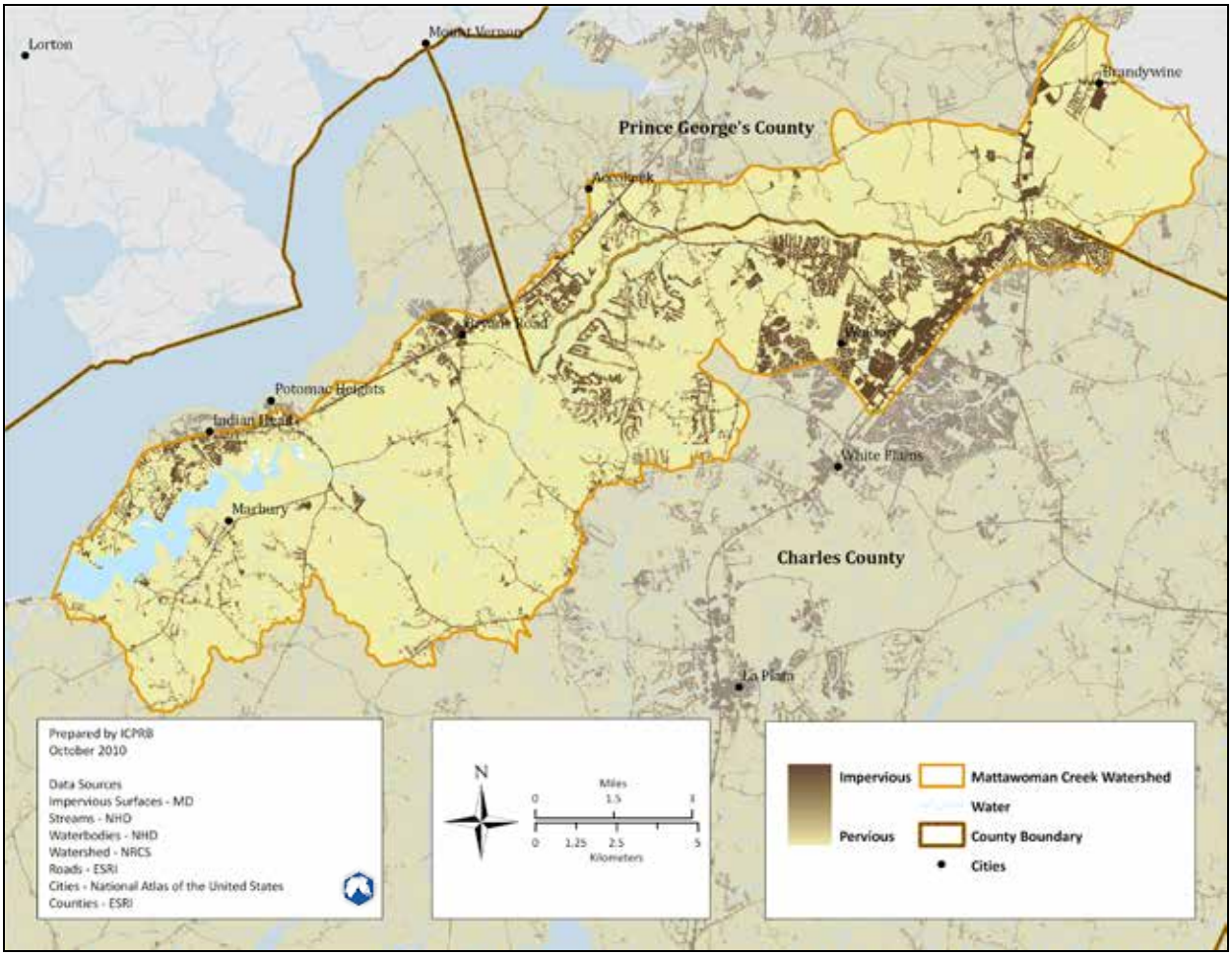

Figure 2-5. Impervious land cover in the Mattawoman Creek watershed.

2.3 Development in Charles County

Until 1990, the County was predominantly rural in character. The county has since seen tremendous amounts of growth and development as it has become a more viable option for those who commute into Washington, D.C., 18 miles to the north. Additional homes, roads, and other community services have been built to meet demand. Maryland Routes 301 and 5 have become heavily travelled corridors through the county.

According to the 2010 U.S. Census, the population of Charles County was 146,551. This is an increase of more than 21 percent since the 2000 census.[9] Census tract maps show that the majority of the people live in the Waldorf area, which is in the headwaters of the Mattawoman watershed. Between 1980 and 2000, Waldorf alone experienced a population increase of 136 percent.[10]

[9] U.S. Census Bureau. "2010 Census." (2010) <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> Accessed May 27, 2011.

[10] Charles County Government. "Charles County Comprehensive Plan – Chapter 2 – Background." (2006) <http://www.charlescounty.org/pgm/planning/plans/commplanning/compplan/index.html> Accessed April 1, 2010.

The Metropolitan Washington Council of Governments' 2009 forecast estimated a total population of over 200,000 by 2030 (Table 2-1). Given the county's current development plans, this growth would be directed into the Development District and therefore into the Mattawoman watershed.

Table 2-1. Population forecasts for Charles County by Metropolitan Washington Council of Governments.[11]

Year	Population
2005	136,599
2010	144,950
2015	160,950
2020	177,200
2025	193,099
2030	204,197
2035	215,343
2040	226,541

2.4 Protected Lands

The state of Maryland has purchased land to protect the watershed's most valuable and sensitive areas. Charles County also operates a few smaller parks in the watershed. Both state- and county-owned lands are shown in Figure 2-6 below. The federal government owns a significant portion of land in the watershed, but because it is used for military purposes and is not intended for preservation, it is not depicted on this map.

Maryland DNR owns five parks in the Mattawoman watershed, covering approximately 5,700 acres.[12] These include, as described in Table 2-2: Mattawoman Natural Environmental Area (NEA), Myrtle Grove Wildlife Management Area (WMA), Chapman State Park, Smallwood State Park, and Cedarville State Forest.

Both the Mattawoman NEA and the Myrtle Grove WMA are internationally recognized as important as components of the Chesapeake Bay Estuarine Complex, which is a designated site under the Ramsar Convention on Wetlands of International Importance.[13]

In addition to these state- and county-owned lands, certain areas such as wetlands, the stream valley's steep slopes, and forest buffers, are protected from development through other regulatory means. Natural resource-related regulations are discussed in Section 3.

[11] Goodwin, Gregory C. and Abdurahman Mohammed. "Round 7.2: A Cooperative Forecasting: Population and Household Forecasts to 2040 by Traffic Analysis Zone." Metropolitan Washington Council of Governments, Washington, D.C. (2009) <http://www.mwcog.org/uploads/pub-documents/zVZXXg20091211140123.pdf> Accessed May 14, 2009.
[12] Charles County Government. "Charles County Comprehensive Plan." (2006) <http://www.charlescounty.org/pgm/planning/plans/commplanning/compplan/index.html> Accessed April 1, 2010.
[13] U.S. National Ramsar Committee. U.S. Ramsar Sit[14] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011

Table 2-2. Description of the state-owned protected lands in the Mattawoman watershed.

Park Name	Acres	Description
Mattawoman Natural Environmental Area[†*]	2,509	Contains 25 species of plants that are rare, threatened, or endangered in Maryland. Portion of area is in the Maryland Wildlands Preservation System (1,605 acres) and is designated a wetland of special state concern.
Myrtle Grove Wildlife Management Area[†]	1,722	Oldest State-managed public hunting land in Southern Maryland. Wood duck habitat
Smallwood State Park[†]	626	Hardwood forest Large marina hosts bass tournaments
Chapman State Park[*]	2,180	South track of park covers areas of coastal plain forest and the stream valley. Varity of wetlands habitat for plant and animal species. Contains a wet meadow that is a Nontidal Wetland of Special State Concern.
Cedarville State Forest[†] – mainly in Zekiah Swamp watershed	3,625 (Prince George's -992, Charles - 2,706)	Park provides hunting, camping, trails, fishing, and fisheries education.

Source:

†Maryland Department of Natural Resources. "Maryland Land Preservation, Parks, and Recreation Plan –Volume II." (2009) <http://www.dnr.state.md.us/land/stewardship/pdfs/CompleteDNRORP.pdf> Accessed January 31, 2011.

[*] Maryland Department of the Environment, Wetlands and Waterways Program. "Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland." (2006) <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/prioritizingareas.aspx> Accessed April 6, 2010.

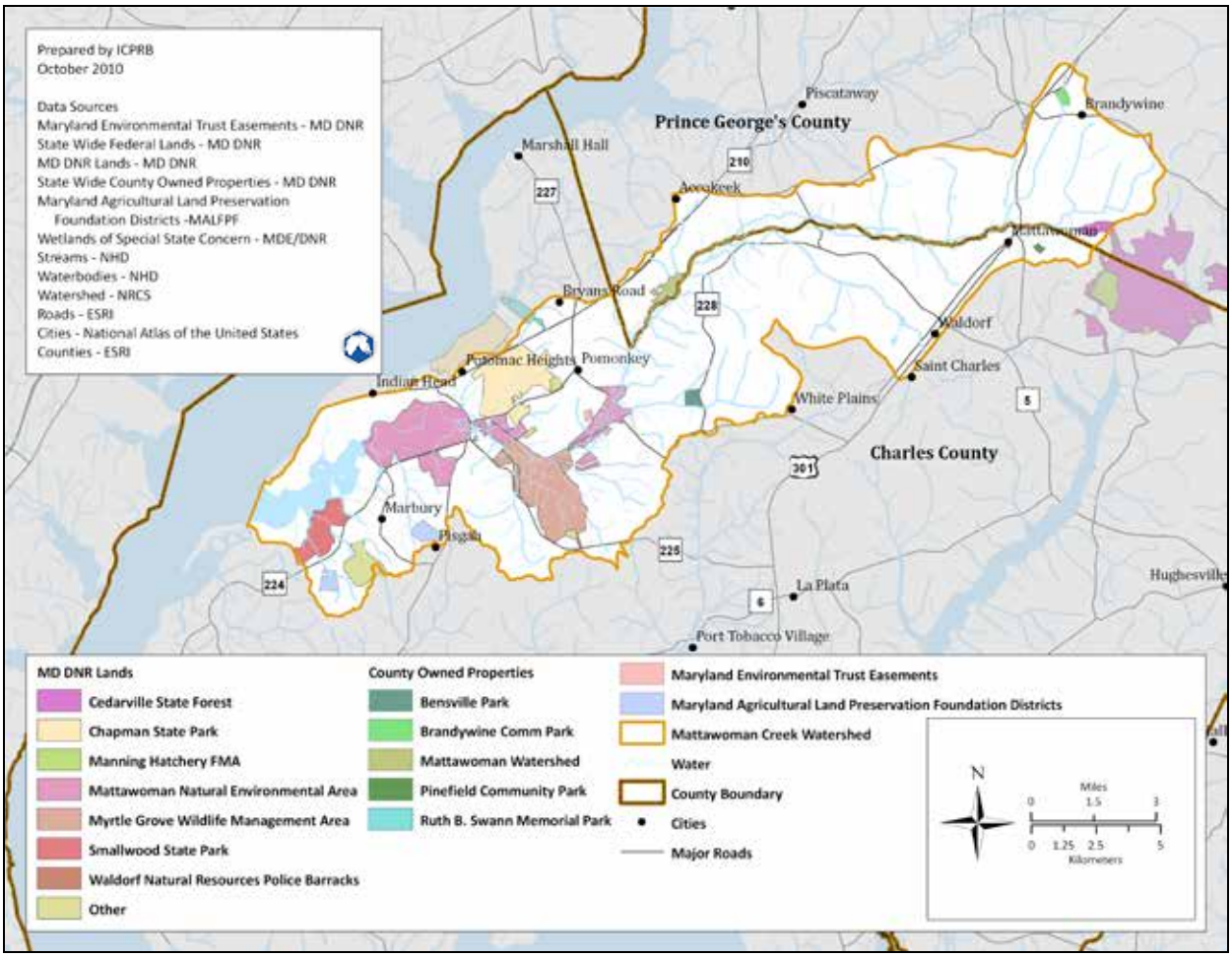

Figure 2-6. State- and county-owned land in the Mattawoman Creek watershed.

In addition to land protected through state and county ownership, much of the most sensitive lands are protected from development by local, state, and federal regulations. For example, the Charles County Resource Protection Zone protects many of the county's stream corridors from development.

2.5 Water Supply and Wastewater Treatment

The county's drinking water needs are supplied primarily by groundwater sources. The only surface water consumed as drinking water is purchased from the Washington Suburban Sanitary Commission (WSSC). In 2005, groundwater withdrawals at public and individual wells totaled 9.00 million gallons per day (MGD).[14] The county's agreement with WSSC currently allows them to purchase up to 1.4 MGD each year. The largest water supply system, as well as the interconnection with WSSC, is in the Waldorf area.

The Town of Indian Head has the only public wastewater treatment plant (WWTP) that discharges into Mattawoman Creek. The plant serves only Indian Head and has a capacity of 0.500 MGD.

[14] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011

The largest WWTP in the county is the Mattawoman WWTP which discharges into the Potomac River. The plant serves the Waldorf area and other portions of the county's Development District. County plans indicate that the plant will serve the entire Development District in the future.[15] The plant uses Enhanced Nutrient Removal technology and has an existing capacity of 20 MGD.

2.6 Natural Resources

The watershed supports a wide variety of wildlife, including blue herons, bald eagles, common egrets, black crowned night herons, wood duck, otter, and mink.[16] In 2009, it was recognized as an "Important Bird Area" by the National Audubon Society because of the high-quality bird habitat and the diversity of the Forest Interior Dwelling Species found in the watershed.[17]

Because of the diverse nature of the flora and fauna in the watershed, both the Maryland Department of the Environment (MDE) and DNR have identified the creek and its wetlands as one of the most important spawning and nursery areas for many fish and bird species in the Chesapeake Bay.[18,19]

Maryland DNR's Green Infrastructure program has identified the most undeveloped lands throughout the state which provide important ecosystem functions. This land is characterized as either being a hub – large intact tracts of undeveloped land – or a corridor – smaller tracts of land that serve to connect hubs and allow for movement of animals and plants.

A large portion of the Mattawoman Creek stream valley is identified as a hub (Figure 2-7). Hubs in the Mattawoman watershed include: The protected lands of the Indian Head Surface Warfare Center, Smallwood State Park, Chapman State Park, Mattawoman NEA, and Myrtle Grove WMA. The proposed, but currently unprotected, Mattawoman Creek Greenway is also a hub.

[15] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011

[16] U.S. Army Corps of Engineers Baltimore District. "Mattawoman Creek Watershed Management Plan." (2003) <http://www.charlescounty.org/pgm/planning/plans/environmental/mattawoman/plan/plan.pdf> Accessed April 1, 2010.

[17] National Audubon Society. "Site Profile: Mattawoman Creek." (2010)

[18] Weber, Ted. "Maryland's Green Infrastructure Assessment." (2003) Maryland Department of Natural Resources. <http://www.dnr.state.md.us/greenways/gi/gi.html> Accessed January 20, 2010.

[19] Maryland Department of the Environment, Wetlands and Waterways Program. "Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland." (2006) <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/prioritizingareas.aspx> Accessed April 6, 2010.

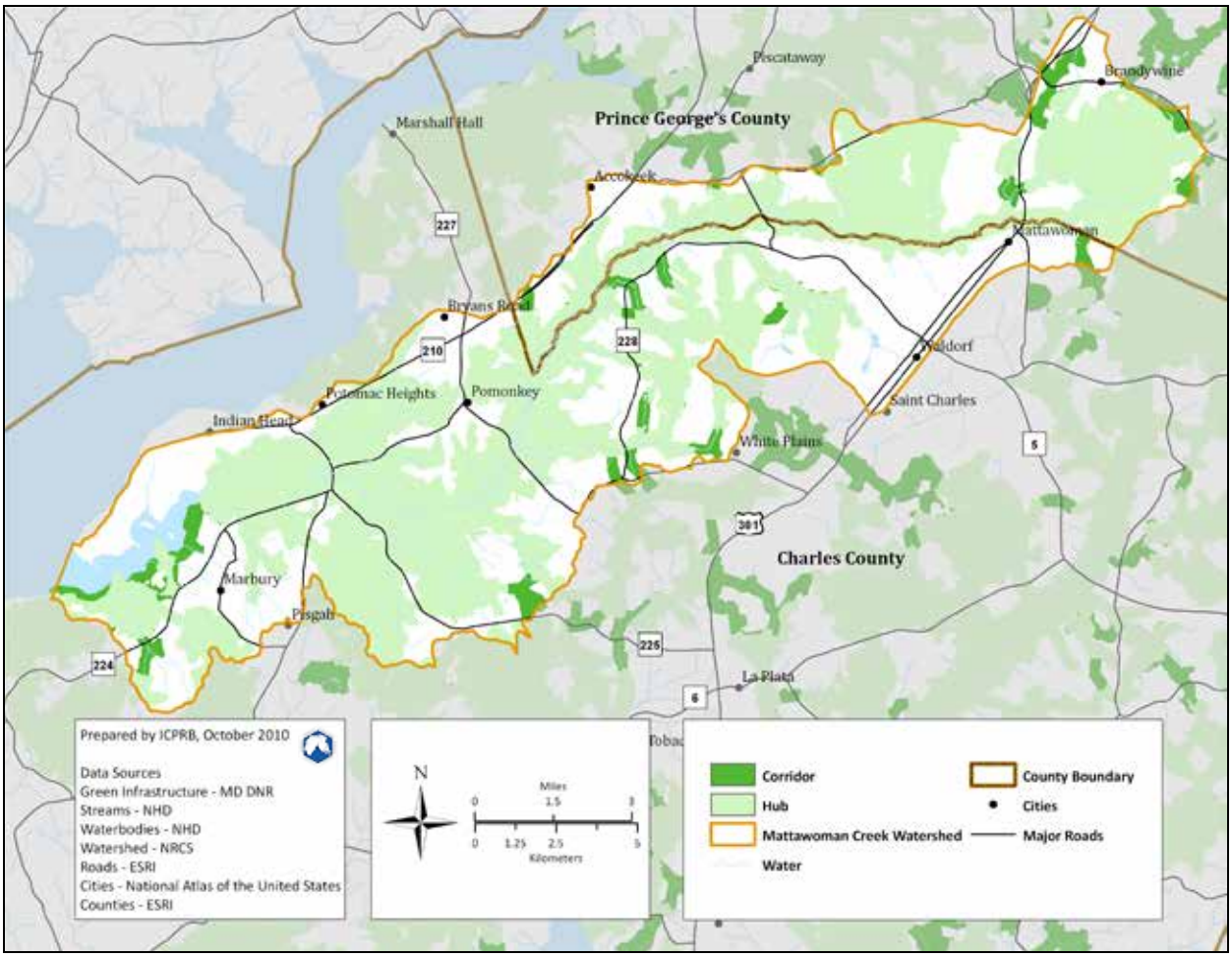

Figure 2-7. Green Infrastructure network in the Mattawoman Creek watershed.

The watershed contains 8,627 acres of wetlands. The majority of these are located at the bottom of the creek's stream valley.[20] There are a variety of wetland types present, including forested wetlands and wet meadows.[21]

As seen in Figure 2-8 below, the downstream portion of the Mattawoman's non-tidal wetlands have been designated as a Nontidal Wetland of Special State Concern (NTWSSC). Wetlands identified as a NTWSSC represent some of the state's best non-tidal wetland habitat and are afforded extra protection under Maryland's non-tidal wetland regulations.[22] A portion of the Mattawoman NTWSSC is protected

[20] U.S. Army Corps of Engineers Baltimore District. "Mattawoman Creek Watershed Management Plan." (2003) <http://www.charlescounty.org/pgm/planning/plans/environmental/mattawoman/plan/plan.pdf> Accessed April 1, 2010.

[21] Maryland Department of the Environment, Wetlands and Waterways Program. "Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland." (2006) <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/prioritizingareas.aspx> Accessed April 6, 2010.

[22] Maryland Department of the Environment. "Nontidal Wetlands of Special State Concern." (2007) <www.mde.maryland.gov/assets/document/wetlandswaterways/ssc.pdf> Accessed October 29, 2010.

from development within the Mattawoman Creek Natural Environmental Area. The Pomonkey School Stream/Chapman's Forest NTWSSC remains unprotected.

In the tidal area, the wetlands support rare species including the American lotus (*Nelumbo lutea*) and wild rice (*Anelema keisak*).

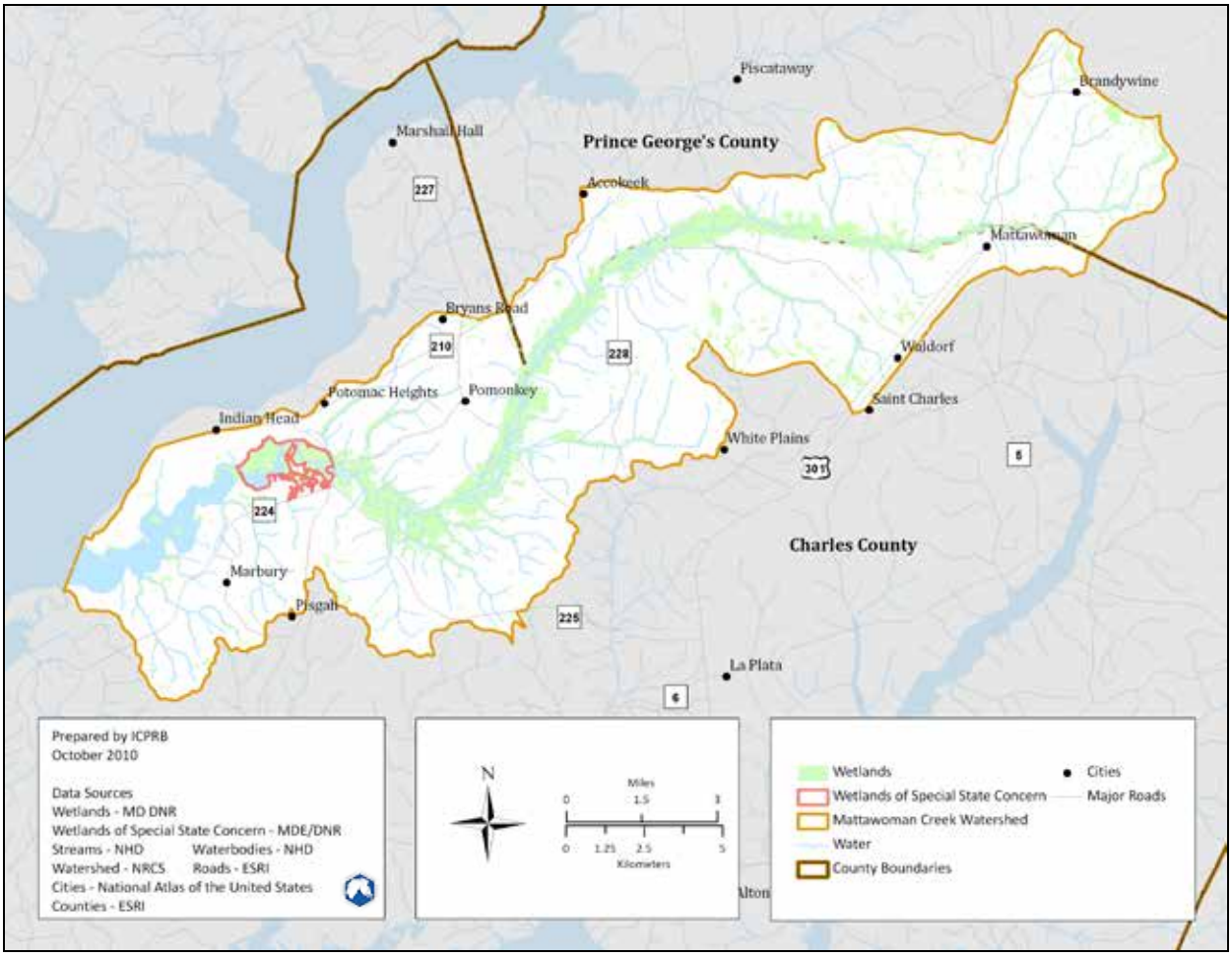

Figure 2-8. Wetlands in the Mattawoman Creek watershed.

Also unique to the Mattawoman watershed is a 6.5 acre magnolia bog, known as Araby Bog. A type of wetland, this and one other bog in the watershed, are characterized by groundwater seeps in terrace gravel formations and acidic, sandy, and gravelly soils.[23] Magnolia bogs are globally rare and many of the plant species found in them are rare in the Mid-Atlantic region. The health of this bog is threatened by continuing development that would increase impervious surface cover and stormwater runoff.

[23] Shetler, Stanwyn G. et al. "Araby Bog" *Marilandica - Journal of the Maryland Native Plant Society*. Vol. 9, No. 1. Summer/Fall (2001) <http://www.mdflora.org/Resources/Publications/Marilandica/marilandica_sum_fall_01.pdf> Accessed November 2, 2010.

2.7 Water Quality

While the Mattawoman is facing water quality issues, portions of the creek remain in good condition. Development and increasing amounts of impervious surfaces are likely to continue stressing the system.

Per the Code of Maryland Regulations (COMAR) Section 26.08.02, the designated use of the non-tidal portion of Mattawoman Creek is Use I. The designated use of the tidal portion is Use II. Waters designated as Use I are to be maintained at a quality that allows for water contact recreation and the protection of nontidal warmwater aquatic life. Use II waters are intended to be of a quality that supports estuarine and marine aquatic life and shellfish harvesting.

In 1996, the estuary portion of Mattawoman Creek was first identified as not meeting this requirement based on high nutrient levels as determined by signs of eutrophication, measured in terms of chlorophyll *a* levels.

A Total Maximum Daily Load (TMDL) for nitrogen and phosphorus was developed to address the impairment in 2004. The analysis done by the U.S. Army Corps of Engineers in 2003 indicated that under various future development scenarios, the creek is likely to experience increasing levels of nitrogen, phosphorus, and suspended solids.

MDE's 2008 Integrated Report on impaired waters, indicates that the non-tidal stream portion of the creek does not meet its Aquatic Life and Wildlife designation (Use I) due to poor benthic and fish survey results. This impairment received a Category 5 listing meaning that it may require a TMDL in the future.[24] The Category 5 listing for non-tidal waters is based on surface water quality information from the Maryland Biological Stream Survey (MBSS).

The MBSS collects water chemistry, physical habitat quality, and biological community data to evaluate stream conditions across the state. One of the survey locations on the Mattawoman Creek is a sentinel site. This means it represents some of the highest quality aquatic conditions in the state.[25] As part of the Sentinel Site Network, this location has been monitored since 2000. In addition to this location, ten other locations have recently been sampled as part of the MBSS in the watershed (Table 2-3).

Stream health is assessed by indices of biologic integrity (IBI). For this survey, both fish and benthic IBI scores are used as indicators. Survey results for the Mattawoman show better benthic than fish IBI scores.

The ten years of data for the sentinel site on the Mattawoman show an improvement in benthic scores and fair fish conditions over time (Table 2-4). In the U.S. Army Corps of Engineers 2003 report on

[24] Maryland Department of the Environment, "The 2008 Integrated Report of Surface Water Quality in Maryland." (2008) <http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/index.aspx > Accessed April 9, 2010.

[25] Maryland Department of Natural Resources. "Maryland Biological Stream Survey's Sentinel Site Network: A Multi-purpose Monitoring Program." (2010) <www.dnr.state.md.us/streams/pdfs/2010SentinelSiteReport.pdf> Accessed October 22, 2010.

the Mattawoman, it interpreted the MBSS data as indicating poorer conditions in the developed headwater areas than in the downstream and tributary reaches.

Table 2-3: Fish and Benthic IBI scores for MBSS sample locations in the Mattawoman Creek watershed. Sites are listed from upstream to downstream locations.[26]

Sample Site	Location	Sample Year	Fish IBI		Benthic IBI	
MATT-201-A	Mattawoman Creek	2008	4	Good	2.43	Poor
MATT-103-R	Piney Branch	2007	2.33	Poor	3.29	Fair
MATT-316-A	Mattawoman Creek	2007	5	Good	4.43	Good
MATT-110-A	UT Old Woman's Creek	2009	1	Poor	2.14	Poor
MATT-102-A	Old Woman's Creek	2009	4	Good	4.71	Good
MATT-101-A	Old Woman's Creek	2009	4	Good	4.71	Good
MATT-309-A	Mattawoman Creek	2009	3.67	Fair	4.71	Good
MATT-308-A	Mattawoman Creek	2009	2.33	Poor	4.71	Good
MATT-102-R	Myrtle Grove Lake UT1	2007	NR	-	4.71	Good
MATT-033-S	Mattawoman Creek	2009	3.33	Fair	4.71	Good
MATT-104-R	Mattawoman Creek UT5	2007	4.67	Good	4.43	Good

Table 2-4: Fish and Benthic IBI scores from 2000 through 2009 for the sentinel site location on Mattawoman Creek.[27]

Sample Site	Location	Sample Year	Fish IBI		Benthic IBI	
MATT-033-S	Mattawoman Creek	2000	3.33	Fair	3.86	Fair
MATT-033-S	Mattawoman Creek	2001	3.67	Fair	3.86	Fair
MATT-033-S	Mattawoman Creek	2002	3.67	Fair	4.14	Good
MATT-033-S	Mattawoman Creek	2003	3.67	Fair	3	Fair
MATT-033-S	Mattawoman Creek	2004	4.67	Good	4.43	Good
MATT-033-S	Mattawoman Creek	2005	3	Fair	4.14	Good
MATT-033-S	Mattawoman Creek	2006	2.33	Poor	4.71	Good
MATT-033-S	Mattawoman Creek	2007	2.67	Poor	5	Good
MATT-033-S	Mattawoman Creek	2008	3	Fair	4.43	Good
MATT-033-S	Mattawoman Creek	2009	3.33	Fair	4.71	Good

Portions of the watershed have been designated as high priorities by a number of Maryland state programs. Such designations include:

· Tier II – High Quality Waters (Figure 2-9; see Section 3.2.1.1.1 for more information);
· Nontidal Wetland of Special State Concern;

[26] Maryland Department of Natural Resources. "Maryland Biological Stream Survey." <http://mddnr.chesapeakebay.net/mbss> Accessed October 21, 2010.
[27] Maryland Department of Natural Resources. "Maryland Biological Stream Survey." <http://mddnr.chesapeakebay.net/mbss> Accessed October 21, 2010.

· Priority Biological Restoration Initiative area;
· High priority Blue Infrastructure area;
· Targeted Ecological Area;
· Medium priority Chesapeake Bay Trust Fund watershed;
· Chesapeake Bay Critical Area; and
· Stronghold watershed.

These designations have all been included as factors in the WRR opportunity analyses and are described in Section 3.

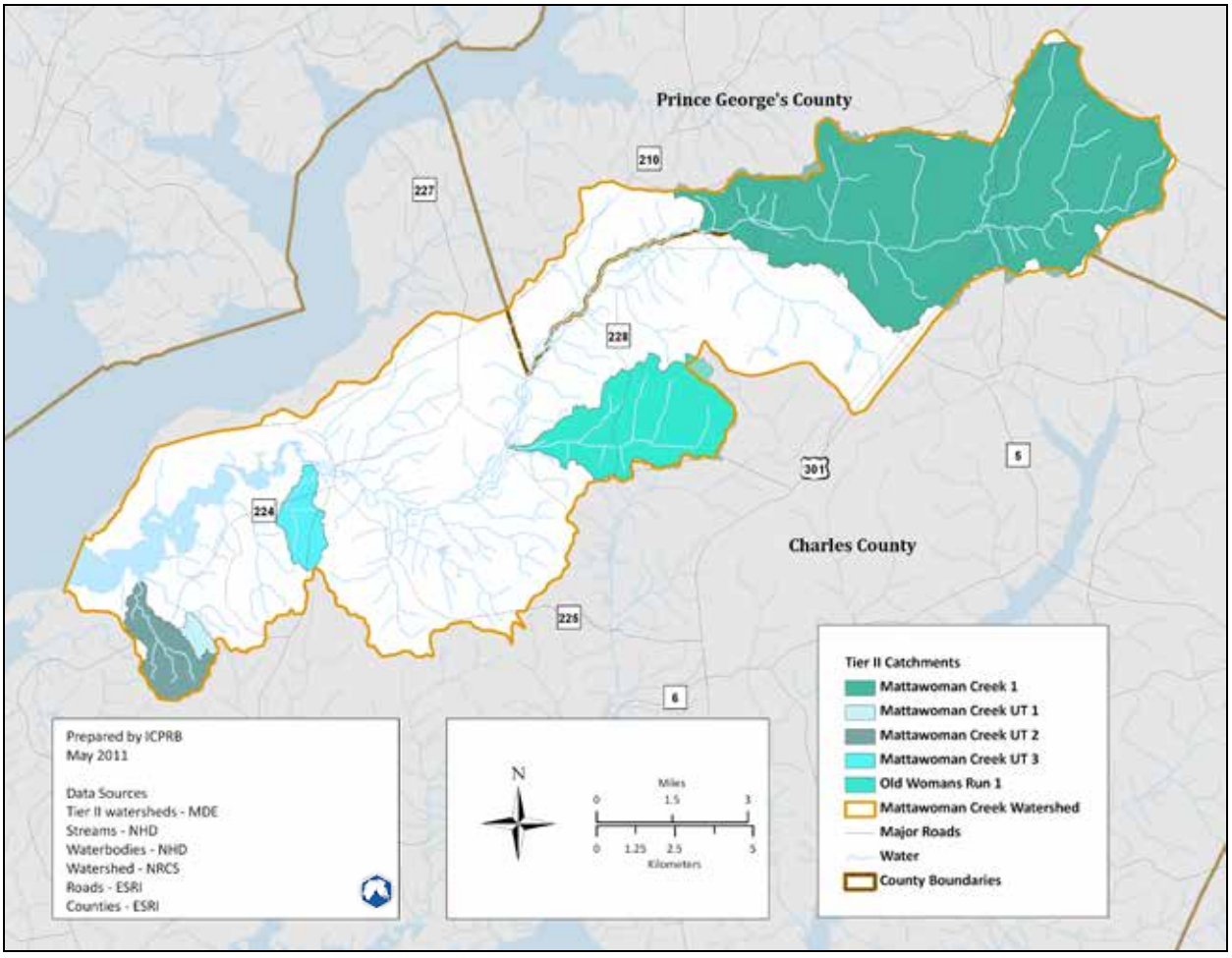

Figure 2-9. Mattawoman Creek Tier II watersheds. Stream reaches that exceed the water quality criteria for their specified designated use are referred to as Tier II waters.

Growth and its Impact in the Mattawoman Watershed

As noted above, the Mattawoman Creek watershed supports a wide variety of important plant and wildlife species. Unfortunately, its continued ability to do so is tentative. Many indicators point to deteriorating conditions that could impact the physical structure of the stream and the related biological health.

The main threat to the Mattawoman is increased development throughout the watershed. DNR's 2010 *Sentinel Site Network* report indicated that of the 27 sentinel sites in the state, the Mattawoman watershed had lost the most forest cover (932 acres) between 2000 and 2009.[28]

In addition to causing a loss of forest, development can increase runoff volumes and rates, water temperature, siltation, and pollutions loads, as well as increase the potential for the introduction of invasive species.

The 2003 Army Corps of Engineers report found that development since the 1990s has had a negative effect on habitat and water quality in the watershed and will continue to do so if development occurs unabated.

The county's 2006 Comprehensive Plan prioritizes much of the watershed as the targeted area for future growth (Figure 2-10). The sustained health of the watershed will be directly related to the amount and type of development that is realized and the mitigation and preservation efforts undertaken to reduce the resultant impacts. The current comprehensive plan and zoning ordinances are discussed in detail in Section 3.3.

[28] Maryland Department of Natural Resources. "Maryland Biological Stream Survey's Sentinel Site Network: A Multi-purpose Monitoring Program." (2010) <www.dnr.state.md.us/streams/pdfs/2010SentinelSiteReport.pdf> Accessed October 22, 2010.

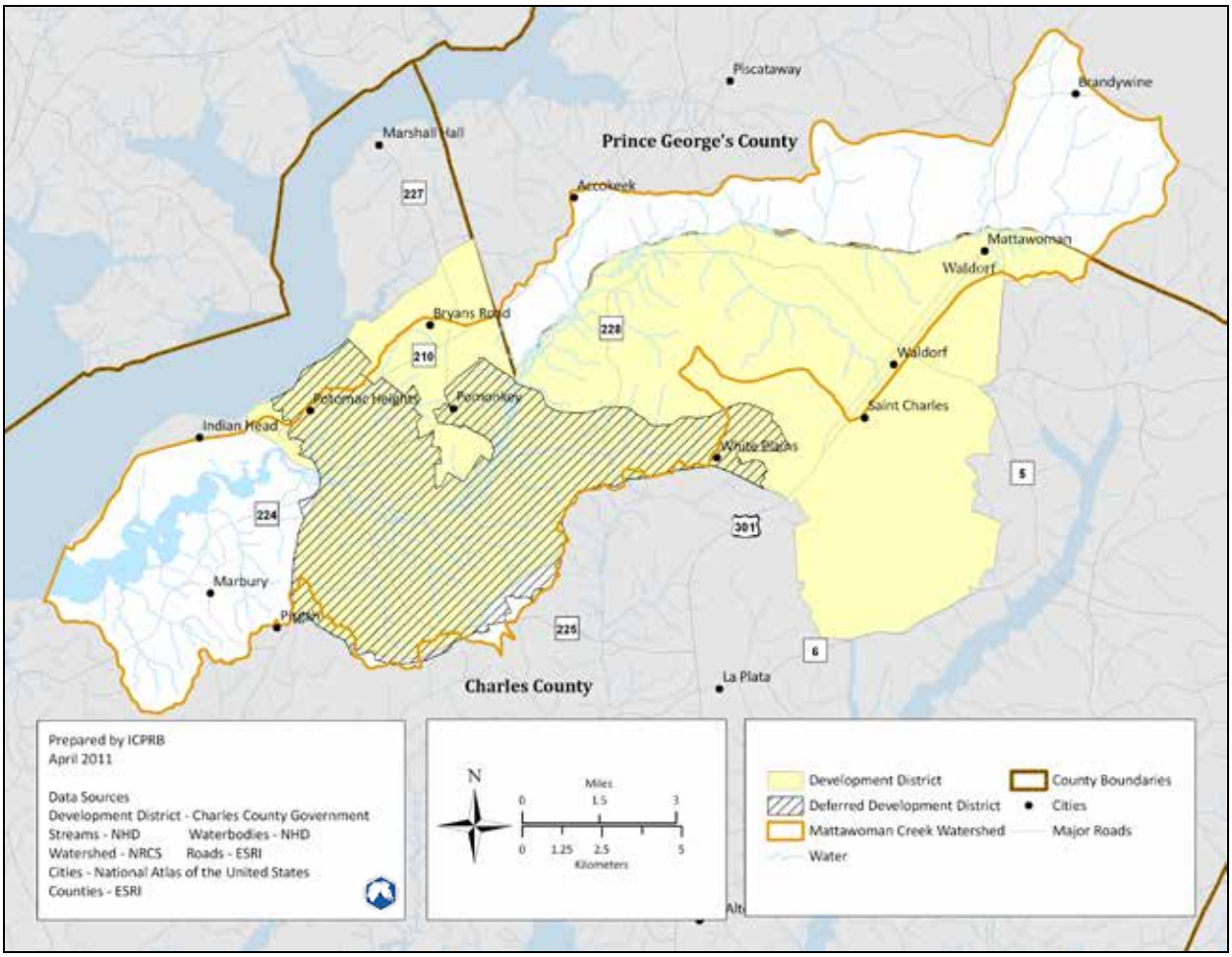

Figure 2-10. Charles County Development District and Deferred Development District.

3 Federal, State, and Local Regulatory Authority and Agency Priorities

This section covers the policies, regulations, permit requirements, and priorities of the federal, state, and local government agencies involved in the following: Aquatic and/or terrestrial conservation activities, stormwater management, watershed planning, transportation planning, and/or other related land use decisions.

The relationship between federal and state law is such that certain authorities in federal laws, such as TMDL enforcement in the Clean Water Act, can be delegated to individual states. Other laws require compliance from states. To do this, states develop their own statutes and regulations.

In turn, some state authorities can be delegated to counties. Other state laws, such as the Stormwater Management Act of 2007, require counties to incorporate certain provisions into their own ordinances.

This section covers the framework of laws and government agency priorities that inform both how the Watershed Resources Registry was developed and how it can be put to use.

3.1 Federal Government

Federal regulations guide many of the land- and water-use decisions made at the local level. Federal agencies and their regulations influence which lands are protected from development and how negative impacts are mitigated.

This section covers federal laws and the authorities granted to the Environmental Protection Agency, Army Corps of Engineers, and Federal Highway Administration. The WRR was designed to assist these agencies and their staffs were instrumental in its creation.

3.1.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA) is the national-level policy for protecting the environment while balancing economic interests. All federal actions are subject to NEPA, including the promulgation of laws, regulations, procedures, and policies, and any projects funded or approved by a federal agency.

The law requires federal agencies to consider all potential or known environmental impacts when making agency decisions (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982).[29] Each agency is required to develop regulations to govern how NEPA requirements will be implemented within the agency.[30]

[29] Council on Environmental Quality. "A Citizen's Guide to the NEPA." (2007) <http://ceq.hss.doe.gov/publications/citizens_guide_to_nepa.html> Accessed August 18, 2010.

[30] See for list of all agency rules: http://ceq.hss.doe.gov/nepa/regs/agency/agencies.cfm

Within the NEPA review process actions can be "Categorically Excluded" from review if there will be no impact to the environment. If the impacts are unknown or likely insignificant an Environmental Assessment is conducted. A Finding of No Significant Impact will be submitted if no impacts are anticipated. If significant impacts are expected or if it is controversial, an Environmental Impact Statement (EIS) is required.

The U.S. Environmental Protection Agency (EPA) is tasked with reviewing and storing EISs submitted by all federal agencies on behalf of the Council on Environmental Quality (CEQ). If the EPA finds any action to be "unsatisfactory" with regard to public health or environmental quality, it is referred to the CEQ.

3.1.2 Environmental Protection Agency

The Environmental Protection Agency is responsible for a wide variety of environmental issues in the general categories of air and water quality, chemical safety and pollution prevention, and solid waste. The federal authority for EPA activities is found in Title 40, Protection of the Environment, of the Code of Federal Regulations (CFR).[31]

The EPA's 2011-2015 strategic plan states that protecting and restoring watersheds and aquatic ecosystems, including wetlands, is a main objective of the agency.[32] Apropos of the WRR effort are the activities carried out in the Office of Water in EPA's headquarters and in the Water Protection Division in EPA's Region 3 office. The EPA's authority for these and other related activities comes from the Clean Water Act, the relevant details of which are described below.

3.1.2.1 Clean Water Act

Administered by the EPA, the Clean Water Act (CWA) regulates both water quality standards and the discharge of pollutants into waterways (33 U.S.C. 1344). The goal of the act is to "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (33 U.S.C. 1251(a)).

The CWA administers various permits that control pollution. Section 402 creates the National Pollutant Discharge Elimination System to regulate discharges from discrete conveyance systems. Section 404 provides the main authority for the regulation of activities in wetlands. It requires permits for the discharge of dredged or fill material into waters of the United States. The CWA also provides funding to support state and local programs and projects that implement its provisions. This is covered in Section 319. These and other key parts of the act are discussed in more detail below.

As conceived, the WRR is intended to discourage the compartmentalized approach to regulatory implementation and to encourage actions that address multiple EPA regulations and priorities at the same time. For example, during the review of a Section 404 permit, the WRR can be used to select wetland mitigation sites which not only have the potential for wetland restoration or preservation (CWA

[31] Code of Federal Regulations 40: Protection of the Environment, available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div6&view=text&node=40:1.0.1.1.1.1&idno=40.

[32] U.S. Environmental Protection Agency. "Fiscal Year 2011-2015 EPA Strategic Plan." (2010) <http://www.epa.gov/ocfo/plan/plan.htm> Accessed November 3, 2010.

404), but which would also provide a stormwater benefit (CWA 402) . This, therefore, integrates multiple benefits into one project to provide a greater benefit to the watershed. Furthermore, the WRR could be utilized to target the use of CWA Section 319 funds allocated to the state by identifying the areas of greatest need and greatest value in a given watershed.

3.1.2.1.1 Section 303 and 305: Water quality standards, monitoring, and Total Maximum Daily Loads

Sections 303 and 305 cover the Clean Water Act's the water quality based controls. These sections mandate the development of water quality standards and the requirements for monitoring and reporting. They also lay out the legal means for addressing water quality violations.

These sections require that states determine the desired use for each waterbody in their jurisdiction. These are known as "designated uses." Examples of common designated uses are public water supply, protection of aquatic life, and recreation. For each designated use, specific water quality criteria are determined that allow for the safe use of that water.

Section 305(b) requires states and tribes to assess the quality of the waters within their jurisdiction biennially and report their findings to the EPA. Section 303(d) requires a list of threatened and impaired waterways.

There is also a requirement to maintain the quality of existing high quality waters. This is known as the antidegradation policy.

For those waters not meeting the given water quality criteria for its designated use, a Total Maximum Daily Load (TMDL) is required. These waters appear on the state's 303d list. TMDLs determine a pollution budget for the waterbody, specifying how much of the contaminant causing the impairment can be released into the waterbody from each known source. States can create a specific designated use for wetlands, and therefore, also determine water quality standards and develop TMDLs to improve wetland health.

CWA Sections 305(b) and 303(d) are implemented by Maryland through the Maryland Code of Regulations in Section 26.08.02.[33] See Section 3.2.1.1 for more on Maryland's water quality standards.

3.1.2.1.2 Section 319: Nonpoint source management programs

Section 319 provides for technical assistance and funding to states, territories, and Indian Tribes for the development and implementation of nonpoint source pollution control plans. Nonpoint sources of pollution are those arising from diffuse sources. For example, runoff across agricultural land is considered nonpoint, whereas flow leaving the end of a pipe is a point source.

[33] Maryland Code of Regulations. "Water Quality." Title 26 Department of the Environment, Subtitle 08 Water Pollution, Chapter 02 Water Quality. < http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.00.htm> Accessed November 17, 2010.

Funds available through the 319 program can be used to restore, preserve, or enhance wetlands by improving water quality. Prior to funding specific nonpoint source controls, a watershed plan must be approved by the EPA. These plans are to include the following:[34]

1. Identification of the causes and sources of the nonpoint source pollution
2. Estimate of load reductions from the control measures to be put into place
3. Description of the nonpoint source pollution controls
4. Estimate of the technical and financial assistance required, including costs
5. Public outreach plan
6. Implementation schedule
7. Measurable indicators of success
8. Criteria for determining actual load reductions for determining if the plan needs to be revised
9. Monitoring plan

A full description of the 319 program and successful projects is available on EPA's website at http://water.epa.gov/polwaste/nps/cwact.cfm.

3.1.2.1.3 Section 401: Certification

Section 401 provides states and tribes the authority to "review and approve, condition, or deny all Federal permits or licenses that might result in a discharge to State or Tribal waters, including wetlands."[35] This allows states and tribes the discretion to deny permits for any discharge activity that may violate a state water quality standard, including activities on wetlands. Both permits issued through Sections 402 and 404 can be influenced by this authority.

Under this authority Maryland issues a State Water Quality Certification (WQC) for activities requiring a CWA Section 404 permit (see Section 3.1.2.1.5).

3.1.2.1.4 Section 402: National Pollutant Discharge Elimination System (NPDES)

The discharge of any pollutant from a point source into navigable waters without a permit is prohibited by CWA Section 402. This applies to municipal separate storm sewer systems.

Maryland has been approved by the EPA to administer its own NPDES permit program. See Section 3.2.1.2.3 for information on Maryland's permitting process.

3.1.2.1.5 Section 404: Regulating discharges of dredged or fill material

Section 404 of the Clean Water Act regulates the discharge of dredged or fill materials into waters of the United States, including into wetlands. This applies to activities such as fill for development, water resource projects, infrastructure, and mining. Discharges from these types of activities are permissible

[34] U.S. Environmental Protection Agency. "Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY 2003." (2009) <http://water.epa.gov/polwaste/nps/success319/319guide03.cfm> Accessed November 10, 2010.

[35] U.S. Environmental Protection Agency. "Section 401 Certification and Wetlands." (2009) <http://www.epa.gov/owow/wetlands/facts/fact24.html> Accessed May 28, 2010.

only if they will have no adverse effect on U.S. waters.[36] The effects of a potential discharge are evaluated based on an activity's individual and cumulative impacts on the affected waterbody.

Section 404 is jointly implemented by the EPA and the Army Corps. A permit is required from the U.S. Army Corps of Engineers (Army Corps) before a discharge is made unless the activity is exempt. If a permit is granted, it must be shown that impacts from the discharge have been avoided, minimized, and compensated for. Additionally, discharges are not to be permitted if a practical alternative is available that would have less of an impact.

There are specific circumstances under which discharges will not be allowed. Including if the activity:

- Causes water quality to drop below a state water quality standard;
- violates a toxic effluent standard;
- harms a threatened or endangered species;
- violates a requirement to protect a marine sanctuary;
- causes or contributes to the degradation of U.S. waters; or
- if steps to avoid impact have not been taken.

Either an individual or a general permit is required to make a discharge. Individual permits are required in situations where an activity may have significant impacts on the affected waterbody. General permits are issued for certain categories of activities that are known to have minimal negative impacts on U.S. waters, specifically for

> "(1) The activities in such category are similar in nature and similar in their impact upon water quality and the aquatic environment; (2) The activities in such category will have only minimal adverse effects when performed separately; and (3) The activities in such category will have only minimal cumulative adverse effects on water quality and the aquatic environment."[37]

The Army Corps oversees the permit process on a day-to-day level (see Section 3.1.3), though many actions are authorized under a State Programmatic General Permit without individual Corps review. Separately, the EPA has the authority to prohibit the use of a specific site as a disposal location and the U.S. Fish and Wildlife Service and National Marine Fisheries Service can raise concerns over impacts to fish and wildlife in specific cases after conducting an evaluation.

In Maryland, there is a joint application process for a CWA Section 404 permit with the Army Corps and the Maryland Department of the Environment (MDE). In conjunction with the joint application process and review under state authorities, MDE also provides a State Water Quality Certification, discussed in Section 3.1.2.1.3, as part of the state decision on issuing an authorization.

In 2008, the EPA and Army Corps updated the compensatory wetland mitigation provisions outlined in Section 404. The goal of the Compensatory Mitigation Rule is to improve the effectiveness of wetland mitigation projects used to offset unavoidable impacts to waters of the United States.

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[36] Code of Federal Regulations. "Guidelines for specification of disposal Sites for dredged or fill material." Title 40, Section 404(b)(1), Part 230. < http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/regs_index.cfm > Accessed May 3, 2011.

[37] Code of Federal Regulations. "Guidelines for specification of disposal Sites for dredged or fill material." Title 40, Section 404(b)(1), Part 230. < http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/regs_index.cfm > Accessed May 3, 2011.

Mitigation projects are implemented to restore, establish, enhance, and/or preserve aquatic resources. These projects can be completed through the purchase of credits for a mitigation bank site or an in-lieu fee program, or, when these options are not viable, through mitigation efforts completed by the entity receiving the permit.

Preference is given to compensatory mitigation projects in the same watershed as the activity causing impacts. Replacing lost ecological functions and services is also a priority.

There are three means of providing compensatory mitigation: purchasing credits from a mitigation bank, paying into an in-lieu fee program, or conducting permitee-responsible mitigation.

Mitigation banks and in-lieu fee programs accept payments from those permitees required to mitigate unavoidable impacts and in turn become responsible for meeting the mitigation requirements. Both mitigation banks and in-lieu fee programs are established and operated by sponsors. Mitigation bank sponsors can be either public or private entities, but sponsors for in-lieu-fee programs must be governmental or non-profit natural resource management organizations.

Essentially, mitigation bank and in-lieu fee programs provide the same service to permitees looking to meet their permit requirements. The difference between the two mainly lies in the rules that govern them. A preference is given to mitigation bank projects because they typically have a project on the ground for which credits are available. Often times there may be a lag with in-lieu fee program projects. Mitigation banking is generally preferable to a permitee-responsible mitigation project because they often tend to be larger, more ecologically valuable, and have more rigorous planning and implementation requirements.

Regardless of the means selected for mitigation, all siting decisions must be made using a watershed approach. This approach accounts for where the negative impacts will take place and the resulting adverse effects to ecological functions. This may require the "consideration of landscape scale, historic and potential aquatic resource conditions, past and projected aquatic resource impacts in the watershed, and terrestrial connections between aquatic resources when determining compensatory mitigation requirements for [Section 404] permits."[38]

3.1.2.2 Chesapeake Bay TMDL

The Chesapeake Bay has long been impaired for nutrients (specifically, nitrogen and phosphorous) and sediments. A TMDL for the entire Chesapeake Bay watershed was issued in 2009. The TMDL is a critical part of the federal strategy developed after President Obama's 2009 Executive Order calling for a renewed focused on improving conditions in the Bay. The goal of the TMDL is to have the required restoration measures in place by 2025.

This TMDL requires the six states in the Bay watershed (New York, Delaware, Pennsylvania, West Virginia, Maryland, and Virginia) and the District of Columbia to meet specific load reduction allocations. Allocations for nutrients and sediments were issued to each jurisdiction in 2009.

[38] Code of Federal Regulations. "Compensatory Mitigation for Losses of Aquatic Resources." Title 33, Chapter II, Part 332. <http://www.access.gpo.gov/nara/cfr/waisidx_10/33cfr332_10.html> Accessed May 3, 2011.

Phase I Watershed Implementation Plans (WIP) were developed by each jurisdiction and submitted to the EPA for approval in 2010. These plans are meant to show a "reasonable assurance" that the jurisdiction will be able to meet its required pollutant load reductions. The plans include information on the commitment of resources and achievable goals. A set of two-year milestones are supposed to keep each jurisdiction on-track to meeting the 2025 goal.

The jurisdictions are currently (as of August 2011) working on their Phase II WIPs. These break down the state allocations to local-level goals. Plans detail quantitative targets, how the loads will be met, and BMP implementation plans.

A third iteration of the WIPs will be written in 2017, the half-way point to 2025, to adjust plans as needed.

In order to meet the load allocations, jurisdictions have to figure out how to reduce pollutant loads entering waterways. This can be achieved by a combination of point and non-point source controls. For point sources, the permitted discharge amount can be reduced when permits come up for review.

Non-point source controls are mainly best management practices for reducing runoff and low-impact development techniques. These could include such efforts as forest buffer projects along streams and improved management of stormwater in urban settings. The WRR could be used to identify potential locations for these BMPs.

3.1.2.3 Healthy Watersheds Initiative

In support of the agency's regulatory functions to restore impaired waters, the Healthy Watersheds Initiative aims to proactively protect existing high-quality waters.[39] The program encourages assessments of ecological health and development pressures that can identify healthy watersheds that need protection. The suggested assessments include biological, chemical, and physical analyses of conditions that, when integrated, provide an understanding of ecological health and watershed functionality.

Once the assessments are completed and priority areas identified, management approaches at the national, state, and local level can be used to protect the valuable waterways. In addition to education and outreach activities that can be done at all levels, the suggested protection and restoration approaches include using the following regulations, programs, and strategies:

- National: large-scale freshwater conservation, designation of Wild and Scenic Rivers, use of Wildlife Action Plans to inform assessment priorities, National Flood Insurance Program, U.S. Forest Service Forest Legacy Program, land trusts and environmental protection organizations, National Fish Habitat Action Plan, National Fish Passage Program, Total Maximum Daily Loads, Nonpoint Source Management Program (CWA Section 319), USDA programs (Conservation Reserve Enhancement Program, Wetlands Reserve Program, Wildlife Habitat Incentives

[39] U.S. Environmental Protection Agency. "Healthy Watersheds." (2011) <http://water.epa.gov/polwaste/nps/watershed/index.cfm> Accessed April 15, 2011.

Program, Environmental Quality Incentives Program, Conservation Security Program, Grassland Reserve Program)

- State: antidegradation policies, instream flow protection, growth management, river and habitat protection programs, restoration of flow and connectivity of stream networks
- Local: land protection; land use planning and smart growth; river corridor, headwaters, and source water protection; protection of greenways; wetland restoration in the watershed context; reforestation

The WRR opportunity analyses, along with the information provided in the online interactive tool, aggregate much of the information and analyses suggested by the Healthy Watersheds Initiative. For example spatial data used in the WRR indicate water quality, aquatic health, and stream conditions.

Using the WRR, these layers of information can be viewed individually or collectively to construct a picture of watershed health. Additionally, government agencies and non-governmental organizations can use the various opportunity analyses to identify areas for protection to maintain a healthy stream or watershed and/or indentify sites for restoration that could provide further benefits.

These analyses have embedded in them factors that prioritize sites with rare or endangered species habitat, the potential to be removed from the 303(d) list, large nutrient contributions to the Chesapeake Bay, high-quality waters, and extensive development, among others.

The approaches suggested by the Healthy Watersheds Initiative to protect high quality waters would all make use of the various layers included in the WRR. Having all these factors and agency priorities in one location and as part of an opportunity analysis provide for an integrated approach that can be tailored to a specific location, watershed need, or organizational priority.

3.1.3 U.S. Army Corps of Engineers

As described in Section 3.1.2.1.5 above, the U.S. Army Corps of Engineers oversees the permit process for applications to alter a floodplain, waterway, or tidal or nontidal wetland as stipulated in Section 404 of the Clean Water Act.

In Maryland, as in other states, the Army Corps and the state have developed a joint permitting process for both general and individual permits. The Corps issued the most recent permit, Maryland State Programmatic General Permit (MDSPGP-3), in October 2006. It is set to expire in September 2011.

State Programmatic General Permits are issued for specific categories of activities when they are "similar in nature and cause minimal environmental impact (both individually and cumulatively) and the regional permit reduces duplication of regulatory control by state and federal agencies."[40] If these conditions do not apply, then an Individual Permit is required.

Both the general and individual permit applications are sent to the Wetlands and Waterways Program in MDE's Water Management Administration. After an initial review by MDE, applications that

[40] U.S. Army Corps of Engineers Baltimore District. "Regulatory Program – Permit Types and Process." (2011) <http://www.nab.usace.army.mil/Wetlands%20Permits/permits.htm > Accessed May 6, 2011.

meet certain criteria are sent to both the applicable federal (EPA, National Marine Fisheries Service, Fish and Wildlife Service, U.S. Coast Guard) and state (Maryland Historic Trust, Department of Natural Resources) agencies for review. Not all applications require a review by all agencies. In some cases, MDE can approve minor, non-controversial projects without an Army Corps review.[41] These applications represent the majority of proposed activities.

Other projects must go through a review by the Army Corps to determine if the proposed activity meets the CWA Section 404 requirements. In addition to agency review, a public hearing may be required. The specific requirements for permit approval in Maryland are covered in Table 3-2.

Generally, the Army Corps reviews the application, considers input from the federal and state agencies and the public, and makes a final decision for its permit. MDE makes its authorization decisions based on its authorities. Projects with significant environmental impacts or those not meeting the requirements of the general permit go through the individual permit process.

One of the explicit reasons for developing the Watershed Resources Registry was CWA Section 404 permit and mitigation requirements. The 2008 rule on compensatory mitigation requires that mitigation be conducted using a watershed approach. The WRR can assist in identifying mitigation sites through the wetland opportunity analyses. MDE is likely to use the WRR in conjunction with its 2006 document – *Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland*.[42]

3.1.4 U.S. Department of Transportation Federal Highway Administration

The authority for the U.S. Department of Transportation's Federal Highway Administration (FHWA) appears in the Code of Federal Regulations Title 23, Chapter 1. Part 771 of this chapter outlines FHWA's NEPA implementation regulations. Part 777, Mitigation of Impacts to Wetlands and Natural Habitat, covers how the agency is to evaluate and mitigate negative environmental impacts from its activities in order to adhere with other federal regulations. So while the agency is not responsible for permitting activities in wetlands or other sensitive areas as described in the previous sections, federal regulations require the agency to account for, and compensate, their own negative impacts to both wetlands and natural habitats.

As discussed above in Section 3.1.1, all federal decisions are required to go through the NEPA review process to identify any potentially negative environmental impacts. This includes decisions to fund state projects and therefore requires state agencies, in this case the Maryland State Highway Administration, to submit the required NEPA documents.

FHWA's policy for complying with NEPA includes two significant requirements. The first is that alternatives must be considered and that decisions be "based upon a balanced consideration of the need for safe and efficient transportation; of the social, economic, and environmental impacts of the proposed transportation improvement; and of national, State, and local environmental protection

[41] U.S. Army Corps of Engineers Baltimore District. "Regulatory Program – Permit Types and Process." (2011) <http://www.nab.usace.army.mil/Wetlands%20Permits/permits.htm > Accessed May 6, 2011.
[42] Clearwater, Denise. Maryland Department of the Environment. Personal communication. June 24, 2011.

goals."[43] The second requires adverse impacts to be mitigated, which is particularly pertinent to the WRR.

To comply with NEPA, FHWA provides those agencies receiving Title 23 funds for projects with the policy and procedures for evaluating and mitigating environmental impacts.[44] These policies list the other federal regulations with implications for wetland management including:[45]

- Protection of wetlands: Executive Order 11990 - Protection of Wetlands and Department of Transportation Order 5660.1A - Preservation of the Nation's Wetlands
- Mitigation and management of impacts to wetlands and natural habitats: Sections 103 and 133 of CFR Title 23
- Requirements for disposing of dredged or fill material: 33 CFR parts 320 through 330, Regulatory Program, U.S. Army Corps of Engineers; Section 404, Clean Water Act; and 40 CFR part 230, Section 404(b)(1) Guidelines for the Specification of Disposal Sites for Dredged or Fill Material
- Federal guidance on the use of mitigation banks to account for unavoidable damage
- Interagency coordination for consultation related to the Endangered Species Act: Endangered Species Act of 1973, as amended (50 CFR part 402)

Section 777.7 specifies how to evaluate both the reasonableness of a mitigation project and the importance of a specific wetland or natural habitat:[46]

> Reasonableness of spending public funds:
>
> 1. Importance of the wetland or natural habitat
> 2. Extent of the proposed project's impacts on the wetland or natural habitat
> 3. Required compliance with Section 404 of the Clean Water Act (see Section 3.1.2.1.5)
>
> Importance of wetlands or natural habitats to be impacted:
>
> 1. Functional capacity
> 2. Relative importance of the above functions to the rest of the wetland or natural habitat
> 3. Uniqueness, esthetics, cultural values
> 4. Input from resource management agencies

[43] Code of Federal Regulations. Title 23 Highways, Chapter 1 Federal Highway Administration, Department of Transportation, Part 771 Environmental Impact and Related Procedures, Section 105 Policy. <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=2caaa8d8c68f4e87ff7bf1247644a6f2&tpl=/ecfrbrowse/Title23/23cfr771_main_02.tpl> Accessed August 24, 2010.

[44] Mar, Jeanette. Federal Highway Administration. Personal communication. July 30, 2010.

[45] Code of Federal Regulations. Title 23 Highways, Chapter 1 Federal Highway Administration, Department of Transportation, Part 777 Mitigation of Impacts to Wetlands and Natural Habitat, Section 3 Background. <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=2caaa8d8c68f4e87ff7bf1247644a6f2&tpl=/ecfrbrowse/Title23/23cfr777_main_02.tpl > Accessed August 24, 2010.

[46] Code of Federal Regulations. Title 23 Highways, Chapter 1 Federal Highway Administration, Department of Transportation, Part 777 Mitigation of Impacts to Wetlands and Natural Habitat, Section 7 Evaluation of impacts. <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=2caaa8d8c68f4e87ff7bf1247644a6f2&tpl=/ecfrbrowse/Title23/23cfr777_main_02.tpl > Accessed August 24, 2010.

If mitigation activities are deemed appropriate, there are three types of activities that are eligible for federal funding:[47]

1. Avoidance and minimization of impacts
2. Compensatory mitigation – mitigation banks, on-site mitigation, restoration or enhancement on- or off-site, wetland creation, preservation (under special circumstances only)
3. Improvements to existing wetlands or natural habitats

If a compensatory mitigation project is undertaken, approved mitigation banks are the preferred means of implementation. If unavailable, a specific set of options are listed as alternatives in the regulation. Most importantly, the overall goal of the agency's mitigation efforts is to create a net gain of wetlands.

Two recent federal laws have been passed that bolster environmental protections in transportation development projects and streamline the NEPA process with other federal, state, and local review and approval processes: The Transportation Equity Act for the 21st Century (TEA-21) passed in 1998, and the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU), passed in 2005, which aims to improve portions of the environmental and streamlining initiatives in TEA-21.

While FHWA is not tasked with permitting authority it is required to comply with the federal laws discussed above. Given the nature of highway construction, the agency is responsible for a considerable amount of wetland mitigation and stormwater runoff management. From FHWA's perspective, the WRR will facilitate the selection of mitigation sites and improve coordination between the agency, Maryland State Highway Administration, and federal and state permitting agencies.[48]

3.2 State of Maryland

This section covers the State of Maryland's authority to regulate activities relating to wetlands, floodplains, waterways, and stormwater. It also includes a review of relevant agency programs and priorities that address land and water conservation, preservation, and restoration. Many of the functions discussed in this section are required by the federal statutes covered in the previous section.

Each of the departments covered here have been involved in the development of the Watershed Resources Registry and will ultimately use the final product. For instance, the Department of the Environment (MDE) is likely to use the tool, among various other information sources, to identify potential sites for wetland mitigation projects. The State Highway Administration (SHA) may use it to identify potential locations for MS4 or Chesapeake Bay TMDL compliance.

The Department of Natural Resources (DNR) will use the tool in a completely different way because it does not have extensive regulatory authority nor are its activities often regulated. Instead, for DNR the

[47] Code of Federal Regulations. Title 23 Highways, Chapter 1 Federal Highway Administration, Department of Transportation, Part 777 Mitigation of Impacts to Wetlands and Natural Habitat, Section 9 Mitigation of impacts. <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=2caaa8d8c68f4e87ff7bf1247644a6f2&tpl=/ecfrbrowse/Title23/23cfr777_main_02.tpl > Accessed August 24, 2010.

[48] Mar, Jeanette. Federal Highway Administration. Personal communication. July 30, 2010.

WRR provides an opportunity for its priorities to be considered in project planning and other decisions with environmental impacts.

The State of Maryland's statues are found in the Annotated Code of Maryland. Statutes are enacted by the Maryland legislature and provide state agencies with the authority to set regulations. Agency regulations, which are more detailed than the statues, are found in the Code of Maryland Regulations. Both of these documents should be referred to for complete and up-to-date guidance on Maryland's laws and regulations.

Significant actions proposed by state agencies are reviewed under the Maryland Environmental Policy Act.[49] Significant state actions are defined as those requiring Maryland legislative action or appropriation. Similar to the National Environmental Policy Act, the state law requires all state agencies to conduct a review of impacts, suggest means of minimizing any impacts, and explore alternatives for any action that would have a significant environmental impact.

The Department of Natural Resources has written the general guidelines for complying with the act and each agency is to develop its own implementation procedures for striking a balance between environmental protection and economic development. The resulting environmental impact reports are evaluated by the Maryland General Assembly before project approval.

3.2.1 Department of the Environment

The Maryland Department of the Environment strives to "protect and restore the quality of Maryland's air, water, and land resources, while fostering smart growth, economic development, healthy and safe communities, and quality environmental education for the benefit of the environment, public health, and future generations."[50]

The authority to create the department and carry out these functions is in the Environment Article of the Annotated Code of Maryland. Given this mission of environmental protection and restoration, MDE plays a key role in land and water management decisions. MDE's Water Management Administration and Science Services Administration have both been involved with the development of the WRR.

The following sections cover the relevant responsibilities and activities of the two departments and discuss how the WRR may be used. A summary of permits issued by MDE for which the WRR could be used by applicants and/or state permit reviewers appears in Table 3-2.

3.2.1.1 Science Services Administration

MDE's Science Services Administration (SSA) is responsible for developing the state's water quality standards and managing the Total Maximum Daily Load (TMDL) program. Both of these efforts require

[49] Michie's Legal Resources. Annotated Code of Maryland, Natural Resources Article. Title 1 Department of Natural Resources, Subtitle 3 Maryland Environmental Policy Act. <http://www.michie.com/maryland/lpExt.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=cba7#JD_nr1-301> Accessed November 30, 2010.

[50] Maryland Department of the Environment. "About MDE." <http://www.mde.state.md.us/aboutMde/Pages/aboutmde/home/index.aspx> Accessed November 5, 2010.

the SSA to maintain information on state water quality conditions and provide data and analyses to assist in MDE's regulatory functions. The SSA is also responsible for preventing the deterioration of existing high quality waters and for addressing nonpoint source pollution issues.

The authority for Maryland to determine designated uses, water quality standards, and TMDLs is from the federal Clean Water Act discussed in Section 3.1.2.1. MDE's authority to carry out these activities is in the Annotated Code of Maryland in Subtitle 9 of the Environment Article. Water quality-related regulations are found in the Code of Maryland Regulations (COMAR) under Title 26 Department of the Environment, Subtitle 8 Water Pollution.

The SSA's Environmental Assessment and Standards Program establishes the water quality standards for the state and develops regulations to protect water quality. As discussed in Section 3.1.2.1.1, surface waters are to be categorized by their intended use(s).

The designated uses for surface water in Maryland are:[51]

- **Use I:** Water Contact Recreation and Protection of Nontidal Warmwater Aquatic Life
- **Use I-P:** Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply
- **Use II:** Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting
  - Shellfish Harvesting Subcategory
  - Seasonal Migratory Fish Spawning and Nursery Subcategory (Chesapeake Bay only)
  - Seasonal Shallow-Water Submerged Aquatic Vegetation Subcategory (Chesapeake Bay only)
  - Open-Water Fish and Shellfish Subcategory (Chesapeake Bay only)
  - Seasonal Deep-Water Fish and Shellfish Subcategory (Chesapeake Bay only)
  - Seasonal Deep-Channel Refuge Use (Chesapeake Bay only)
- **Use II-P:** Tidal Fresh Water Estuary – includes applicable Use II and Public Water Supply
- **Use III:** Nontidal Cold Water
- **Use III-P:** Nontidal Cold Water and Public Water Supply
- **Use IV:** Recreational Trout Waters
- **Use IV-P:** Recreational Trout Waters and Public Water Supply

All surface waters in the state are, at a minimum, designated as Use I. The water quality criteria that accompany the designated uses can be found in the "Water Quality Criteria Specific to Designated Uses" section in COMAR 26.08.02.03.

In the event that a waterway is not meeting the water quality standards for its designated use, the state is required to develop a TMDL to return the water to its intended quality. The TMDL Technical Development Program manages the water quality data required for these assessments and conducts the modeling necessary to establish a TMDL.

Every two years the state drafts its Integrated Report of Surface Water Quality that combines information required in Sections 305(b) and 303(d) of the Clean Water Act.[52] This report includes

[51] Code of Maryland Regulations. "Designated Uses." Title 26 Department of the Environment, Subtitle 8 Water Pollution, Chapter 2 Water Quality, Section 2 Designated Uses. < http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.02.htm> Accessed November 22, 2010.

[52] Maryland's most recent (2010) "Integrated Report of Surface Water Quality" is available at: http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/index.aspx

information on surface water quality and the status of TMDLs for impaired waters. Two sets of information are commonly referred to – the 303(b) list that contains the water quality assessments and the 303(d) list with the impaired waterways. Water quality monitoring in wetlands is currently being undertaken so that wetlands can be included in the state's 305(b) list.

TMDL implementation is essential to achieving water quality improvements, though implementation plans are not required. Maryland is in the process of developing a framework that will assist with planning and implementation. This framework includes nested watershed planning, State Water Quality Management Plans, Bay TMDL Watershed Implementation Plans, Water Resources Elements, NPDES Stormwater permits, and local watershed plans.[53]

Impaired streams on the 303(d) list are included as a relative factor in the WRR's ranking of suitable sites to meet various watershed goals. This means that when the WRR is used to search for a restoration site, those parcels that drain into or are near a 303(d) stream will be scored higher than those that do not. Thus, TMDL implementation could be assisted by many projects without an explicit TMDL end goal.

Chesapeake Bay TMDL

Maryland is required under the Chesapeake Bay TMDL to reduce nutrient and sediment loads to the bay. MDE has allocated the state's required reductions to 58 "segment-sheds" and each pollutant source sector (i.e. urban stormwater, agriculture) as part of the Phase I Watershed Implementation Plan.

MDE is currently working with other agencies and partners on the Phase II WIPs. These plans are to detail how the load reductions will be met at the local level. This will include a combination of strategies, control measures, and polices, among other techniques for limiting pollution. A set of two-year milestones are being developed to assist short-term implementation.

Implementation is likely to include a variety of activities, such as:

- Wastewater treatment plant and septic system upgrades;
- stormwater management improvements;
- agricultural BMPs;
- watershed management;
- land use planning; and
- conservation and restoration of natural resources, specifically wetlands, forests, and streams.

3.2.1.1.1 Water Quality Protection and Restoration Program

Antidegradation Policy

In addition to determining designated uses and the associated water quality standards, the EPA also requires the protection of existing high-quality waters through its antidegradation policy. This responsibility is carried out by SSA's Water Quality Protection and Restoration Program.

[53] Maryland Department of the Environment. "TMDL Implementation Framework." (2010) <http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/programs/waterprograms/tmdl/implementation.aspx#what> Accessed November 4, 2010.

Maryland's antidegradation policy is defined in COMAR 26.08.02.04, under the authority of the Annotated Code of Maryland Environment Article, Title 9 Water, Ice, and Sanitary Facilities, Subtitle 3 Water Pollution Control. The regulation outlines three tiers of waters:

- Tier I: Waters that meet their designated use and minimum water quality standards.
- Tier II: High quality waters that exceed the water quality standards for their designated use.[54] In Maryland, Tier II waters are identified using the findings of the Maryland Biological Stream Survey. (See Figure 2-9 for a map of Tier II waters in Charles County.)
- Tier III: Waters that represent exceptional national resources such as waters in state or national parks and wildlife refuges and waters of exceptional recreational or ecological significance, including wetlands of special concern. There are currently no Tier III designated waters in Maryland.

Changes to county plans or to discharge permits that will create or increase a pollutant discharge into Tier II waters must go through an antidegradation review process before a permit is granted. This process requires the identification of alternative discharge locations.[55] If a cost-effective alternative is available, it will become a condition of the permit or county plan. If no alternative is deemed cost effective then the applicant must show how any adverse impacts will be mitigated. An approved social and economic justification is required for activities that will cause an impact even after efforts have been made to reduce them. The review process can result in permit conditions or in denial of a permit application.

Maps of Tier II waters are available for each county in Maryland to facilitate the identification of these waters by potential applicants.

The presence of a Tier II watershed is a factor considered in each WRR opportunity analysis. This makes them priority locations for preservation and restoration projects. The WRR specifically could be used during antidegradation reviews to identify more suitable alternative locations for a discharge and for mitigation sites if required.

Non-Point Source Program

Maryland's Non-Point Source Program within SSA's Water Quality Protection and Restoration Program oversees the implementation of the state's 319 grant program (319 refers to Clean Water Act Section 319; see Section 3.1.2.1.2).

In fiscal year 2010, the goals of the program were to eliminate or reduce nonpoint source pollution, remove waters from the state's 303(d) list, and restore and protect aquatic habitats through watershed

[54] Maryland Code of Regulations. Article 26 Department of the Environment, Subtitle 8 Water Pollution, 2 Water Quality, 4-1 Antidegradation Policy Implementation Procedures. <http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.04-1.htm> Accessed November 17, 2010.

[55] Maryland Department of the Environment Research Center. "Maryland's High Quality Waters (Tier II)." <http://mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/Antidegradation.aspx> Accessed May 6, 2011.

planning, implementing BMPs, water quality monitoring, stream and wetland restoration, and outreach and education.[56] Much of the program's efforts focus on supporting and funding local watershed planning and implementation projects.

The authority for MDE to develop comprehensive watershed management plans is found in Title 26, Section 5-908 "Watershed management plans" of the Maryland Annotated Code. These plans are to be developed with input from state, local, and federal agencies. The plans must address nontidal wetland protection, creation, and restoration; cumulative impacts; flood protection; and water supply concerns.[57] Additionally, these plans can serve to address the nonpoint source pollution reductions required by TMDLs.

Grants for these types of projects are applied for through the Chesapeake & Atlantic Coastal Bay Trust Fund (administered by DNR). This process allows applicants to compete for a variety of funds aimed at reducing nonpoint source pollution.

A prerequisite for receiving 319 funds is the approval of a watershed plan as described by the EPA. Completed plans are to be used by Maryland regulating agencies to provide consistent permitting decisions that benefit water resources.

The Watershed Resources Registry could be used in the development of these plans to identify locations to control nonpoint source pollution through the restoration or preservation of wetlands, uplands, riparian areas, and/or natural stormwater infrastructure.

As part of the program's effort to protect aquatic habitat, it has funded the monitoring of high quality streams facing development pressure. This type of data and analysis can contribute to mandated antidegradation reviews in Tier II watersheds.

Such an effort was undertaken in the Mattawoman watershed on Old Woman's Run in 2010.[58] The monitoring indicated that without mitigation measures the tributary would not be able to assimilate any additional pollution that would likely result from the construction of a highway and associated development in the watershed.

[56] Shanks, Ken. "Maryland 319 Nonpoint Source Program 2009 Annual Report." Section §319(h) Nonpoint Source Program, Maryland Department of the Environment. (2010) <http://www.mde.state.md.us/programs/Water/Pages/Programs/waterprograms/319nps/index.aspx> Accessed November 10, 2010.

[57] Michie's Legal Resources. Annotated Code of Maryland, Environment Article, Title 5 Water Resources, Subtitle 9 Nontidal Wetlands, Section 908 Watershed Management Plans. <http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=6f1b#JD_en5-908> Accessed November 15, 2010.

[58] Shanks, Ken. "Maryland 319 Nonpoint Source Program 2010 Annual Report." Section §319(h) Nonpoint Source Program, Maryland Department of the Environment. (2011) <http://www.mde.state.md.us/programs/Water/319NonPointSource/Documents/2010%20MD%20Annual%20Rpt%20201102224.pdf> Accessed May 19, 2011.

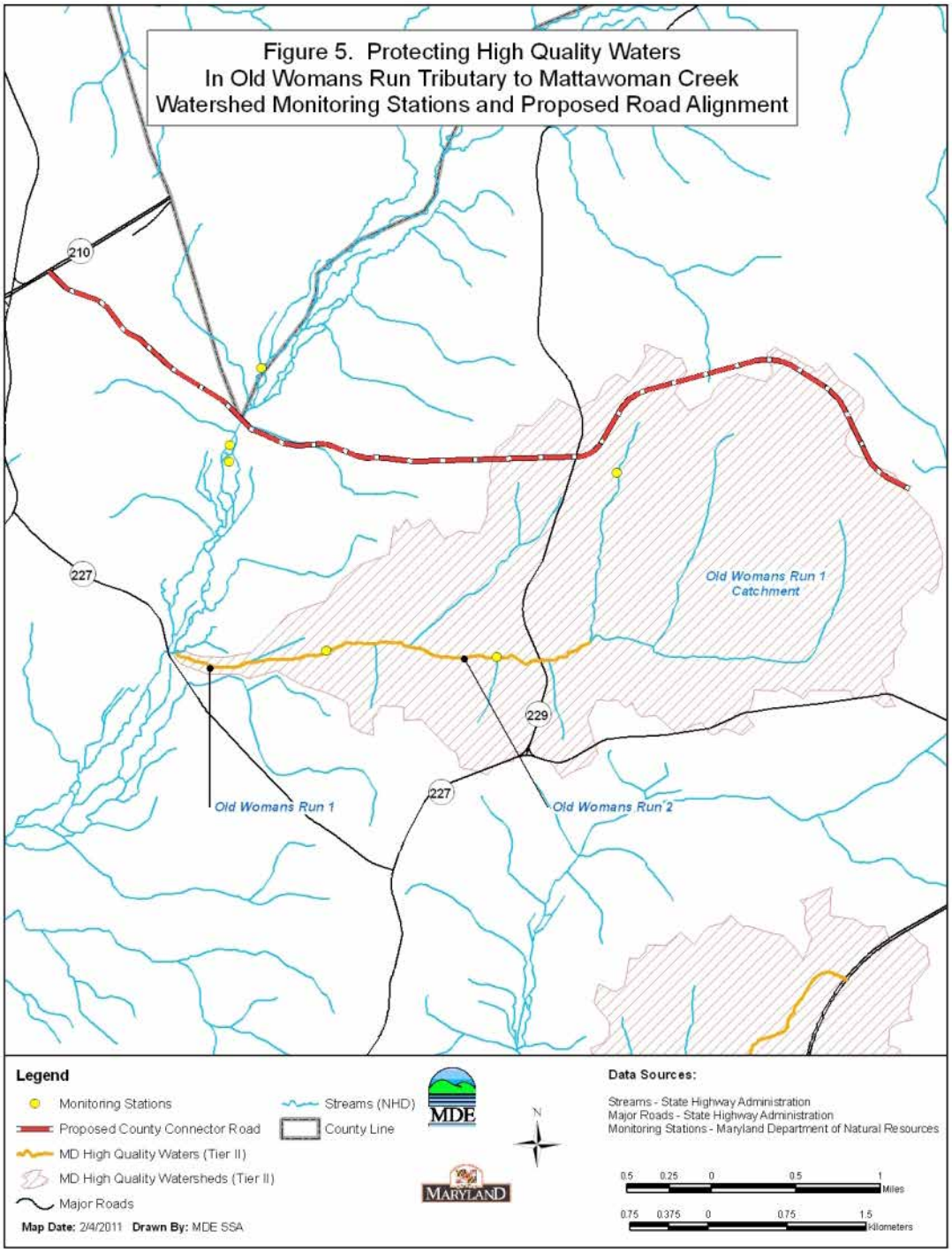

Figure 3-1. Areas where the proposed Cross County Connector crosses the Old Woman's Run watershed.[59]

[59] Image appears in: Shanks, Ken. "Maryland 319 Nonpoint Source Program 2010 Annual Report." Section §319(h) Nonpoint Source Program, Maryland Department of the Environment. (2011) <http://www.mde.state.md.us/programs/Water/319NonPointSource/Documents/2010%20MD%20Annual%20Rpt%20201102 24.pdf> Accessed May 19, 2011.

The Nonpoint Source Program also leads the Biological Restoration Initiative (BRI). This project focuses on restoring biologically impaired streams. The biological integrity of streams is determined using data from DNR's Maryland Biological Stream Survey. BRI prioritizes watersheds for 319 grants by those with streams on the 303(d) list with the highest potential for recovery.[60]

Portions of the Mattawoman Creek watershed are ranked as BRI priority areas. BRI watersheds are included as a scoring factor for the WRR restoration opportunity analyses.

3.2.1.2 Water Management Administration

The Water Management Administration (WMA) is responsible for a diverse set of issues relating to surface and groundwater resources. These include water supply appropriation, source water protection, NPDES permits, dam safety, policies to control runoff from stormwater and sediment sources, and inspections for permit compliance, among others. Programs and permits that relate to the Watershed Resources Registry are discussed in this section.

3.2.1.2.1 Wetlands and Waterways Program

The key function of the Wetlands and Waterways Program is to protect the state's tidal and nontidal wetlands, waterways, and floodplains. Maryland has a "no net loss" policy that requires mitigation of and compensation for any impacted wetlands.[61]

These goals are achieved through regulatory programs and technical assistance, guidance, and tool development, and by helping individuals and local governments to do the same. The program administers permits for temporary or permanent impacts to tidal and non-tidal wetlands and their buffers, waterways, and floodplains.[62] This authority comes from sections within the Annotated Code of Maryland Environment Article, Title 16 Wetlands and Riparian Rights (tidal wetlands) and Title 5 Water Resources. The corresponding regulations for these statues are in the Code of Maryland Regulations 26.23, 26.24, 23.02.04, and 26.17.04, respectively.

Nontidal Wetlands

The Nontidal Wetland Protection Act passed in 1989 provides MDE with the authority to regulate activities in nontidal wetlands and to restore, conserve, and mitigate impacts through programmatic activities. Specifically, the act calls for "a comprehensive, statewide nontidal wetland program" with a goal "to attain no net overall loss in nontidal wetland acreage and function and to strive for a net resource gain."

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[60] Maryland Department of the Environment. "TMDL Implementation Framework." (2010) <http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/programs/waterprograms/tmdl/implementation.aspx#what> Accessed November 4, 2010.

[61] Michie's Legal Resources. Annotated Code of Maryland, Environment Article, Title 5 Water Resources, Subtitle 9 Nontidal Wetlands, Section 902 Legislative findings and intent; goal of statewide program. < http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=6f11#JD_en5-902> Accessed November 15, 2010.

[62] Maryland Department of the Environment. "Water Programs." <http://www.mde.state.md.us/PROGRAMS/WATER/Pages/Programs/WaterPrograms/index.aspx> Accessed June 22, 2010.

Under the authority of this act, the WMA is responsible for the following duties:[63]

> (1) Coordinate with other State agencies, federal agencies, other states, local governments, and interested persons in the regulation of nontidal wetlands;
>
> (2) Assist local governments in undertaking nontidal wetland management planning, including mapping, technical assistance, and expediting the permit process;
>
> (3) Develop certification programs to ensure uniform and professional standards for the identification, delineation, functional assessment, and mitigation of nontidal wetlands;
>
> (4) Evaluate proposed activities on nontidal wetlands and grant or deny permits or other approvals of proposed activities;
>
> (5) Conduct watershed studies and educational programs and disseminate information concerning the nontidal wetlands program;
>
> (6) Prepare, adopt, and periodically revise guidance maps of nontidal wetlands;
>
> (7) Adopt standards for planning, regulating, restoring, creating, and enhancing nontidal wetlands;
>
> (8) Purchase, restore, and create nontidal wetlands; and
>
> (9) Conduct periodic monitoring, cumulative impact assessment, and evaluation of activities authorized under this subtitle.

The permits required by MDE for activities in both tidal and nontidal wetlands and waterways/floodplains are summarized in Table 3-2 below. Whenever a permit is applied for the application goes through the joint state/federal permitting process which may include the U.S. Army Corps of Engineers review as discussed earlier (see Section 3.1.3).

MDE's authority to issue general permits for activities in state-owned tidal wetlands has been delegated from the Maryland Board of Public Works (COMAR 23.02.04).[64] In the event that an individual permit is required due to the scope or nature of a proposed activity, MDE will send a recommendation to the Board's Wetlands Administrator, and ultimately the entire Board will review and make a decision on the application.

Depending on the type of permitted activity, mitigation of wetland losses may be required. As described in Section 3.1.2.1.5, the EPA and the Army Corps have specific requirements for compensatory mitigation projects. MDE also has mitigation requirements under its statutes and regulations. MDE is currently updating the guidance document for conducting nontidal wetland mitigation in Maryland. Key aspects of the 1998 version, *Maryland Nontidal Wetland Mitigation Guidance*, are briefly covered here.

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[63] Michie's Legal Resources. Annotated Code of Maryland, Environment Article, Title 5 Water Resources, Subtitle 9 Nontidal Wetlands, Section 903 Statewide program established; application of subtitle; Department's duties; regulations. <http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=6f13#JD_en5-903> Accessed November 15, 2010.

[64] Maryland Board of Public Works. "Wetlands: Types of Licenses." <http://www.bpw.state.md.us/Wetlands/License_Types/default.shtml> Accessed June 4, 2010.

Part of the application process is the submission of a Phase I Mitigation Plan. The Phase I plan is a proposal for the location, size, vegetation, and hydrology source for a mitigation project. This plan is submitted to MDE with the rest of the permit application.

If a suitable mitigation site is not located, the applicant can propose to pay into the Nontidal Wetland Compensation Fund. Though, generally, MDE favors permittee-responsible mitigation over use of its In-Lieu Fee program except under certain circumstances.

If a permit is granted, the Phase II Mitigation Plan must be submitted within three months of approval. The Phase II plan contains detailed information on the mitigation project, including how the land will be permanently protected from development. The final step in the permit process is for the applicant to file a surety bond to hold the applicant accountable for the project outlined in the mitigation plan.

To determine the size of a mitigation project, MDE has specified replacement ratios based on the type of wetland to be mitigated (see Table 3-1). There are a number of ways to meet the mitigation requirements. These include on-site or off-site restoration, creation, and enhancement or payment to the Nontidal Wetland Compensation Fund.[65] Generally, on-site mitigation projects are preferred to those off-site, but functionality, size, and watershed needs are considered and can affect priority locations.

Currently, MDE's In-Lieu Fee program and mitigation banking rules are being updated for consistency with the 2008 Compensatory Mitigation Rule. One proposed change would reorder the priority activities for mitigation to first be payment into a mitigation bank, then on-site projects in support of a watershed plan, and finally off-site projects.[66] This shift would prioritize watershed needs over on-site projects. This is likely to lead to fewer, larger sites instead of many small ones.

Another possible outcome of this review is the use of the WRR as part of the comprehensive plan for the In-Lieu Fee program.[67] The WRR would be a component of the watershed approach required by the EPA for siting mitigation projects, along with other tools such as MDE's 2006 wetlands prioritization document. These tools would assist with indentifying priority sites, watershed needs, and form the basis of a restoration plan.

Additionally, the WRR and other tools can be used by applicants for wetland permits to identify potential mitigation sites. The tools could also be used by developers and others to identify high-value sites to avoid in the initial planning phase for their projects, which may aid in meeting requirements of an alternative site analysis.

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[65] Neff, Kelly, et al. "Effectiveness of Maryland Compensatory Mitigation Program." (2007) Wetlands and Waterways Program, Maryland Department of the Environment. <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/mitigation_report.aspx> Accessed November 12, 2010. Additional guidance for siting mitigation projects is in COMAR 26.23.04.03 Mitigation Standards.

[66] Neff, Kelly. Maryland Department of the Environment. Personal communication. February 16, 2011.

[67] Neff, Kelly. Maryland Department of the Environment. Personal communication. February 16, 2011.

Table 3-1. Mitigation replacement ratios.[68]

Wetland Type	Replacement Ratio
Emergent	1:1
Emergent, using a bank	1.5:1
Farmed	1:1
Farmed, using a bank	1.5:1
Scrub-shrub to emergent conversion	1:1
Scrub-shrub to emergent conversion, using a bank	1.5:1
Forested to emergent conversion	1:1
Forested to emergent conversion, using a bank	1.5:1
Forested to scrub-shrub conversion	1:1*
Scrub-shrub	2:1
Scrub-shrub, using a bank	3:1
Forested	2:1
Forested, using a bank	3:1
Emergent (of special State concern)	2:1
Emergent (of special state concern), using a bank	3:1
Scrub-shrub (of special State concern)	3:1
Scrub-shrub (of special State concern), bank	4.5:1
Forested (of special State concern)	3:1
Forested, (of special state concern), using a bank	4.5:1
* Some conversions of forested wetlands to scrub-shrub require mitigation.	

[68] Neff, Kelly, et al. "Effectiveness of Maryland Compensatory Mitigation Program." (2007) Wetlands and Waterways Program, Maryland Department of the Environment. <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/wetlands_Waterways/about_wetlands/mitigation_report.aspx> Accessed November 12, 2010.

In addition to conducting permitting operations, the Wetlands and Waterways Program also works programmatically to protect, enhance, and restore wetlands and streams. This is done through a variety of initiatives looking at prioritizing wetlands for restoration,[69] evaluating the effectiveness of the state's wetland mitigation[70] and conservation programs,[71] developing a wetland monitoring strategy,[72] and facilitating and documenting the protection of wetlands on public and private lands.[73]

Water Quality Certification

The Wetlands and Waterways Program is also responsible for issuing Water Quality Certifications as required by Section 401 of the Clean Water Act (see Section 3.1.2.1.3). Any federal activity that will discharge, including those permitted through the National Pollutant Discharge Elimination System, into the waters of the state requires a water quality certification from MDE. This certification verifies that the discharge will not violate the water quality criteria for the stream's designated use.

The application for certification must, if applicable, include the type of discharge, locations, treatment and containment efforts, monitoring plan, and any other information requested by MDE.[74]

A State Water Quality Certification, if applicable, is required before other wetland and waterway permits can be granted. The certification is meant to ensure that any discharge will not violate Maryland water quality requirements or limitations.

Waterway and Floodplain Construction

The Wetlands and Waterways Program also regulates activities that change the course, current, and cross sections of streams and their 100-year floodplains. This designation does not include wetlands or areas subject to tidal flooding.

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[69] Maryland Department of the Environment. "Prioritizing Areas for Wetland Restoration, Preservation, and Mitigation." (2006) <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/prioritizingareas.aspx > Accessed June 28, 2010.

[70] Maryland Department of the Environment. "Mitigation." <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/Regulations/Pages/programs/waterprograms/wetlands_waterways/regulations/mitigation.aspx > Accessed June 28, 2010.

[71] Maryland Department of the Environment. "The Maryland Wetland Conservation Plan." (2003) <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/MDWetlandConservationPlan/Pages/Programs/WaterPrograms/Wetlands_Waterways/wetland_conservation/index.aspx > Accessed June 28, 2010.

[72] Maryland Department of the Environment. "Wetland Monitoring." <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/monitoring.aspx > Accessed June 28, 2010.

[73] Maryland Department of the Environment. "Wetland Restoration Accomplishment Report." <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/accomplish.aspx>; "Landowner Stewardship Referral Form." <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/AboutWetlands/Pages/Programs/WaterPrograms/Wetlands_Waterways/about_wetlands/landowner.aspx>; "Wetland Maps." <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/DocumentsandInformation/Pages/Programs/WaterPrograms/Wetlands_Waterways/documents_information/maps.aspx> Accessed June 28, 2010.

[74] Maryland Code of Regulations. Article 26 Department of the Environment, Subtitle 8 Water Pollution, 2 Water Quality, Section 10 Water Quality Certification. <http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.10.htm> Accessed November 19, 2010.

While the authority for these activities is derived from separate statues, the same application process is used. Applicants are required to submit a "Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland."

Key permit requirements are that the project is consistent with existing watershed and flood management plans, mitigation measures have been considered, and that the project plan is consistent with local regulations.

Maryland has specific guidelines for construction in a floodplain.[75] The regulatory authority to permit these activities can be found in the Maryland Annotated Code, Environment Article Title 5 Water Resources, Subtitle 5-501 through 5-514. A summary of the permitted activities in the 100-year floodplain appears in Table 3-2 below under the title Waterway And 100-Year Floodplain (Nontidal Wetlands And Waterways Permit).

Coastal Zone Consistency Review

The Coastal Zone Consistency Division is responsible for ensuring that federal activities in Maryland's coastal zone are consistent with the state's federally approved Coastal Zone Management Program.[76] The authority for this comes from Section 307 of the federal Coastal Zone Management Act.

The division reviews federal projects, including direct federal activities, federal licenses and permits, and federal assistance to state and local governments. Activities that require a state permit go through the normal permitting process. The permit determination is viewed as the consistency review. Projects not requiring a permit are reviewed for consistency separately.

3.2.1.2.2 Sediment, Stormwater, and Dam Safety Program

The Sediment, Stormwater, and Dam Safety Program focuses on limiting runoff and nonpoint source pollution. Dam safety responsibilities will not be discussed here.

To address runoff and nonpoint source pollution, the program develops policies and guidance documents to help local governments minimize the negative impacts. For example, the program produced stormwater management guidelines for state and federal projects and guidance documents for developing an erosion and sediment control plan for private projects.[77,78]

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[75] Maryland Department of the Environment. "Maryland's Waterway Construction Guidelines" (2000) <http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/DocumentsandInformation/Pages/programs/waterprograms/wetlands_waterways/documents_information/guide.aspx> Accessed November 19, 2010.

[76] Ghigiarelli, Elder, Jr. Maryland Department of the Environment. "A Guide to Maryland's Coastal Zone Management Program." (2004) <http://www.dnr.state.md.us/ccp/coastal_policy.asp> Accessed June 27, 2011.

[77] Maryland Department of the Environment. "Maryland Stormwater Management Guidelines for State and Federal Projects." (2010) <http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/GuidelinesforStateandFederalProjects/Pages/Programs/WaterPrograms/SedimentandStormwater/Guidelines/index.aspx> Accessed May 27, 2010.

[78] Maryland Department of the Environment. "Maryland 2010 Standards and Specifications for Erosion and Soil Control." (2010) <http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/SoilErosionandSedimentControl/Pages/pro

The authority for both the sediment control and stormwater management programs is in the Environment Article in the Annotated Code of Maryland, Title 4 Water Management, Sections 4-101 through 4-116 and 4-201 through 4-215, respectively.

The sediment control provisions require soil erosion control programs to be implemented by counties or local conservation districts. Additionally, an approved grading and sediment control plan is required (except when related to agricultural land management) before a grading or building permit can be granted.

In addition to programmatic efforts, three permits are administered by this program: Erosion/Sediment Control and Storm Water Management Plan, Stormwater Associated with Construction Activity, and Municipal Separate Storm Sewer System (MS4) Permit (see Table 3-2).

The regulatory authority for these permits and programs is in the Annotated Code of Maryland, Environment Article, Title 4, Subtitle 1 (Sediment Control) and Subtitle 2 (Stormwater Management); and Title 9, Subtitle 3 (Water Pollution Control).

Stormwater Management

The passage of the Stormwater Management Act in 2007 by the Maryland General Assembly strengthened the requirements for the management of stormwater runoff. Specifically, the use of environmental site design (ESD) to the "maximum extent practicable" is now required.

Environmental site design is defined in the Annotated Code of Maryland as "using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources."[79]

MDE lists the following as appropriate ESD techniques:[80]

- Preserving and protecting natural resources
- Conserving natural drainage patterns
- Minimizing impervious area
- Using green roofs, permeable pavement, reinforced turf, and other alternative surfaces
- Reducing runoff volume
- Maintaining 100 percent of the annual predevelopment groundwater recharge volume
- Clustering development
- Limiting soil disturbance, mass grading, and compaction
- Disconnection of rooftop runoff
- Disconnection of non-rooftop runoff
- Sheetflow to conservation areas

grams/waterprograms/sedimentandstormwater/erosionsedimentcontrol/draft_esc_standards.aspx> Accessed November 5, 2010.

[79] Michie's Legal Resources. Annotated Code of Maryland, Environment Article, Title 4 Water Management, Subtitle 2 Stormwater Management, Section 201.1 Definitions. <http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=6de9#JD_en4-2011> Accessed May 19, 2011.

[80] Maryland Department of the Environment. "Maryland Stormwater Management Guidelines for State and Federal Projects." <http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/GuidelinesforStateandFederalProjects/Pages/Programs/WaterPrograms/SedimentandStormwater/Guidelines/index.aspx> Accessed May 27, 2010.

- Rainwater harvesting
- Submerged gravel wetlands
- Landscape infiltration
- Infiltration/filtration berms
- Dry wells
- Micro-bioretention
- Rain gardens
- Vegetated swales
- Enhanced filters
- Stormwater management ponds
- Stormwater management wetlands
- Stormwater management infiltration
- Stormwater management filtering systems
- Stormwater management open channel systems
- Other techniques approved by the Administration

Other major provisions of the statute are that counties and municipalities must adopt ordinances to implement a stormwater management plan and that post-development runoff mimics pre-development runoff conditions.

Stormwater management plans are required for all private or governmental projects that involve land clearing or soil movement. These plans are meant to prevent soil erosion and increased nonpoint source pollution, maintain biological functions in associated streams, minimize pollutants from runoff, protect public safety, maintain the same recharge rate to groundwater as prior to development, remove pollutants from the runoff, implement a stream channel protection strategy, and prevent an increase in flood frequency from large, less frequent storms.[81]

As detailed in the Code of Maryland Regulations, the Water Management Administration is required to:[82]

- Set policies, procedures, standards, model ordinances, and criteria for stormwater management;
- review and approve county and municipal ordinances and stormwater management plans for state and federal projects;
- inspect and enforce stormwater management requirements for state and federal projects;
- conduct inspection and enforcement activities in conjunction with local authorities;
- develop guidelines and regulations;
- assist and train local authorities;
- develop public education programs; and
- evaluate the effectiveness of stormwater management techniques.

[81] Michie's Legal Resources. Annotated Code of Maryland, Environment Article, Title 4 Water Management, Subtitle 2 Stormwater Management, Section 203 Duties of Department. <http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=6ded#JD_en4-203> Accessed November 22, 2010.

[82] Code of Maryland Regulations. Title 26 Department of the Environment, Subtitle 17 Water Management, 2 Stormwater Management, 3 General Provisions. <http://www.dsd.state.md.us/comar/comarhtml/26/26.17.02.03.htm > Accessed November 22, 2010.

The regulations expressly incorporate the *2000 Maryland Stormwater Design Manual, Volumes I and II* and require its use in county and municipal ordinances and in the development of stormwater management plans when required for development and redevelopment projects.

Two of the Watershed Resources Registry opportunity analyses specifically address the need to locate sites for stormwater management. The Preserving Natural Stormwater Infrastructure analysis identifies natural areas that support groundwater recharge and/or minimize stormwater runoff. The second analysis, Restoring Compromised Stormwater Infrastructure, identifies locations where there is a potential for the implementation of best management practices to restore the stormwater system. The WRR could be used to identify sites near a specific project where ESD techniques have the highest potential for effectively addressing stormwater needs.

3.2.1.2.3 Wastewater Permits Program

The Wastewater Permits Program oversees permits for surface and ground water discharges. This covers wastewater and industrial sources that are not discharged directly into the sanitary sewer. Industrial sources include industrial, commercial, and institutional facilities, including landfills. Stormwater discharges not categorized under a MS4 permit are regulated by this program.

These permits, along with the MS4 permits issued by the Sediment, Stormwater, and Dam Safety Program, effectively implement the federal NPDES program explained in Section 3.1.2.1.4. The authority for these permits is in the Annotated Code, Environment Article; Title 9 Water, Ice, and Sanitary Facilities; Subtitle 3 Water Pollution Control.

3.2.1.2.4 Compliance Program

The Water Management Administration's Compliance Program inspects and enforces the permits and plans administered by the Administration's other programs. Specifically, the program inspects tidal and nontidal wetlands, waterway, stormwater, and erosion control projects.

3.2.1.2.5 Water Management Administration Permits

MDE issues two types of permits: individual or general. General permits cover specific types of activities with known environmental impacts. Individual permits cover a specific need or type of project. Those applying for general permits must agree to comply with permit conditions as written. The permits that are relevant to land management, wetlands, and stormwater are all issued by MDE's Water Management Administration.

The Maryland Department of the Environment's *2008 Guide to Environmental Permits and Approvals* outlines the applicability, requirements, and approval process for obtaining permits for certain activities.[83]

[83] Maryland Department of the Environment. "2008 Guide to Environmental Permits and Approvals."(2009) <http://www.mde.maryland.gov/assets/document/permit/2008permitguide/2008_mde_permitguide.pdf> Accessed May 12, 2010.

The permit guide offers a simple questionnaire to help identify which, if any, permits are required for a given project. The questions that identify the need for a permit pertaining to wetlands, stormwater, and construction in Maryland state waters are listed here to highlight permits that may benefit from the development of the Watershed Resources Registry.[84] A summary of each permit is in Table 3-2 below.

1. Do you perform any activity that generates wastewater?
    a. Will I discharge any wastewater from an industrial facility or landfill to any place other than the sanitary sewer?
       3.01 Surface Water Discharge Permit (Industrial)
    b. Will I discharge any wastewater or stormwater to any place other than the sanitary sewer? OR Do I own or operate a manufacturing facility, a fleet of vehicles or a recycling facility?
       3.02 General Discharge Permits
    c. Will I discharge any storm water to the State's surface waters AND Do I operate an "industrial facility, as defined below"? AND Is there any potential for any pollutants from this activity to come in contact with storm water?
    d. **3.03 General Permit for Discharges of Stormwater Associated with Industrial Activity**
    e. Will I discharge any wastewater to any place other than the sanitary sewer? OR Do I own or operate a sewage or water treatment plant?
       3.04 Surface Water Discharge Permit (Municipal)
    f. Will I discharge any wastewater to the groundwaters of the State?
       3.05 Ground Water Discharge Permit (Municipal or Industrial)
2. Do you perform construction projects that may affect tidal or non-tidal wetlands or flood plains?
    a. Does the tide rise and fall at the site where you propose your project? If so, Does your project involve constructing a shore erosion control measure such as a bulkhead, stone revetment, pier or marsh? OR dredging any open water or marsh?
       3.18 Tidal Wetland Licenses and Permits
    b. Does your project require work to be performed in a non-tidal wetland, the non-tidal wetland buffer?
       3.19 Non-Tidal Wetlands (Non-tidal Wetlands and Waterways Permits)
    c. Does your project require work to be performed in a non-tidal wetland, the non-tidal wetland buffer?… or the 100-year floodplain?
       3.20 Waterway and 100-year Floodplain (Nontidal Wetlands and Waterways Permits)
3. Do you perform construction that involves earth moving or excavation?
    a. Is the project undertaken by a State or Federal agency or local government agencies or private concerns? If so, will 5000 square feet or more or 100 cubic yards or more of earth be disturbed? OR Will the project impact an existing storm water management facility?
       3.21 Erosion/Sediment Control and Storm water Management Plan Approvals
    b. Am I planning a construction project in Maryland? AND Will my overall project disturb one acre or more of earth?
       3.23 Permit for Stormwater Asso. with Construction Activity (if disturbed area > 1 acre)
4. Are you an owner of a municipal separate storm sewer system serving large, medium and small municipalities?

[84] Adapted from: Maryland Department of the Environment. "2008 Guide to Environmental Permits and Approvals."(2009) <http://www.mde.maryland.gov/assets/document/permit/2008permitguide/2008_mde_permitguide.pdf> Accessed May 12, 2010.

a. Are you a government agency, serving a large or medium population, that owns and operates a storm drain system within the urbanized area (localities with populations over 100,000) of Maryland? (individual permit) OR Are you a government agency that owns and operates a storm drain system serving a facility over 5 acres, but with a population less than 100,000, within the urbanized area of Maryland? (general permit)
   3.24 Municipal Separate Storm Sewer Permit

5. Do you operate or plan to construct a bridge, dam or other obstruction to a waterway?
   a. Does your project require work to be performed in a non-tidal wetland, the non-tidal wetland buffer?
      3.19 Non-Tidal Wetlands (Non-tidal Wetlands and Waterways Permits)
   b. Does your project require work to be performed in a non-tidal wetland, the non-tidal wetland buffer?… or the 100-year floodplain?
      3.20 Waterway and 100-year Floodplain (Nontidal Wetlands and Waterways Permits)
   c. Will I be building a dam?
      3.25 Dam Safety Permit/Waterway Construction Permit

Table 3-2. Summary of permits related to wetlands, waterways, and/or stormwater activities regulated by MDE.[85]

3.01 Surface Water Discharge Permit (Industrial) (Combined state/federal NPDES permit)					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Discharges from industrial, commercial, or institutional facilities of wastewater (or stormwater in some instances) into state surface waters	FEDERAL: Clean Water Act STATE: Environment Article, Title 9, Subtitle 3; COMAR 26.08.01-26.08.04 and for the Pretreatment Permit, COMAR 26.08.08	Some facilities discharging non-domestic wastewater to a publicly-owned wastewater treatment plant may require a pretreatment permit.	Submit application. Continue to meet federal effluent guidelines and does not impair the designated use of the state water after permit has been granted.	Industrial Discharge Permits Division	Max. 5 years

3.02 Industrial Wastewater/Stormwater General Discharge Permits					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
• Concentrated animal feeding operations • Stormwater associated with industrial activities • Surface coal mines • Mineral mines, quarries, borrow pits, readymix concrete and asphalt plants • Seafood processors • Hydrostatic testing of tanks and pipelines • Marinas • Swimming pools and spas	FEDERAL: Clean Water Act STATE: Environment Article, Title 9, Subtitle 3; COMAR 26.08.01 through 26.08.04	See 3.22 General Permit for Construction Activities.	Submit Notice of Intent form. Meet requirements of general permit for specific type of activity.	General Permits and Technical Support	Expiration of general permit or as specified in permit; max. 5 years

3.03 General Discharge Permit For Stormwater Associated With Industrial Activities					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Any facility primarily involved in manufacturing, mining operations, hazardous waste treatment or disposal, landfills receiving industrial waste, recycling facilities, steam electric power generating facilities, transportation facilities conducting vehicle maintenance), sewage treatment works designed for over 1.0 MGD, and construction activity that disturbs over an acre.	FEDERAL: Clean Water Act, Section 402 STATE: Environment Article, Title 9, Subtitle 3; COMAR 26.08.01 through 26.08.04		File a "No Exposure Certification" if discharge will not be exposed to stormwater. If the discharge will come into contact with stormwater, submit a Notice of Intent for a general permit.	General Permits and Technical Support	Expiration of general permit or as specified in permit; max. 5 years

[85] Adapted from: Maryland Department of the Environment. "2008 Guide to Environmental Permits and Approvals."(2009) <http://www.mde.maryland.gov/assets/document/permit/2008permitguide/2008_mde_permitguide.pdf> Accessed May 12, 2010. A complete guide to MDE's permits and approvals can be found here: http://www.mde.state.md.us/Permits/index.asp.

3.04 Surface Water Discharge Permit (Municipal) (Combined state/federal NPDES permit)					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Any discharge of wastewater to surface waters from municipalities, counties, federal facilities, schools, commercial water and wastewater treatment plants, and private residence treatment systems	FEDERAL: Clean Water Act. STATE: Environment Article, Title 9, Subtitle 3; COMAR 26.08.01 through 26.08.04.		Submit application. Project is required to be in the county water and sewer plan unless it is for a private residence. Meet effluent, monitoring, and permit requirements. Obtain Water and Sewerage Construction Permit before building.	Municipal Discharge Permits Division	Max. 5 years

3.05 Ground Water Discharge Permit (Municipal or Industrial)					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Disposal of treated municipal or industrial wastewater via land application or into the subsurface	FEDERAL: 40 CFR Part 144 STATE: Environment Article, Title 9, Subtitle 3; COMAR 26.08.01through 26.08.04 and 26.08.07	Local permits may be required.	Submit permit application. Conduct hydrogeological study. Municipal projects must be in the county water and sewer plan.	Groundwater Permits Division	Max. 5 years

3.18 Tidal Wetland Licenses and Permits					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Filling of open water, vegetated wetlands, and alteration of wetlands. Construction of piers, bulkheads, revetments Dredging Marsh establishment	STATE: Environment Article Title 16; COMAR 26.24, 23.02.04	Chesapeake Bay Critical Area Protection Program Erosion/Sediment control and stormwater management plan approvals (3.20) Local building permits State Water Quality Certification Board of Public Works may issue license	Complete the Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland. Demonstrate that impacts to tidal wetlands are necessary and unavoidable. Alternatives analysis may be required. Mitigation and mitigation monitoring may be required.	Tidal Wetlands Division	Max. 3 years

3.19 Nontidal Wetlands (Nontidal Wetlands And Waterways Permits)					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Grading or filling Excavating or dredging Changing existing drainage patterns Disturbing the water level or water table Destroying or removing vegetation Any activity that alters a nontidal wetland or its 25 foot buffer (100 feet if in a wetland of special state concern)	STATE: Environment Article Title 5, Subtitle 5-901through 5-911; Annotated Code of Maryland; COMAR 26.23	Chesapeake Bay Critical Area Protection Program Erosion/Sediment control and stormwater management plan approvals (3.20) Local building permits State Water Quality Certification	Complete the Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland. Demonstrate that impacts to tidal wetlands are necessary and unavoidable. Alternative site analysis may be required. Mitigation and mitigation monitoring may be required.	Nontidal Wetlands Division	Max 5 years; possible 5 year extension

3.20 Waterway And 100-Year Floodplain (Nontidal Wetlands And Waterways Permit)					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
In a waterway or 100-year floodplain: construction or repair of dams and reservoirs, bridges and culverts; excavation, filling or construction; channelization; changing the course, current or cross-section of any stream or 100-year floodplain; temporary construction; or any other similar project	STATE: Environment Article Title 5, Subtitle 5-501 through 5-514; COMAR 26.17.04	Chesapeake Bay Critical Area Protection Program Erosion/Sediment control and stormwater management plan approvals (3.20) Local building permits State Water Quality Certification	Complete the Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland. May require engineering analysis and mitigation. Submit impacts on nontidal wetlands, in-stream fisheries, wildlife, endangered species and their critical habitat and project alternatives.	Waterway Construction Division	Max 5 years; possible 5 year extension

3.21 Erosion/Sediment Control And Stormwater Management Plan Approvals					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Erosion/sediment control plan approval: any construction activity that disturbs 5,000 square feet or more of soil, or results in the excavation of 100 cubic yards or more of soil. Stormwater management plan approval: any new development project that disturbs 5,000 square feet or more of land.	STATE: Environment Article, Title 4, Subtitle 1 for erosion and sediment control, and Subtitle 2 for stormwater management; COMAR 26.17.01 and 26.17.02		STATE AND FEDERAL PROJECTS: Submit erosion/sediment control and stormwater management plan. Comply with the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control, Erosion and Sediment Control Guidelines, 2000 Maryland stormwater design manual, and Stormwater Management Guidelines For State and Federal Projects. PRIVATE and local GOVERNMENT PROJECTS: Erosion/sediment control plans and stormwater management plans are administered and reviewed by local authorities.	Sediment, Stormwater, and Dam Safety Program	Erosion/Sediment: 2 years; Stormwater: none

3.23 Permit For Stormwater Associated With Construction Activity (NPDES program)					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Required for all construction activity that will disturb 1 acre or more.	FEDERAL: Clean Water Act Section 402 and the Code of Federal Regulations (40 CFR 122.26). STATE: Environment Article, Title 9, Subtitle 3: COMAR 26.08.04	Approved erosion/sediment control and stormwater management plans.	Submit application. Comply with water quality standards and TMDLs. Self-monitoring and record keeping.	Compliance Program	5 years from permit issue date

3.24 Municipal Separate Storm Sewer Permit (NPDES program)					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
Municipal separate storm sewer systems serving large, medium and small municipalities. [*Charles Co is a medium]*	FEDERAL: Clean Water Act, Section 402 and Code of Federal Regulations (40 CFR 122.26) STATE: COMAR 26.08.04		Collect information on existing stormwater programs to control pollution. Propose management program to reduce risk of contamination, including monitoring program. Submit application.	Sediment, Stormwater and Dam Safety Program	Max. 5 years

3.25 Dam Safety Permit/Waterway Construction Permit					
Activities Regulated	Legal Authority	Additional Approvals	Requirements	Water Management Administration Office	Permit Length
New dam or pond construction. Some ponds are exempt from needing permit. Modify existing impoundment structures.	STATE: Environment Article Title 5, Subtitle 05, COMAR 26.17.04		Complete the Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland. Notify all contiguous property owners and local authorities of the proposed project.	Sediment, Stormwater and Dam Safety Program	Max. 2 years

3.2.2 Department of Natural Resources

The Maryland Department of Natural Resources aims to secure "a sustainable future for our environment, society, and economy by preserving, protecting, restoring, and enhancing the State's natural resources."[86] Many DNR programs focus on collecting and analyzing data that inform decisions across the state. While the agency has minimal regulatory authority over actions that impact the state's natural resources, the Annotated Code of Maryland Natural Resources Article provides the agency with this broad mandate.

As specified in the Annotated Code the agency's major responsibilities are to:[87]

> (1) Review and evaluate all natural resources policies, plans, programs, and practices of State, county, regional, and federal agencies and institutions;
>
> (2) Coordinate natural resources activities within the State;
>
> (3) Be a center for collecting and organizing information on natural resources for the guidance of the Governor and the General Assembly; and
>
> (4) Otherwise unify, coordinate, and promulgate policies, plans, programs, and practices which insure the preservation, development, wise use, and enjoyment of all the natural resources for greatest benefits to the State and its citizens.

Contributing data, information, and expertise to the development of the Watershed Resources Registry helps fulfill DNR's mission. Many datasets and spatial layers created by DNR form the basis of the WRR opportunity analyses. Additionally, the WRR results can help inform development decisions within an ecosystem-based management framework.

The DNR programs relevant to this project are Land Resources, Aquatic Resources, and the Office for a Sustainable Future. The functions of these programs are summarized below.[88]

3.2.2.1 Office for a Sustainable Future

This office is charged with the integration, planning, and evaluation of many of DNR's activities, focusing on green infrastructure and land conservation, climate changes, and smart growth.[89] The office is also responsible for the BayStat Program which coordinates efforts across agencies and disciplines to assist with Chesapeake Bay restoration efforts, evaluates progress, and prioritizes Chesapeake and Coastal Bay Trust Fund grants to reduce nonpoint source pollution.

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[86] Maryland Department of Natural Resources. "DNR's Vision, Mission, and Agency-wide Priorities." <http://www.dnr.maryland.gov/mission_vision.asp> Accessed June 4, 2010.

[87] Michie's Legal Resources. Annotated Code of Maryland, Natural Resources Article, Title 1 Department of Natural Resources, Subtitle 1 Organization, Powers, and Duties of Department, Section 1 Department established; Secretary of Natural Resources; counsel; legislative intent. < http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=cb81#JD_nr1-101> Accessed December 1, 2010.

[88] Information for this summary was drawn from the DNR website and publications, Maryland State Archives (http://www.msa.md.gov/msa/mdmanual/21dnr/html/21agen.html, accessed December 9, 2010), and personal communications with Christine Conn, Department of Natural Resources.

[89] Maryland State Archives. "Department of Natural Resources – Functions." (2010) <http://www.msa.md.gov/msa/mdmanual/21dnr/html/21agen.html> Accessed December 9, 2010.

A key function of this office is to set priorities and target the most ecologically valuable resources in the state using the many resource assessments conducted by DNR.[90] A prime example of this is the GreenPrint program. This program prioritizes land for protection based on its ecological value. Using a detailed green infrastructure (GI) analysis combined with other data, priority areas – Targeted Ecological Areas – were identified and now help guide the department's annual land conservation priorities.

3.2.2.2 Aquatic Resources

The Aquatic Resource division addresses issues along the Atlantic and the Chesapeake Bay coasts and the broader tidal and nontidal ecosystems in Maryland. The division provides a number of services through its departments that collect and analyze data and help others to use this information. Below is a brief summary of these functions.

Chesapeake and Coastal Watershed Services – This department focuses on the planning, policy, and funding issues to conserve and restore riparian and wetland ecosystems. Primary functions include conservation education, riparian and wetland ecosystem restoration projects, watershed analysis, and GIS information.

The department's Environmental Review section reviews and comments on proposed state and federally funded projects.

The Environmental Review section is currently working with the Charles County Government to provide information and recommendations on activities in the Mattawoman watershed.[91] This effort is intended to inform the county's current effort to update its comprehensive plan. It will provide recommendations to the county for maintaining the health and productivity of the Mattawoman. The county is not obligated to implement DNR's recommendations.

Critical Area Commission for the Chesapeake and Atlantic Coastal Bay – The Chesapeake Bay Critical Area Protection Act[92] was passed in 1984 to improve water quality and habitat protection while continuing to accommodate growth in the Chesapeake Bay watershed. Maryland's Critical Area Program protects land within 1,000 feet of the mean high water line in tidal areas or the edge of tidal wetlands.

To implement this, all of Maryland's jurisdictions were required to draft Critical Area Plans in the late 1980s. This was later extended to address the Atlantic Coastal Bays as well. Now the Commission reviews and approves changes to these local critical area plans, as well as plans for state projects on state-owned lands and proposals for major development in the critical area. Plans are required to mitigate the impacts of development on water quality and habitats.

Land uses within this buffer area are defined as Intensely Developed Areas, Limited Development Areas, or Resource Conservation Areas. These designations determine what types of activities can take place within the critical area. Development on private land is enforced by local jurisdictions. The

[90] Conn, Christine. Maryland Department of Natural Resources. Personal communication. June 1, 2010.

[91] Conn, Christine. Maryland Department of Natural Resources. Personal communication. May 3, 2011.

[92] Annotated Code of Maryland, Natural Resources Article, Title 8, Subtitle 18; COMAR 27.01.01.00, Critical Area Commission For The Chesapeake and Atlantic Coastal Bays. <http://www.dsd.state.md.us/comar/subtitle_chapters/27_Chapters.aspx>. Accessed June 7, 2010.

Commission reviews and approves state actions on state-owned land in the critical area, state or local development on private lands or land owned by the local jurisdiction, and changes to a jurisdiction's Critical Area Program.[93] See Section 3.3.2 for details on how Charles County implements this statute.

Fisheries Service – This department has a number of programs that study and restore freshwater and tidal fisheries.

Resource Assessment Service – Much of the data and analysis on tidal and nontidal aquatic ecosystems comes from Resource Assessment Service programs. This includes the Maryland Geological Survey (also conducting hydrological and hydrogeological assessments), Monitoring and Nontidal Assessment, Power Plant Assessment, Support Services, and Tidewater Ecosystem Assessment.

Monitoring and Nontidal Assessment Division – This program conducts water monitoring and assessments to describe the status of ecosystems. A critical project is the Maryland Biological Stream Survey which assesses stream health, evaluates watershed management impacts, and works toward habitat protection and restoration. This data is often used by other state agencies, including by MDE for TMDL and Tier II evaluations. Specifically, the MBSS results are used in streams and small rivers to determine if waters with an Aquatic Life designated use are impaired.

The division also identifies "stronghold" watersheds in the state. These watersheds are identified as those "where rare, threatened, or endangered freshwater fish, amphibians, reptiles, or mussel species have the highest numbers (abundance and number of occurrences)." [94] The stronghold watershed designation is given to these watersheds to identify them as the most critical waters for maintaining aquatic diversity in Maryland. These watersheds are included as part of the WRR opportunity analyses.

3.2.2.3 Land Resources

The responsibilities of the Land Resources division include ecological assessments of land resources and habitat and the prioritization and acquisition of important terrestrial resources. The programs described in brief below are the ones that have either supplied data to or will use the results from the Watershed Resources Registry.

Land Acquisition and Planning – This department provides the information and review necessary for DNR to acquire and manage lands in the state.

Planning – Writes master resource plans for state parks.

Land and Property Management – Coordinates real estate transactions.

Program Open Space – This is an important program for the acquisition of state land (stateside program) and the funding of local recreational areas and open spaces (local side program). Land purchased through this program is prioritized by the GreenPrint assessment.

[93] Maryland Department of Natural Resources. "Critical Area Commission for the Chesapeake and the Atlantic Coastal Bays." <http://dnr.maryland.gov/criticalarea/aboutthecommission.html> Accessed June 7, 2010.
[94] Maryland Department of Natural Resources. "Stronghold Fact Sheet." (no date) <http://www.streamhealth.maryland.gov/stronghold.asp> Accessed October 27, 2010.

The Stateside program has a detailed process used to evaluate potential parcels for conservation. Sites are first prioritized by ecological value, then by programmatic factors, and ultimately by site-specific conditions.[95] The ecological value of land across the state has been determined through the state's Green Infrastructure assessment. This assessment identified Targeted Ecological Areas (TEA), which are the most ecologically valuable lands in the state.[96]

The Local Side program requires each jurisdiction applying for program funds to first have a Land Preservation, Parks, and Recreation Plan to guide decisions and ensure consistency with the State Land Preservation, Parks and Recreation Plan. Local plans go through a joint DNR and Department of Planning review process.[97]

Rural Legacy Program – Helps local jurisdictions and land trusts preserve open space and limit sprawl by providing financial assistance for the purchase of agricultural, rural, or ecologically or environmentally important tracks of land.

Maryland Environmental Trust – Promotes open space conservation through easements and assistance to local land trusts. Most decisions made through this program are required to follow Program Open Space criteria for protecting ecologically sensitive or important lands.[98]

Forest Service – The Forest Service helps private landowners and local governments manage forests and tree resources, including those in urban settings, through technical assistance. Forest management encompasses the use of forests, fire and insect control, and watershed management.

The Forest Service also administers a number of state laws including the Forest Conservation Act, Reforestation Law, Tree Expert Law, and Roadside Tree Law. The Forest Conservation Act (Maryland Annotated Code, Natural Resources Article §5-1601 – 5-1613) requires a Forest Conservation Plan and Forest Stand Delineation to be approved by county officials prior to the development of an acre or more of land. Projects on state land are reviewed by DNR. The goal of this act is to help prioritize important forest areas for conservation and protection.

The Maryland Reforestation Law (Maryland Annotated Code, Natural Resources Article §5-103) requires any highway construction activity using state funds that causes the loss of one acre or more of trees to replace an equivalent amount. The preferred reforestation location is within the same watershed and county as the loss on state or locally owned land. If this cannot be done, then priority goes to either reforestation within the watershed or the county. There is a provision for the use of credits from a forest mitigation bank or payment into the Restoration Fund if necessary.

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[95] Maryland Department of Natural Resources. "Targeting and Ranking Land Conservation – How Land is Evaluated" <http://www.dnr.state.md.us/land/pos/pos_eval_process.asp> Accessed January 31, 2011.

[96] Maryland Department of Natural Resources. "Targeted Ecological Areas." Maryland's Environmental Resources and Land Information Network. (2010) <http://www.mdmerlin.net/metadata/brief/tea.html> Accessed May 23, 2011.

[97] Maryland Department of Natural Resources. "Program Open Space Manual." (2006) <http://www.dnr.state.md.us/land/pos/pos_how_to_apply.asp> Accessed May 23, 2011.

[98] Michie's Legal Resources. Annotated Code of Maryland, Natural Resources Article, Title 3 Environmental Programs, Subtitle 2 Maryland Environmental Trust. <http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=cc65#JD_nr3-201> Accessed December 2, 2010.

Maryland Park Service – Manages state parks, natural environmental areas, natural resource areas, and marinas for multiple uses including resource preservation and recreation.

3.2.2.4 Interagency Efforts

In addition to the programs discussed above, DNR is the lead agency on many Maryland interagency initiatives. The ones mentioned below either could use the WRR or have their data incorporated into the opportunity analyses.

- Maryland Chesapeake & Coastal Program – This program brings together local, state, and regional agencies, in addition to private organizations, to collaborate on protecting Maryland's coastal resources. Activities include restoring streams and protecting habitats.[99]
    - The Chesapeake and Atlantic Coastal Bays Trust Fund focuses on providing grants that will assist in the restoration of the Chesapeake Bay. Priority is given to those watersheds contributing the largest amounts of nitrogen and phosphorus to the Bay.[100] Mattawoman Creek watershed is ranked as a medium priority Trust Fund watershed.
    - A project of the Chesapeake and Coastal Program, the Watershed Assistance Collaborative provides technical assistance to local communities that want to engage in watershed planning.[101] The focus is on increasing local capacity to plan implementation projects that can be funded by the state. In addition to state agencies, partners include the Chesapeake Bay Trust and the EPA's Mid-Atlantic Environmental Finance Center.
- Riparian Forest Buffer Initiative/Stream ReLeaf – implements a Chesapeake Bay Executive Council directive to improve riparian forest buffers in the Bay watershed. The goal was to conserve existing buffers and to create 2,010 miles of new buffers by 2010.[102]

3.2.3 Maryland Department of Transportation

The Maryland Department of Transportation (MDOT) oversees all aspects of transportation in the state, including compliance with state and federal environmental laws. The department's Office of Environment, in conjunction with other state agencies, assists the other divisions not only with compliance, but also with sustainability and resource stewardship. MDOT has put together a simple table to help identify the type of environmental reviews and permits required for any given project

[99] Maryland Department of Natural Resources. "Maryland Chesapeake & Coastal Program." <http://www.dnr.state.md.us/ccp/index.asp> Accessed May 23, 2011.
[100] Chesapeake and Atlantic Coastal Bays Trust Fund, Maryland Department of Natural Resources. "SFY12 Trust Fund Priority Areas." (2010) <http://www.dnr.state.md.us/ccp/funding/trust_fund.asp> Accessed May 23, 2011.
[101] Watershed Assistance Collaborative, Maryland Department of Natural Resources. "Watershed Assistance Collaborative." <http://www.dnr.state.md.us/ccp/healthy_waters/wac.asp> Accessed May 20, 2011.
[102] Maryland Department of Natural Resources. "Riparian Forest Buffer Initiative/Stream ReLeaf." <http://www.dnr.state.md.us/forests/programapps/ripfbi.html> Accessed May 20, 2011.

(Table 3-3). Many of these permits were discussed in Section 3.2.1.2.5, which covered permits administered by MDE's Water Management Administration.

In addition to those permits previously discussed, MDOT projects also go through the National Environmental Policy Act (NEPA) process if receiving federal funding or permits, or the Maryland Environmental Policy Act (MEPA) process if receiving state funds and permits only. For projects requiring a NEPA review, the regulations and procedures of the Federal Highway Administration are followed as described in Section 3.1.4.

Table 3-3: MDOT table of required environmental permits.[103]

Pre-Planning Processes	
If,	then...
A Project is paid for with federal funds or involves a major federal action significantly affecting the human environment:(A federal action includes the issuing of a permit for construction or any approval process in which a federal agency can exercise discretion over the outcome):	The decision-making process and the assessment of the project's impacts on the environment must be documented by a NEPA (National Environmental Policy Act) process. There are several types of NEPA documents (EIS, EA, CE, etc.) depending on likely level of impacts. Forms/checklists and processes are usually dictated by the federal sponsor (FHWA, FAA, MTA, USACOE, etc.).
Federal permits will be required:	Coordination for these permits should take place during the NEPA process.
A Project is paid for entirely by state funds, does not require a permit from a federal agency, and requires no federal action to begin or continue:	Impacts should be assessed using the Maryland Environmental Policy Act (MEPA) checklist. Contact the Maryland Department of the Environment's Customer Service Center (MDE CSC) at (410)537-3772 or (800)633-6101 x3772 for additional information.

Pre-Construction Permits and Approvals	
If,	then...
Any portion of Project, regardless of size, is located within 1000 feet of tidal waters or tidal wetlands, or is in tidal waters:	Approval of the Critical Areas Commission is required.
The Project limit of disturbance is more than 5,000 square feet:	Stormwater Management Plan Approval is required from MDE.
The Project involves disturbance of 5,000 square feet of soil, or excavation of 100 cubic yards of soil:	Sediment and Erosion Control Plan Approval is required from MDE.
The Project or any part of the project will involve grading or land disturbance within the Severn River Watershed:	Sediment & Erosion Control Plans must be approved by the Anne Arundel County Soil Conservation District (AASCD) in addition to approval by MDE.
The project involves construction of a highway that requires clearing of one acre or more of forest	It must be reviewed by DNR Forest Service and mitigated under the Maryland Reforestation Law.

[103] Maryland Department of Transportation. "Transportation Construction Projects." (2011) <http://www.mdot.maryland.gov/Planning/Environmental_Permits-Construction/Index.html#Other> Accessed May 6, 2011.

and involves the use of State funds:	
The project involves construction of a highway that causes cutting of trees or clearing of less than one acre of forest within a designated right of way of a State, County or local roadway:	A Roadside Tree Permit is required from DNR.
The project is not part of a highway construction project, is not in the Critical Area, but requires a Sediment and Erosion Control Plan and will disturb more than 40,000 square feet:	It must be mitigated under the Maryland Forest Conservation Law.
The Project involves construction activity with a planned total disturbance of one acre or more:	A Notice of Intent (NOI) to be covered under the National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activity.
The Project involves alteration (filling) of floodplains, waterways, tidal wetlands, non-tidal wetlands, including those involving dredging or requiring:	You must complete the Joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal or Non-tidal Wetland.
The Project will use federal funding or assistance, but will not require a federal permit:	You must request a Coastal Zone Management Act federal consistency determination from MDE. (For projects that also require a federal permit this review will be part of the Joint Permit Application.)
Your project includes construction or modification of a bridge or causeway across a navigable waterway of the U. S.:	You must apply for a Coast Guard bridge permit. This includes all temporary bridges used for construction access or traffic detour.

Other Requirements	
If,	then...
The Project requires Sediment and Erosion Control Plan approval:	Plans must include a certification that a "responsible person" will be on-site during construction. This certification must be executed by someone who has passed MDE's Responsible Personnel Training ("Green Card" training).
The Project is an SHA project that requires Sediment and Erosion Control Plan approval:	SHA requires that project designers and construction inspectors pass the SHA Sediment and Erosion Control Training Program ("Yellow Card").
Responsibility for Sediment and Erosion Control activities will be transferred to the Construction Contractor:	The original permittee must submit a Transfer of Authorization to MDE.

Post Construction	
When,	then...
The Project is completed:	A Stormwater Management "As Built" Certification and Tabulations must be submitted MDE.
Upon final stabilization of the construction area Covered by the General Permit for Construction Activity:	A Notice of Termination Form must be submitted to MDE.

3.2.3.1 State Highway Administration

The Maryland State Highway Administration (SHA) builds and maintains the state's highways and bridges. Environmental considerations are largely handled by the Office of Environmental Design and the Highway Hydraulics Division of the Office of Highway Development.

Responsibilities of the Office of Environmental Design include integrating environmental design principals into planning, construction, and maintenance of SHA projects. This office directly oversees the required state and federal tidal and nontidal wetland and waterway permits and mitigation, Maryland Forest Conservation Act, and Erosion and Sediment Control permit requirements. Additionally, the office ensures compliance with other environmental laws and regulations, conducts trainings with SHA staff, provides technical guidance to other SHA divisions, and develops and implements landscape architecture projects.[104]

The Highway Hydraulics Division is responsible for all aspects of highway design and construction as it relates to stormwater and drainage issues, including stream stabilization and erosion and sediment control.[105] The division also oversees SHA's obligations under the agency's NPDES Municipal Separate Storm Sewer System (MS4) discharge permit.

The Watershed Resources Registry is a resource that SHA can use in the planning process and to meet various regulatory requirements. State and federal regulations require that SHA avoid, minimize, and mitigate negative environmental impacts. Proposed highway alignments can be viewed in the context of the WRR to identify high-value areas to avoid. In the event that mitigation is required the WRR can be used to find suitable sites within the project area.

The WRR can be used by the agency to meet its mitigation and stormwater management permit requirements described in the following sections. The WRR has the benefit of being developed by many of the agencies involved in project review and permit processes. Ideally this means that SHA can better identify and avoid sensitive ecological areas early on in the planning process rather than waiting for an agency to raise an objection.

3.2.3.1.1 Regulatory Compliance

Federal and State Environmental Review Process

Given the potential impacts on the environment from highway construction and maintenance, SHA works to avoid, minimize, and mitigate these through the planning process and via its permit requirements. To do this, as required by law, SHA projects go through a detailed NEPA review process. Since 2000, there has been a streamlined process for developing projects with the appropriate federal,

[104] State Highway Administration. "Office of Environmental Design" <http://www.sha.maryland.gov/Index.aspx?PageId=114> Accessed December 10, 2010.
[105] State Highway Administration. "Office of Highway Development" <http://www.sha.maryland.gov/Index.aspx?PageId=116> Accessed December 10, 2010.

state, and local agencies that will ultimately be involved in reviewing, permitting, and funding decisions.[106]

The process is designed to incorporate the requirements of the applicable laws, including:

- Section 106 of the National Historic Preservation Act, as amended
- Act for the Preservation of American Antiquities
- Archeological Resources Protection Act, 1979
- Section 4(f) of U.S. DOT Act
- National Environmental Policy Act
- Maryland Environmental Policy Act
- Coastal Zone Management Act of 1972, as amended
- Title 23 U.S.C. (Transportation)
- Safe Drinking Water Act
- Wilderness Act
- Wild and Scenic Rivers Act
- Executive Order 11990, Protection of Wetlands
- Order 11988, Flood Hazards
- Rivers and Harbor Act of 1899
- Clean Water Act, 1977
- Fish and Wildlife Coordination Act of 1958
- Endangered Species Act
- Insurance Act
- Clean Air Act, as amended
- Noise Control Act of 1972
- Maryland Economic Growth, Resource Protection and Planning Act of 1992
- Maryland Historical Preservation Act, 1985, as amended
- Protection Act, 1989 (Title 5, Subtitle 9, Environment Article, Annotated Code of Maryland); and Waterway Construction Permits (Title 5, Subtitle 5, Section 503, Environment Article, Annotated Code of Maryland)
- Wetlands and Riparian Rights (Title 16, Environment Article, Annotated Code of Maryland)
- Transportation Equity Act for the 21st Century, 1998
- Smart Growth Areas Act of 1997

The process is characterized by on-going involvement by the relevant agencies and by reaching agreement on key decision points before proceeding to the next step. The three decision points where formal concurrence is required are 1) the purpose and need of the project, 2) project alternatives that will be studied further, and 3) the final project scenario selected by the SHA Administrator and the conceptual mitigation plan. Prior to each of these decision points any required analysis is conducted and results are presented at interagency review meetings.

[106] Federal Highway Administration. "Maryland's Streamlined Environmental and Regulatory Process." (2010) <http://www.environment.fhwa.dot.gov/strmlng/md_fhwaproc.asp> Accessed November 24, 2010.

3.2.3.1.2 State and Federal Permits for SHA Projects

For most highway construction projects there are regulatory requirements relating to wetlands and waterways, stormwater, erosion and sediment, and reforestation to which SHA and their contractors must adhere. In order to ensure compliance with a project's various permit requirements, SHA has developed a tracking system that provides their inspectors with all the conditions to be assessed for a given project while they are in the field.

Wetland and Waterway Mitigation Permits

Particularly pertinent to SHA's use of the Watershed Resources Registry are the wetland and waterways permit requirements, requiring both a Water Quality Certification and permits from the state, and a Section 404 permit from the Army Corps of Engineers. Applications for these are typically submitted when a project reaches the semi-final design stage, and depending on the type and size of the project, pre-application meetings are usually held with both MDE and the Army Corps. SHA funds permit staff from MDE and Corps to assist with application and permit development and review.[107]

Erosion and Sediment Control

MDE has delegated its authority to SHA to oversee the agency's erosion and sediment control plans.[108] This agreement is formalized in a memorandum of understanding between the two agencies.

Erosion and sediment control projects are tracked for effectiveness by trained SHA inspectors. MDE also conducts inspections to ensure state regulations are being met. Erosion and sediment plans are developed within SHA by the Highway Hydraulics Division.

Reforestation Requirements

In the case that an acre or more of forest is removed for a project, the construction company contracting with SHA must replace an equal amount within the same county and watershed. For both wetland and reforestation mitigation projects, if suitable mitigation sites cannot be located fees can be paid into funds that support off-site projects.

Stormwater Management

To comply with the 2007 Stormwater Management Act (see Section 3.2.1.2.2 for description), SHA follows the *Maryland Stormwater Management Guidelines for State and Federal Projects* (2010). A major requirement of this legislation is that for all new impervious surfaces environmental site design techniques must be implemented to the maximum extent practicable.

Stormwater control standards are volume-based meaning that controls are designed to handle the volume of water that would result from a 25-year or 100-year storm, for example. This typically requires the handling of 1.0 to 2.6 inches of rainfall.

[107] Hertz, Sandy. State Highway Administration. Personal communication. January 3, 2011.

[108] Pujara, Karuna. State Highway Administration. Personal communication. February 4, 2011.

As noted above, SHA's Highway Hydraulics Division is responsible for developing drainage design criteria related to highway development. Stormwater management designs and plans require approval from MDE and, depending on the location of the project, the Critical Area Commission.

If the stormwater control requirements for new or redevelopment projects cannot be met through ESD techniques alone, on and off-site structural BMPs can be considered. These can include filtering systems, open channel systems, infiltration, ponds, or stream restoration.

In specific situations where stormwater management cannot be done effectively on a given construction site, MDE has allowed SHA to develop a water quality banking program. This program allows SHA to develop water quality treatment projects off-site but within the same watershed as construction.[109]

In addition to project-specific stormwater permits, SHA is required to have a MS4 discharge permit as an owner and operator of a MS4 system that connects to stormwater systems of medium and large municipalities which have MS4 permits themselves. SHA operates its highway system in the nine counties required to have a Phase I MS4 permit, including Charles County.

The major requirements of SHA's MS4 permit are: [110]

- Maintain legal authority for implementation,
- identify pollutant sources,
- characterize discharges,
- manage stormwater runoff,
- conduct watershed assessments to identify retrofit opportunities and watershed restoration projects to implement them,
- monitor for effectiveness of control measures,
- assess program funding annually, and
- be consistent with other TMDL waste load allocations.

The Highway Hydraulic Division is responsible for implementing the requirements of the MS4 permit.

The management program to control runoff and to identify illicit connections to the SHA stormwater system includes efforts at all stages of highway development. In the planning phase, projects are run through both the NEPA and MEPA processes, and are shaped by other federal and state regulations that inform development decisions and required mitigation projects, such as Maryland's Economic Growth, Resource Protection, and Planning Act which lays out smart growth principles. A main objective of this planning and design work is to ensure that the stormwater runoff after construction mimics the runoff that was experienced prior to construction as required by Maryland law.

The Highway Hydraulics Division maintains a detailed stormwater BMP inventory for projects within the state highway system. This inventory tracks implementation, inspection cycle, and maintenance and

[109] Pujara, Karuna. State Highway Administration. Personal communication. February 4, 2011.

[110] Maryland Department of the Environment. Municipal Separate Storm Sewer System Discharge Permit # 99-DP-3313/MD0068276. <http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/Pages/Programs/WaterPrograms/sedimentandstormwater/storm_gen_permit.aspx> Accessed December 9, 2010.

remediation needs for each BMP by each county with a Phase I or II MS4 permit.[111] As part of the inspection and maintenance program, each stormwater facility is inspected once every three years to correct problems and identify promising retrofit opportunities.

As of October 2010, the inventory showed over 2,000 facilities across the state and 99 in Charles County.[112]

Chesapeake Bay TMDL

In the current development of the Chesapeake Bay TMDL for nutrients and sediments, there is the possibility that SHA will have to further offset its impacts through stormwater management techniques and off-site mitigation measures.

The implementation strategy for the Bay TMDL is documented in state Watershed Implementation Plans. Under Maryland's Phase I WIP, submitted to the EPA in December 2010, SHA would be required to reduce nutrients and sediments by the equivalent of implementing stormwater treatment on 30 percent of the currently untreated impervious surfaces.[113]

Retrofits, "alternative practices," and trading are listed as the possible means for meeting this requirement. In the WIP document, alternative practices include forest buffer planting, stream restoration, wetland restoration, pavement removal, and operational practices.

The Phase II WIP for Maryland is currently being drafted. This document will lay out in more detail how the state will meet its TMDL requirements through local level action. Any reduction requirements resulting from this TMDL would be implemented through SHA's MS4 permit.

3.2.4 Department of Planning

Article 66B (Land Use) of the Annotated Code covers the requirements for those counties which choose to engage in planning activities. A number of components are required by the law to be included in a comprehensive plan and related planning elements. County plans must be updated every six years and are reviewed by state agencies, including the Department of Planning, and adjacent jurisdictions to ensure consistency with state regulations and priorities.

Plans are required to cover:

- Land use,
- transportation,
- community facilities,
- mineral resources,

[111] Maryland State Highway Administration. "NPDES MS4 Phase I Annual Report: Part Three Stormwater Management Facilities Program." (2009) <http://www.mde.maryland.gov/programs/water/tmdl/documents/www.mde.state.md.us/assets/document/appendix_g1_sha_2009_annual_report.pdf> Accessed December 9, 2010.

[112] SHA iMap Viewer. (2008) <http://www.mdimap.com/sha> Accessed December 14, 2010.

[113] State of Maryland. "Maryland's Phase I Watershed Implementation Plan for the Chesapeake Bay Total Maximum Daily Load" (2010) <http://www.mde.state.md.us/programs/Water/TMDL/TMDLHome/Pages/Final_Bay_WIP_2010.aspx> Accessed December 9, 2010.

- water resources,
- implementation regulations,
- areas of critical state concern,
- areas sensitive to impacts from development, and
- growth.

In 2009, the law was updated to incorporate "vision statements" meant to guide local comprehensive planning. These efforts replace the original eight that were laid out in the 1992 Economic Growth, Resource Protection, and Planning Act.

The 12 state visions are: [114]

Quality of life and sustainability: a high quality of life is achieved through universal stewardship of the land, water, and air resulting in sustainable communities and protection of the environment;

Public participation: citizens are active partners in the planning and implementation of community initiatives and are sensitive to their responsibilities in achieving community goals;

Growth areas: growth is concentrated in existing population and business centers, growth areas adjacent to these centers, or strategically selected new centers;

Community design: compact, mixed-use, walkable design consistent with existing community character and located near available or planned transit options is encouraged to ensure efficient use of land and transportation resources and preservation and enhancement of natural systems, open spaces, recreational areas, and historical, cultural, and archeological resources;

Infrastructure: growth areas have the water resources and infrastructure to accommodate population and business expansion in an orderly, efficient, and environmentally sustainable manner;

Transportation: a well-maintained, multimodal transportation system facilitates the safe, convenient, affordable, and efficient movement of people, goods, and services within and between population and business centers;

Housing: a range of housing densities, types, and sizes provides residential options for citizens of all ages and incomes;

Economic development: economic development and natural resource-based businesses that promote employment opportunities for all income levels within the capacity of the State's natural resources, public services, and public facilities are encouraged;

Environmental protection: land and water resources, including the Chesapeake and coastal bays, are carefully managed to restore and maintain healthy air and water, natural systems, and living resources;

Resource conservation: waterways, forests, agricultural areas, open space, natural systems, and scenic areas are conserved;

[114] Michie's Legal Resources. Annotated Code of Maryland, Article 66B – Land Use. <http://www.michie.com/maryland/lpExt.dll?f=templates&eMail=Y&fn=main-h.htm&cp=mdcode/1f224> Accessed March 3, 2011.

Stewardship: government, business entities, and residents are responsible for the creation of sustainable communities by collaborating to balance efficient growth with resource protection; and

Implementation: strategies, policies, programs, and funding for growth and development, resource conservation, infrastructure, and transportation are integrated across the local, regional, State, and interstate levels to achieve these visions.

Also affecting county development plans is the focus on directing growth to state priority funding areas (PFA).[115] While not limiting growth to PFAs, counties are not eligible for growth-related financial assistance unless a project is in a PFA. Growth activities include such projects as new roads, buildings, and water and sewer lines.

These and other regulations since the early 1990s have focused on implementing the principles of "smart growth." The goals of Maryland's smart growth efforts are to:[116]

Support existing communities by targeting resources to support development in areas where infrastructure exists;

Save our most valuable natural resources before they are forever lost;

Save taxpayers from the high cost of building infrastructure to serve development that has spread far from our traditional population centers; and

Provide Marylanders with a high quality of life, whether they choose to live in a rural community, suburb, small town, or city.

3.2.4.1 State Clearinghouse

The Department of Planning's Maryland State Clearinghouse for Intergovernmental Assistance ensures that state projects or those receiving state funds are consistent with state and local laws and regulations.[117] Its "Intergovernmental Monitor" provides a forum for state agencies to comment on many projects and funding requests across the state, including environmental assessments. This is the means that agencies, such as DNR and MDE, weigh-in on the environmental implications for specific projects.

While each agency will comment on projects from their own perspective, the WRR may provide a glimpse of potential environmental issues that could be raised during this process. As a publically available tool that is based on federal and state regulations and priorities, the WRR allows developers and others submitting project proposals to see where potential environmental conflicts may lie.

[115] Michie's Legal Resources. Annotated Code of Maryland, Article 66B Land Use, Section 3.10 Smart Growth goals, measures and indicators. <http://www.michie.com/maryland/lpext.dll?f=FifLink&t=document-frame.htm&l=jump&iid=55a15e3f.4cd90aa9.0.0&nid=e837#JD_66b310 > Accessed March 3, 2011.

[116] Maryland Department of Planning. "Smart Growth Planning Topics." (2011) <http://planning.maryland.gov/OurWork/smartGrowth.shtml> Accessed. March 3, 2011.

[117] Maryland Department of Planning. "State Clearinghouse." < http://www.mdp.state.md.us/OurWork/GrantResources.shtml> Accessed June 1, 2011.

3.3 Charles County

The Mattawoman Creek watershed in Charles County, Maryland, was selected as the study area for this project. Charles County has a number of means for protecting its natural environment.

The two main mechanisms for doing so are through planning and regulating development. Article 66B of the Maryland Annotated Code provides counties with the planning and enforcement authority required to develop comprehensive plans and regulations to implement the plans.

Planning documents are meant to guide development as the county intends in the Comprehensive Plan. Regulatory documents, such as Zoning Ordinances, establish uniform development requirements for land, buildings, and other structures. Other county codes enforce state and federal requirements, such as the Forest Conservation Ordinance, which enforces the Maryland Forest Conservation Act.

Planning activities and oversight of development and construction permits fall under the purview of the county's Department of Planning and Growth Management.

This section covers the local plans and ordinances in place to protect sensitive and valuable natural resources. The planning documents and relevant regulations reviewed here inform land use decisions and/or protect natural resources. The original documents should be referred to for complete and detailed information.

3.3.1 Planning

3.3.1.1 Comprehensive Plan

As described above, Article 66B of the Maryland Annotated Code provides the authority for counties to develop comprehensive plans to guide development decisions and activities.

Charles County's most recent plan from 2006 contains information on development issues ranging from economic development to agriculture and forestry. An updated plan is required by the state in 2012. The county has begun the update process and envisions the process will result in major changes. The 2006 version is covered here as no drafts of the update were available at the time of publication.

The Comprehensive Plan's chapter on natural resource protection is most relevant to the WRR effort. Clearly, other sections of the plan impact the quality of the county's natural resources but are not dedicated to their protection.

Section 3.3.2 below covers the county ordinances that guide the implementation of the natural resource goals and objectives detailed in the comprehensive plan.

Natural Resource Protection Goals

The county's overall natural resource goal is to "protect the natural resources and enhance the environmental features of the county."[118] The plan includes 30 objectives to help move the county in the direction of meeting the protection goal. These goals are listed in **Error! Reference source not found.**.

Table 3-4. Objectives for natural resource protection as listed in the Charles County Comprehensive Plan.

General Objectives

8-1 Cooperate in efforts to improve and protect the water quality of the Chesapeake Bay and its tributaries through support of the state's Tributary Strategies and enforcement of the County's Critical Area Program that are designed to reduce pollution loads in the Bay's subwatersheds.

8-2 Preserve the Resource Protection Zone to ensure protection of sensitive inland and environmental features in stream valleys outside the Critical Area such as the Mattawoman Creek, Zekiah Swamp Run, Gilbert Swamp Run, Port Tobacco River, Nanjemoy, Swanson, and Indian Creeks' watersheds.

8-3 Maintain a safe and healthy environment by protecting air, water, and land resources, and preventing the degradation of those resources from pollutants.

8-4 Place special emphasis on watershed management to balance the protection of the Mattawoman Creek's natural resources and water quality with the County's development plans.

8-5 Manage agricultural activities to minimize runoff and sedimentation to adjacent waters.

8-6 Enhance the County's environmental preservation and conservation policies through administrative mechanisms including subdivision regulations, sediment and erosion control, environmental review processes, development regulations, and zoning.

8-7 Protect ground water resources.

8-8 Guide development away from areas vulnerable to natural hazards especially areas subject to flooding, shore erosion, and wildfires.

8-9 Encourage best management practices including low-impact development techniques to minimize the impacts of development on the natural environment.

8-10 Through public and private resources, purchase or otherwise acquire conservation easements to preserve environmentally sensitive resources. Develop parks, recreation and open space plans in conjunction with stream valley protection objectives.

Land Resources - including floodplains, steep slopes, and forest lands

8-11 Restrict development within 100-year floodplains.

8-12 Conserve remaining wooded areas in the County, and require new plantings to support other natural resource objectives including enhancing riparian buffers, reducing erosion and sedimentation, improving air quality, and mitigating the effects of stormwater runoff.

[118] Charles County Government. "Charles County Comprehensive Plan." (2006) <http://www.charlescounty.org/pgm/planning/plans/commplanning/compplan/index.html> Accessed April 1, 2010.

8-13 Require special engineering and construction standards when development occurs on erodible soils, steep slopes, or areas requiring special geotechnical consideration.

Inland Habitat Areas

8-14 Protect the habitats of rare, threatened and endangered species to maintain their long-term survival.

8-15 Conserve large tracts of contiguous forestland and forest interior dwelling bird habitat determined by the County to be of local significance due to their wildlife habitat value.

8-16 Promote wildlife education through the development of nature centers and park visitor centers to explain the importance of preserving natural habitat areas.

Shorelines

8-17 Place a high degree of restriction on the use of waterfront land in the form of low residential densities, and high levels of protection for forest land and agricultural land regulated under the Chesapeake Bay Critical Area Program.

8-18 Protect instream and stream bank habitats of anadromous fish spawning waters. Promote land use policies in the watersheds of spawning streams that minimize adverse impacts to aquatic resources.

8-19 Protect shoreline habitats such as tidal wetlands, shellfish harvesting areas, colonial water bird nesting sites, and waterfowl staging and concentration areas through the habitat protection policies established in the County's Critical Area Program.

8-20 Manage development in shoreline areas to minimize problems of shoreline erosion.

Water Resources

8-21 Improve and maintain water quality in coastal, estuarine, and upper basin tributary streams.

8-22 Ensure that point source discharges of pollutants are maintained at safe levels of environmental quality through strict enforcement of state water quality standards for sewage effluent.

8-23 Encourage the establishment of Soil Conservation and Water Quality Plans on all farms in Charles County to reduce sediment and nutrient export from agricultural activities.

8-24 Continue and improve programs and policies to assure the functional maintenance of stormwater management systems.

Environmental Health

8-25 Reduce solid waste generation and increase recycling levels.

8-26 Promote reclamation of resource extraction areas.

8-27 Monitor sewage sludge application on agricultural lands to ensure the continued high quality of soil, surface water, ground water resources, and to minimize impacts from odor, run off, etc. on adjoining properties.

8-28 Correct sanitary sewage and water supply problems in existing problem areas to provide a safe environment for all of the County's residents.

8-29 Work cooperatively with the Metropolitan Washington Area Air Quality Committee to

ensure the area complies with the requirements of the 1992 Clean Air Act.

8-30 Promote awareness of environmental quality issues through public and school environmental education programs, to cultivate a basic understanding of the earth and its valuable resources.

Implementation of Natural Resource Protection

In addition to these fairly broad goals the county identified seven techniques to implement the strategy:

1. Implement recommendations from the 2003 Army Corps of Engineers Mattawoman Creek Watershed Management Plan. The three recommendations from the study are to delineate the stream valley, use low impact design techniques in development, and address potential stormwater retrofit opportunities in existing developments.
2. Develop a Green Infrastructure strategy.
3. Maintain and enhance urban forests.
4. Investigate use of green building and architectural techniques.
5. Promote ozone action days to reduce air pollution.
6. Restore and stabilize edges of Potomac and Port Tobacco rivers to reduce erosion, improve water quality, and enhance aquatic conditions.
7. Coordinate planning efforts to implement goals and objectives of adopted policy plans. As of 2006, these plans were listed as the Patuxent River Policy Plan, Tributary Strategies, the Wicomico Scenic River Study and Management Plan, Mattawoman Watershed Management Plan, Rural Legacy Plan, Total Maximum Daily Load plans, and other watershed restoration and management plans.

The county's 2006 strategy identifies multiple programs and regulations at the local, state, and federal level that play a role in the implementation of these goals and objectives. There are a number of federal programs, with authority delegated to the state, that are ultimately implemented by the county. These include the county's MS4 permit, TMDLs, and tributary strategies.

One way the county can protect its natural resources is through zoning and subdivision ordinances. Zoning regulations are discussed in detail in the next section, but the key zone for watershed protection is the Resource Protection Zone (RPZ). The RPZ limits the permissible activities to protect streams and their valleys, steep slopes, wetlands, and floodplains that fall outside of the state-mandated Chesapeake Bay Critical Area.

Within the Chesapeake Bay Critical Area the county is required to have a program to protect both water quality and wildlife habitat. Resources in the Critical Area are protected by the county's Critical Area Zone. This zoning regulation protects land and water resources, including wetlands. Additionally, Charles County protects sensitive habitat outside the Critical Area where rare, threatened, or endangered species are present. These are discussed in detail in Section 3.3.2.1.

Also listed in the Comprehensive Plan are protections for Nontidal Wetlands of Special State Concern and the requirement for Habitat Protection Plans, environmental education, and land

conservation. Other county ordinances help protect natural resources by regulating construction in floodplains, grading on steep slopes, forest conservation plans, and stormwater management systems.

The county acknowledges the work the state has done to identify the green infrastructure network in the county, but, as of 2006, was not intending to prioritize these locations for protection. As stated in the implementation techniques above, developing a strategy to address green infrastructure is a priority.

Planning for Parks, Recreation, and Open Space

The Comprehensive Plan also contains a short chapter on parks, recreation, and open space issues. This is taken up in extensive detail in the Land Preservation, Parks, and Recreation Plan described in the next section. The chapter in the Comprehensive Plan addresses a diverse set of issues from active recreation opportunities like sport complexes and hunting areas to preserving open space in high growth areas. A complete list of the county's goals, objectives, and policies can be found in chapter 11 of the plan. The relevant ones to this project are:[119]

> Seek to provide 30 acres of parks, recreation and open space land per 1,000 population, consistent with State goals. (goal)
>
> Work towards implementation of the proposed open space network identified in the Waldorf Sub-Area Plan. That plan envisions creating an extensive open space network primarily along the major stream corridors that run through the Sub-Area (see Figure 3-12 of that plan). Only portions of this open space would be open to the public, though there would be some opportunities for trail connections. (objective)
>
> Reexamine current requirements for the dedication of land through the development process and consider alternatives including a fee-in-lieu of land to address a portion of the park and recreation impacts created by development. (policy)
>
> Charles County will coordinate land preservation and open space acquisition with natural resource protection considerations. (policy)

Growth Management and Land Use Planning

Another key section of the Comprehensive Plan covers growth management and land use planning. This plan describes the current pattern of development and sets out a path for the county to both develop and meet other priorities, like natural resource protection. The relevant objectives to natural resource protection and the Watershed Resources Registry project are: [120]

> Concentrate the majority of future growth in areas of the County already served or proposed to be served with public water and sewer. Direct 75 percent of future growth to the Mattawoman sewer service area and the Towns of Indian Head and La Plata.

[119] Charles County Government. "Charles County Comprehensive Plan – Chapter 11 – Parks, Recreation & Open Space." (2006) <http://www.charlescounty.org/pgm/planning/plans/commplanning/compplan/index.html> Accessed April 1, 2010.
[120] Charles County Government. "Charles County Comprehensive Plan – Chapter 3 Growth Management and Land Use." (2006) <http://www.charlescounty.org/pgm/planning/plans/commplanning/compplan/index.html> Accessed April 1, 2010.

Protect environmentally sensitive areas in using the County's abundant waterfront. Guide development away from areas vulnerable to natural hazards.

Concentrate commercial uses primarily in the currently developed portions of the Mattawoman watershed and in the towns of La Plata and Indian Head, and secondarily in the development districts and village centers rather than sprawling along the County's major roads.

Encourage future industrial and office uses to locate in and near existing office and industrial areas in Waldorf (including St. Charles), in White Plains, near the Pomonkey Airport, in the Towns, and adjacent to the Harry Nice Bridge.

Concentrate major community service centers and facilities in and near the County's towns and the Mattawoman sewer service area; and provide community services in other areas in response to need based on growth.

Concentrate future active recreation facilities in and near the County's major development centers; and establish open space on sensitive environmental lands, as a means of preserving them.

Require residential development to be efficient, serviceable, and designed to protect and retain portions of open space that will assure protection of sensitive resources.

These county goals and objectives come together in the Land Use Concept Plan Map (Figure 3-2). The map is characterized by 12 distinct districts that are used to guide zoning decisions at the parcel level. It is more general than the county's zoning map.

The Land Use Concept Plan Map provides the county with a means for realizing the vision laid out in the plan. The districts, as described by the county, are:[121]

Development Districts – Primary Development District of around 52,200 acres that generally coincides with the Mattawoman sewer service area. This Development District is the principal center of population, services and employment for the County. It encompasses Waldorf, including St. Charles, and Bryans Road. The incorporated Towns of La Plata and Indian Head serve as separate development districts.

Development District Residential Districts – General locations of residential areas within the Development District. Residential density will vary ranging from low to moderate density in some areas such as Bensville, Pinefield, and near Indian Head, to higher density in other areas, especially in the Urban Core.

Employment and Industrial Districts – Major existing and future employment, commercial, and business areas.

Commercial and Business Districts – Major existing and future employment, commercial, and business areas.

Mixed Use Districts – Areas identified in the Waldorf and Bryans Road-Indian Head Sub-Area Plans for a mix of medium to high density residential, business, and employment uses in a compact, well-designed, pedestrian-friendly environment.

[121] Charles County Government. "Charles County Land Preservation, Parks, and Recreation Plan." (2006) <http://www.charlescounty.org/pgm/planning/plans/landpreserv/06lprp/default.html> Accessed January 31, 2011.

Deferred Development District – Part of the Development District ultimately envisioned for development on public water and sewer, but where such development is to be deferred until it will be appropriate based on factors such as economic need or lack of developable land elsewhere in the Development District. Current purposes are to maintain low-density residential development and preserve the rural environment, natural features and established character of the area.

Neighborhood Conservation Districts – Residential subdivisions that had already been developed in the County prior to the 1990 Comprehensive Plan.

Village Centers – Areas providing for the special needs of rural unincorporated population centers.

Agricultural Conservation District – District where the County seeks to preserve the agricultural industry and the land base necessary to support it. Agricultural soils are looked upon as a natural resource to be retained for farm use wherever possible. District satisfies some limited rural housing need.

Rural Conservation District – District intended to preserve rural character and open space, to foster agricultural activities and opportunities, and to protect valuable resources. Also intended to prevent premature urbanization in areas where facilities are planned to meet rural needs only.

Rural Residential Districts – Moderate density area between the southern edge of the Development District and the Town of La Plata. Serve to buffer more rural areas of the County from certain Development District edges.

Highway Corridor Districts – Overlay district designed to protect and improve the visual appearance along key highway corridors.

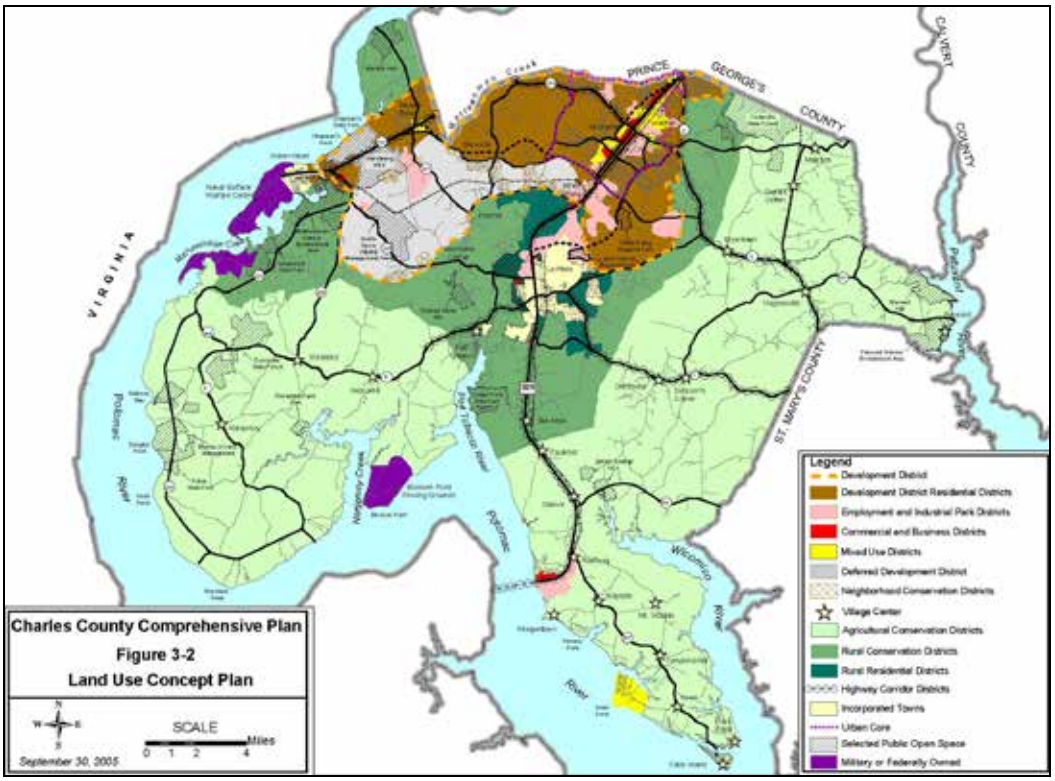

Figure 3-2. Charles County 2006 Land Use Concept Plan. Reproduced from the Charles County 2006 Comprehensive Plan with permission from the Charles County Planning Division.

Use of the Watershed Resources Registry

The Watershed Resources Registry could assist the county in developing the 2012 Comprehensive Plan. The tool can be used to identify priority sites for preservation throughout the county or on an individual watershed scale. Avoiding development in high ecologically valued areas could help protect the health of the Mattawoman as development continues in the Development District. The WRR's stormwater infrastructure analyses could also be very useful to the planning activities as the Development District is basically the county's MS4-regulated area.

Ways in which the WRR can be applied in the Mattawoman watershed and Charles County are covered in detail in Section 4.

3.3.1.2 Land Preservation, Parks, and Recreation Plan

The county's Land Preservation, Parks, and Recreation Plan (LPPRP) is an additional planning element that is incorporated into the county's Comprehensive Plan by reference. An approved LPPRP qualifies the county to receive funding from DNR's Program Open Space (see Section 3.2.2.3).

The plan details how the county intends to meet the goals and objectives laid out in the Comprehensive Plan. It addresses three land resource issues: recreation and parks, agricultural land

preservation, and natural resource conservation.[122] Of particular interest to this project are the natural resource conservation aspects which are summarized below.

The plan's recommendations are intended to help the county achieve three of the basic goals outlined in the Comprehensive Plan, as referenced above. The major recommendations are: [123]

Develop a Green Infrastructure strategy.

Create a natural resource land conservation focus area. Tentatively in the western portion of the county.

Seek to protect 50 percent of the County in open space.

Focus special attention on protecting the "Corps valley" identified by the US Army Corps of Engineers in its 2003 Mattawoman Creek Watershed Management Plan.

Strengthen efforts, such as through clustering requirements, to reduce the impacts of rural development on natural resources in rural parts of the County.

Continue protection of the Zekiah Swamp Watershed Rural Legacy Area as funding is allocated by the State and the County to acquire protective easements.

Increase the pace of capital projects and program development activities for eco-tourism and resource-based recreation.

The other two sections of the plan which focus on recreation and parks and agricultural land preservation have important overlaps with the natural resources element. For instance, the parks and recreation plan recommends regional parks in the western portion of the county and a county-wide trail system. Natural resource considerations could be easily integrated into both goals to help meet some of the explicit natural resource goals. In the case of the agricultural land preservation, this includes preserving forested land, which could have hydrologic benefits for the county's waterways.

3.3.1.3 Water Resources Element

The Charles County Water Resources Element (WRE) is another supplement to the Comprehensive Plan. It became a requirement for all counties in 2006 following an amendment to Article 66B of the Annotated Code of Maryland.

The WRE analysis identifies demand for water supply and wastewater treatment as well as the available and alternative water supply resources and waterbodies that can assimilate wastewater discharges. These demand and supply analyses are conducted under current conditions and future growth and development scenarios. A watershed-based approach is used to understand the limits and potential impacts of development given resource availability. The results from the analysis are used to assess a jurisdiction's land use and development plans to determine if the required resources are available to meet future needs.

[122] The LPPRP is being updated in 2011. At a March 29, 2011, public comprehensive planning meeting, county staff indicated that the updated version will focus primarily on parks and recreation issues. Preservation will be handled in other county plans.
[123] Charles County Government. "Charles County Land Preservation, Parks, and Recreation Plan." (2006) <http://www.charlescounty.org/pgm/planning/plans/landpreserv/06lprp/default.html> Accessed January 31, 2011.

The county released a "Planning Commission Certified Draft" in January 2011 as an amendment to the county's 2006 Comprehensive Plan. The report indicates that a land use plan targeting development in the Priority Funding Areas (PFA) of Waldorf and Bryans Road and maintaining the Deferred Development District until 2030 will best accommodate water supply and wastewater needs of the county. This directed development is already being guided by zoning and density changes implemented through the Waldorf Urban Design Study.

Even though this is the preferred development pattern, it does not meet the water quality goals for Mattawoman Creek. The findings from the wastewater treatment analysis, as it directly affects the health of the Mattawoman Creek watershed, are detailed later in this section.

WRE Development Scenarios

The Charles County WRE is based on three scenarios that assume different priorities and targeted areas for growth and development in the county. These scenarios are:

1. Baseline – Development plans as specified in the 2006 Comprehensive Plan are used.
2. Focused Growth – Directs development into the Waldorf and Bryans Road Priority Funding Areas, reduces development in rural areas, and leaves Deferred Development District (DDD) deferred until 2030.
3. Deferred Development District Focus – Opens the DDD for development now, using the current base zoning for the area (low density residential).

All scenarios use the following population and water use assumptions:

- 2008 population: 140,764
- 2030 population: 204,200
- Annual population increase of 1.7 percent (45 percent increase from 2008 to 2030)
- Equivalent Dwelling Unit[124] water use: 208 gallons per day (GPD)
- Equivalent Dwelling Unit sewer use: 250 GPD

Table 3-5 shows the resulting housing unit forecasts in the major growth areas of the Mattawoman watershed. The forecasts use the population growth assumptions and apply the three development scenarios.

[124] Defined in the Charles County Water Resources Element as the average amount of water used by a household. This figure is used to calculate water demand and wastewater generation for residential and non-residential uses.

Table 3-5. Housing unit projections (2030) used for WRE scenarios. Adapted from Charles County Water Resources Element (2011).[125]

	Housing Units, 2008	2030 Scenarios					
		Baseline		Focused Growth		DDD Focus	
		Increment	Total	Increment	Total	Increment	Total
Waldorf	12,168	2,843	15,011	4,007	16,175	3,016	15,184
Bryans Road	1,007	1,857	2,864	2,120	3,127	1,495	2,502
Indian Head	1,615	659	2,274	659	2,274	659	2,274
Remainder	5,775	1,617	7,392	1,284	7,059	4,799	10,574
Total Mattawoman Creek Watershed	20,565	6,976	27,541	8,070	28,635	9,969	30,534
Total Charles County	53,327	24,173	77,500	24,173	77,500	24,173	77,500

Scenario Analysis and Results

The three scenarios were evaluated on their suitability for meeting water supply and wastewater needs and their potential impacts on water quality. Water quality impacts were judged based on the TMDLs for Mattawoman Creek and Port Tobacco River and on likely future nutrient discharge limits for the public wastewater treatment plants in the county. The Town of Indian Head runs the one public WWTP that discharges into the Mattawoman.

Table 3-6 shows the estimate the nutrient discharge in 2030 and limits for the Town of Indian Head WWTP. Other point source discharges, including the county's MS4 permit were not included in the analysis.

The WRE used MDE-developed methods, adapted to Charles County, to project nonpoint source (NPS) nutrient loads for the three development scenarios. Estimated NPS and total nutrient loads under current conditions and in the future scenarios are shown in Table 3-7 below.

Also shown is the difference between the estimated loads and the current nutrient TMDL. The reductions in NPS loads come primarily from the assumption that more urban stormwater and agricultural runoff BMPs would be in place by 2030.[126]

The Mattawoman Creek TMDL calls for the following limits: nonpoint source total nitrogen (TN): 116,699 lbs/yr, nonpoint source total phosphorus (TP): 5,304 lbs/yr, point source TN: 85,782 lbs/yr, point source TP: 11,786 lbs/yr. These limits are for the Mattawoman watershed as a whole, irrespective

[125] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011.
[126] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011.

of political boundaries. Specific point source caps are place on individual discharges (ex. Indian Head WWTP) and on jurisdictions with MS4 permits. Otherwise, TMDL allocations are not divided among jurisdictions.

In the Mattawoman watershed all three 2030 development scenarios would reduce the amount of the nonpoint and point source pollution. The most effective scenario at reducing NPS nutrient loads is the Focused Growth scenario. Though a reduction in NPS loads is seen in all scenarios, none reduces the amount below the current TMDL cap.

Table 3-6. Current and projected nutrient loadings into Mattawoman Creek. Adapted from Charles County WRE (2011).[127]

		(lbs/yr)	**Town of Indian Head WWTP – Mattawoman Creek**
Existing	**Nutrient Loads**	TN	4,042
		TP	303
All 2030 scenarios	**Estimated Loads**	TN	6,403
		TP	480
	Likely Nutrient Caps	TN	6,091
		TP	457
	Discharge Capacity (Overage)	TN	(312)
		TP	(23)

[127] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011.

Table 3-7. Estimated nutrient loadings to Mattawoman Creek and available TMDL cap capacity under current conditions and future (2030) development scenarios. Adapted from Charles County WRE (2011).[128]

	Load Source	(lbs/yr)	Mattawoman Creek Loading	Available TMDL Cap Capacity (Overage)[3]
Existing	Nonpoint Sources[1]	TN[2]	252,882	(136,183)
		TP[2]	13,231	(7,927)
	Point Source[1] – Indian Head WWTP	TN	4,042	-[4]
		TP	303	-
	Total Nutrients	TN	**256,924**	
		TP	**13,534**	
A. Baseline	Nonpoint Sources	TN	191,335	(74,636)
		TP	8,477	(3,173)
	Point Source – Indian Head WWTP	TN	6,403	-
		TP	480	-
	Total Nutrients	TN	**197,738**	
		TP	**8,957**	
B. Focused Growth	Nonpoint Sources	TN	188,066	(71,367)
		TP	8,456	(3,152)
	Point Source – Indian Head WWTP	TN	6,403	-
		TP	480	-
	Total Nutrients	TN	**194,469**	
		TP	**8,936**	
C. DDD Focus	Nonpoint Sources	TN	231,268	(114,569)
		TP	9,343	(4,039)
	Point Source – Indian Head WWTP	TN	6,403	-
		TP	480	-
	Total Nutrients	TN	**237,671**	
		TP	**9,823**	

[1]Nonpoint sources are based on land use and include septic systems. Point sources include public and other major WWTPs.
[2]TN=total nitrogen, TP=total phosphorous
[3]Mattawoman TMDLs - Nonpoint source TN: 116,699 lbs/yr, nonpoint source TP: 5,304 lbs/yr; point source TN: 85,782 lbs/yr, point source TP: 11,786 lbs/yr. The point source TMDL figures include MS4 permitted discharges from both Charles and Prince George's counties and other permitted point source discharges. Both point and nonpoint source limits are for the Mattawoman watershed as a whole, irrespective of political boundaries.
[4]Available capacity/overage for point sources was not assessed in the context of the total TMDL amount and all point source discharges. See Table 3-6 for nutrient caps and projected overage at the Indian Head WWTP.

[128] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011.

As part of the assimilative capacity analysis the current and possible future amount of impervious land cover by watershed was estimated. The percent of impervious land use in a watershed is often used as a proxy indicator for watershed health. Typically, the higher the percentage, the lower the resulting water quality. The Mattawoman watershed has the highest rate of impervious cover of all Charles County watersheds, both under current conditions and in all 2030 scenarios (see Table 3-8).

Table 3-8. Estimated current and future impervious land cover in the Mattawoman watershed and in all Charles County watersheds combined. Adapted from Charles County WRE (2011).[129]

		Existing		A. Baseline		B. Focused Growth		C. DDD Focus	
Watershed	Total Acreage	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Mattawoman Creek	44,662	4,361	9.8%	4,772	10.7%	4,836	10.8%	4,944	11.1%
Charles County watersheds total	294,450	13,981	4.7%	16,003	5.4%	15,777	5.4%	15,763	5.4%

The wastewater and assimilative capacity analyses, along with those focused on water supply, indicate that the Focused Growth scenario is the best development track for the county. That said, the county recognizes a few limitations to this conclusion. First, TMDLs have only been completed for two of the county's ten watersheds so the true impact of the different scenarios and assimilative capacities of the waters cannot be judged. Secondly, no scenario, including Focused Growth, is able to achieve water the quality goals for Mattawoman Creek. Furthermore, the priorities that are to guide development decisions are often at odds with one another. Charles County faces a situation where its major PFAs are in the impaired Mattawoman watershed,

> Another consideration is that while the majority of the County's Priority Funding Areas (PFAs) fall within impaired watersheds, Maryland's Smart Growth principles fundamentally encourage the continued concentration of new development within these already-developed areas. The opposite approach—dispersal of development to unimpaired watersheds—could help to improve water quality in Mattawoman Creek and other impaired watersheds, but would encourage inefficient use of water and sewer infrastructure, and would impact (and potentially degrade) a larger number of watersheds.[130]

The county's WRE analysis makes it clear that unrestricted growth in the Development District and opening up the Deferred Development District would continue to negatively impact the health of Mattawoman Creek and the flora and fauna that rely on it.

[129] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011.
[130] Charles County Government. "Charles County Water Resources Element." (2011) <http://www.charlescounty.org/pgm/publications/> Accessed March 16, 2011.

As the county moves through the current and future planning processes, the WRR could be used to develop alternative scenarios that protect natural resources as a means of protecting water quality and direct development to less sensitive areas.

3.3.2 Ordinances

In addition to state and federal laws related to wetlands, waterways, stormwater management, erosion and sediment control, and road construction, Charles County ordinances regulate these activities at the local level. These regulations aim to ensure that the goals and objectives in the county's Comprehensive Plan are met.

The ordinances reviewed here are the ones that have natural resource protection elements or could make use of the Watershed Resources Registry in the planning and approval processes. Common requirements in the ordinances that could use the WRR are identification of open space areas, sites for afforestation or reforestation, and avoidance and minimization of impacts. Some of the ordinances require site design proposals, environmental feature analyses, alternative analyses, and/or iterative plan proposals.

The Zoning Ordinance is slightly different from the others in that it is driven by the Comprehensive Plan, the other incorporated plans, and the land use concept map. As each of these is updated, the WRR could be used to inform them and thus zoning in the county. For example, the WRR could be used to evaluate the extent of the Resource Protection Zone and the sending and receiving zones of the Transfer of Development Rights program.

The ordinances discussed here cover subdivision development, forest conservation, stormwater management, and zoning. Those not covered are roads, grading and sediment control, floodplain management, and stormwater drainage. While these do not specifically relate to the WRR, there is typically a requirement in these ordinances that projects must comply with all other local ordinances.

3.3.2.1 Zoning

The Charles County Zoning Ordinance lays out land use categories and the corresponding allowed development and use activities in each zone. Additionally, the ordinance specifies requirements, guidelines, and exemptions for project sites and lots. Developers and land owners are required to get a zoning permit before any construction can take place.

There are three general zoning categories: base zones (Table 3-9), planned development zones (Table 3-10), and overlay zones (Table 3-11).[131] These are summarized below along with other relevant regulations from the ordinance.

Base zones are the basic categories of development and densities allowed in the county. Planned development and overlay zones are used to allow or, conversely, limit certain land uses or activities in specific areas. Planned development zones are used for planned communities that have specific visions

[131] Charles County Government. "Charles County Zoning Regulations." (2009) <http://www.charlescounty.org/pgm/publications/> Accessed January 21, 2010.

for their character and use, such as those centered-around public transportation. Overlay zones alter base zone densities and may restrict permitted activities. These are used for specific purposes, like natural resource protection.

Amendments can be made to both the text of the Zoning Ordinance and to maps that specify a location's zone. Anyone is allowed to submit an application for a proposed text or map amendment. Applications are submitted to the Zoning Officer, reviewed by the Planning Commission and County Commissioners, go through a public review process, and are ultimately decided on by the County Commissioners.

Base Zones

A parcel's base zone indicates the type and density of development allowed. Base zones are used to implement the goals and objectives from the extensive planning processes the county engages in, including comprehensive planning. Additionally, site, building, and lot design criteria are specified for each zone. Table 3-9 lists the base zones and their intended development objectives. Also noted is whether or not it is present in the Mattawoman Creek watershed.

Table 3-9. Charles County base zoning categories and residential densities.[132]

Zone	Code	Residential Density (dwelling units/acre)	Objective/Comments
Agricultural Conservation	AC	Conventional/cluster – 0.33	Agriculture and farming activities, prevent urbanization, and protect existing natural resources and scenic values. Some areas can be sending zones for the Transferable Development Rights Program. Not present in Mattawoman Creek watershed.
Rural			
Rural Conservation	RC	Conventional/cluster – 0.33	Low-density residential, preserve rural environment, natural features, and character. Present in Mattawoman watershed, mainly around Smallwood and Mattawoman NEA.
Rural Residential	RR	Conventional/cluster – 1.00	Low to moderate residential density close to development district and incorporated towns. Present in watershed but very limited.
Rural Conservation Deferred Development District	RC(D)	Conventional – 0.10	Low density residential, preserves rural environment and natural features, maintains agricultural and aquacultural activities. This zone is reconsidered at least every five years. Present in a very small area of the watershed.
Village Existing population and commerce areas outside development district.			
Village Residential	RV	Conventional/cluster – 1.80 Central water or sewer area – 3.00 MX zone – 3.00	Low to medium density residential in areas where development has already been established. Not zoned in Mattawoman watershed.
Village Commercial	CV	MX zone – 3.00	Commercial activity in rural areas. Not zoned in Mattawoman

[132] Charles County Government. "Charles County Zoning Regulations – Article VI Base Zone Regulations." (2009) <http://www.charlescounty.org/pgm/publications/> Accessed January 21, 2010.

			watershed.
Development District Residential Concentrate residential development in development districts. Large portion of Mattawoman watershed is zoned as development district. Public water, sewer, and roads are available or planned. Areas can be receiving zones for TDR program.			
Low-Density Residential	RL	Conventional/cluster – 1.00 PRD zone – 1.75	Low- to medium-density residential where public water and sewer, roads, and other public facilities are not yet available or planned, but might be at some future time. Covers a significant portion of the watershed.
Medium-Density Residential	RM	Conventional/cluster – 3.00 PRD zone – 3.00 MX and PMH zone – 3.00 TOD zone – 4.00	Medium-density residential where public water and sewer and other public facilities are available in development district and town centers. Covers a significant portion of the watershed, with concentrated areas near Bryans Road and Waldorf.
High-Density Residential	RH	Conventional/cluster – 5.00 PRD zone – 5.00 MX zone – 5.00 PMH zone – 5.00 TOD zone – 15.00	High-density residential in and adjacent to urban core of development district. Present in a small area, mainly in the Waldorf/301 area.
Residential/Office	RO		Mix of residential and office for low intensity commercial use. Transition area between high intensity commercial and residential areas. Present in a small portion of the watershed in the areas of Bryans Road and St. Charles.
Commercial Commercial use, preference for clusters over strip development. Requires Site Design and Architectural Review Board approval.			
Neighborhood Commercial	CN		Limited retail and commercial for basic needs of residential neighborhoods. Present in small, dispersed areas throughout the Mattawoman watershed.
Community Commercial	CC	MX zone – 5.00 TOD zone – 15.00	Commercial services for multiple neighborhoods along major roads. Discourage strip development. Covers a small area of the watershed concentrated in the Waldorf area.
Central Business	CB	MX zone – 5.00 TOD zone – 15.00	High-intensity commercial in town centers and urban core. Covers a small area of the watershed concentrated in the Waldorf area.
Business Park	BP	MX zone – 5.00 TOD zone – 15.00	Business and light industrial in park-like setting. Aim to protect environment and reduce impacts on neighborhoods. Sited in large areas for on-site storage, parking, and landscaped areas. There are a few areas with this zoning category scattered across the watershed.
Industrial Promote industrial development and economic environment. Requires Site Design and Architectural Review Board approval.			
General Industrial	IG	MX zone – 5.00 TOD zone – 15.00	Moderate scale and intensity industrial uses. There are two zoned areas for this in the basin, one is fairly large. There are also some areas present right on the edge of the watershed along 301.
Heavy Industrial	IH	MX zone – 5.00 TOD zone – 15.00	Larger or more intensive processing with potentially larger impacts on surroundings. One site present in the watershed.

Planned Unit Development (PUD) Applies only to the St. Charles development near Waldorf to create an economically self-sufficient community. Requirements: commercial and industrial development shall be between 10 and 25% of area development, public water and sewer, and 18% of area reserved for recreation, open space, community facilities. St. Charles east of Route 301, including the St. Charles Towne Center, is included in the Mattawoman Watershed.			
Waterfront Planned Community (WPC) Swan Point only (not in Mattawoman watershed). Varied single family-residential, served by public water and sewer, and 40% dedicated to recreation, open space, and community facilities. Not present in the Mattawoman watershed.			
Core Mixed-Use Mixed use areas; encourage infill and redevelopment, pedestrian and bike travel, high density development to limit surface parking, public transit. Have open space requirements. In the Bryans Road – Indian Head Sub-Area within the Mattawoman watershed.			
Core Employment/ Residential	CER	Conventional – 2.00	Mainly employment and residential with some retail, commercial, and civic uses. Goal is to provide an area of "economic and social vitality" and link transportation and land use. Present in the Bryans Road area of the watershed.
Core Retail/Residential	CRR	Conventional – 2.00	Mainly retail, with some employment, residential, commercial, and civic uses to promote "economic and social vitality" and encourage linkage of trips. Present in the Bryans Road area of the watershed.
Core Mixed Residential	CMR	Conventional – 2.00	High-density residential adjacent to core employment/residential and retail residential areas. Mix of housing types. Present in the Bryans Road area of the watershed.
Activity Center Zones Promote cohesive communities by integrating residential, retail, business, office, and civic uses. Create network of streets, pedestrian ways, and open space. Required to follow Downtown Waldorf Vision Plan, Design Guidelines, Urban Road Standards.			
Waldorf Central Zone	WC	Varies – 12.00–36.00	Moderate to high density development to create downtown core of mixed uses and intensity. Support rail transit. Present in the Waldorf/west of Route 301 area of the watershed.
Acton Urban Center Zone	AUC	Varies – 12.00–36.00	High density urban development of mixed use and intensity. Support rail transit. Present in the Waldorf/west of Route 301 area of the watershed.

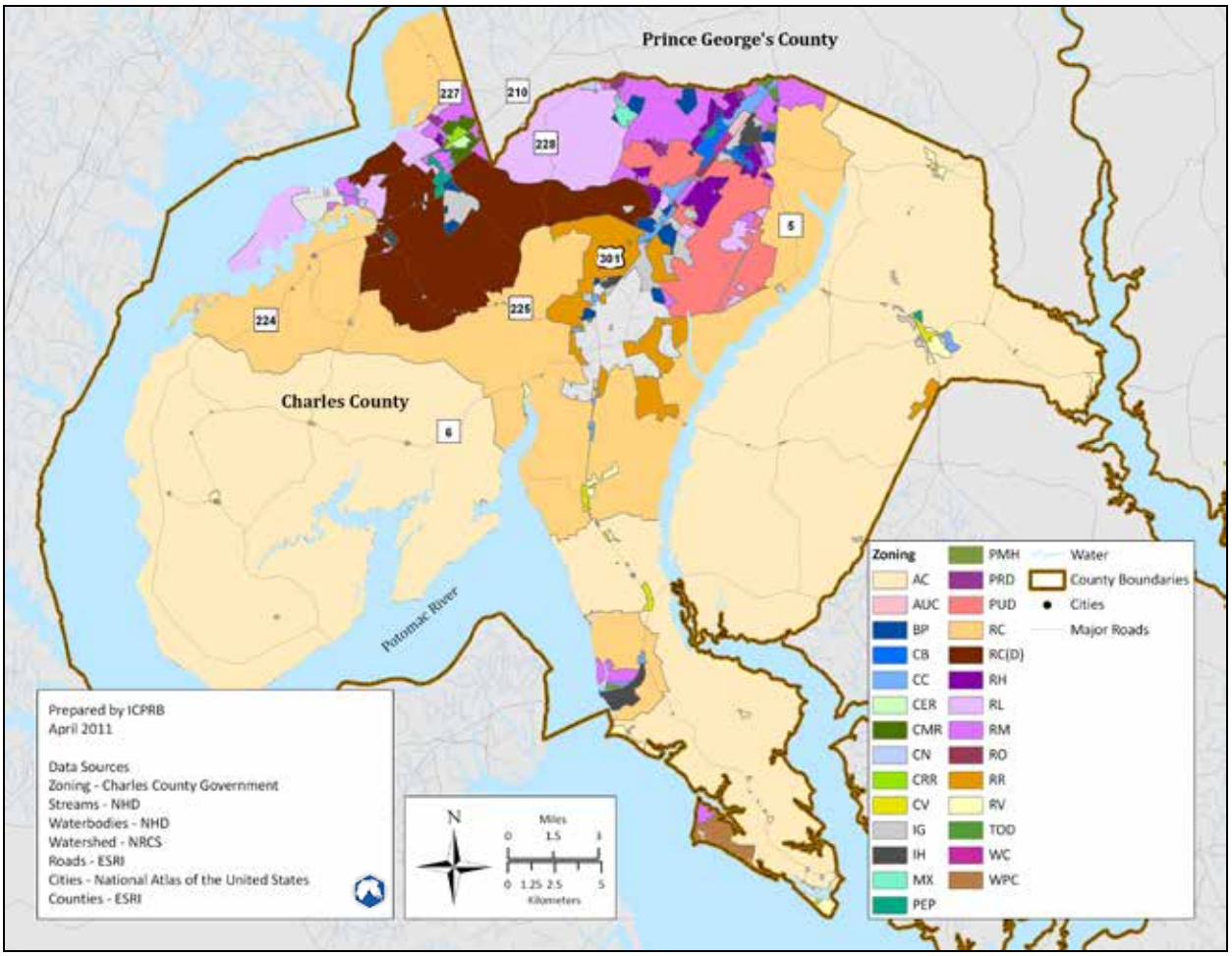

Figure 3-3. Charles County zoning map. Abbreviations in legend are explained in Tables 3-9 and 3-10.

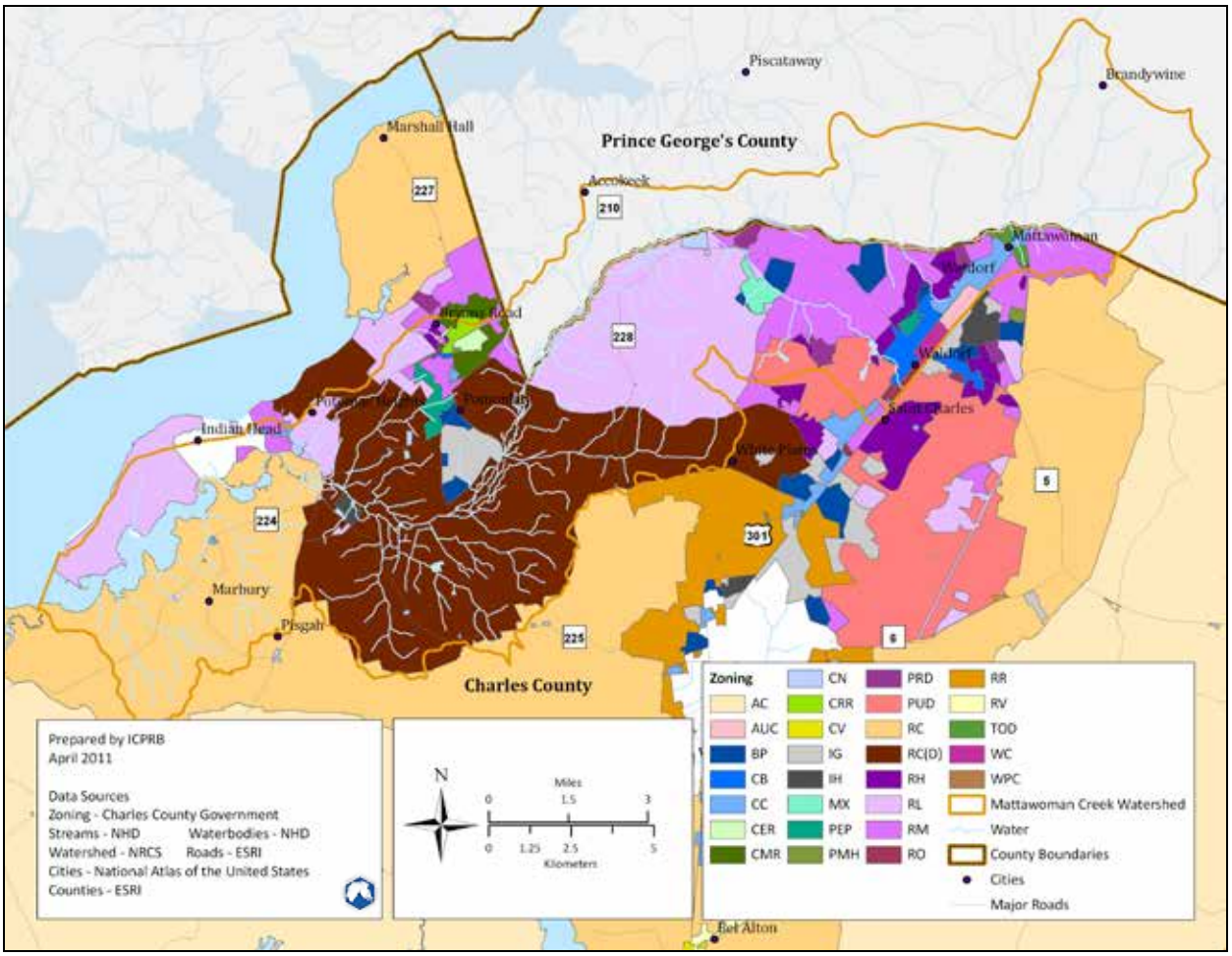

Figure 3-4. Zoning in the Mattawoman Creek watershed portion of Charles County. Abbreviations in legend are explained in Tables 3-9 and 3-10.

Planned Development Zones

Planned development zones are intended to "encourage innovative and creative design of residential, commercial and industrial development."[133] There are five such zone categories. To be designated as one of the five, an application has to be filed to change a parcel from its current base zone designation. This is done through the local map amendment process. This process ensures that a project's master plan is consistent with the county's Comprehensive Plan.

The table below summarizes the five zones, their purpose, and the base zones in which the reclassification would be permitted, pending application approval. The regulations for these zones specify in detail density and site design requirements, among other requirements.

[133] Charles County Government. "Charles County Zoning Regulations Chapter 297 - Article VII Planned Development Zone Regulations." (2010) <http://www.charlescounty.org/pgm/publications/> Accessed April 14, 2011.

Table 3-10. Categories for the Planned Development Zones.[134]

Name	Code	Objective	Permitted Zones
Planned Residential Development	PRD	Used to implement recommendations and county policies for residential development, allow for flexibility of design, and integrate uses for "optimum land planning with greater efficiency, environmental sensitivity, convenience and amenity."Other purposes include preserve historic and cultural heritage, encourage social and community interaction, provide range of housing types, maintain tree canopy, provide open space, create pedestrian circulation networks, achieve safety and convenience, and sustain property values. There are three PRD sites in the Mattawoman watershed.	RL, RM, RH
Mixed Use Development	MX	Large-scale developments that integrate residential, commercial, industrial and institutional uses. Additional purposes: flexibility in land use, design, and density; implement county plans and policies; establish standards for evaluating multi-use proposals; support intention of Downtown Waldorf Vision Plan; be architecturally integrated; correct existing ecological or environmental deficiencies; contribute to historic and cultural heritage; enhance tourism industry; reduce traffic congestion; expand solid waste and recycling program; promote targeted industries; promote planned, phased in multi-use centers; encourage where appropriate high-density residential uses; ensure compatibility of residential and non-residential uses; provide for open space; improve non-vehicular transportation network; encourage energy efficiency; and sustain property values. 20% of zone must be kept as open space. Present in the Development District, west of Waldorf, in the watershed.	RV, RM, RH, CC, CB, CV, BP,IG, IH
Planned Employment and Industrial Park	PEP	Light and medium industrial uses and related commercial uses. Additional purposes: encourage appearance compatibility with surrounding area; site development in areas with water and sewer facilities, served by at least one major highway, and on sites suitable for the specific type of development; flexible land use, intensity, and design; implement county plans and policies; develop standards for evaluating PEP proposals; correct existing ecological or environmental deficiencies; contribute to historic and cultural heritage; reduce traffic congestion; expand solid waste and recycling program; promote targeted industries; encourage comprehensively planned employment centers; require land use planning and site design techniques; and encourage energy efficiency. Present in small areas of the watershed.	AC, RC, RR, RV, RL, RM, RH, CN, CC, CB, CV,BP,IG, IH
Planned Manufactured Home Park	PMH	Establish standards for planned manufactured home residential developments. Additional purposes: locate developments to be consistent with comprehensive plan; allow for design and layout flexibility; compatibility with surrounding area and land uses; upgrade existing manufactured home parks; site new developments near existing manufactured home parks; correct existing ecological or environmental deficiencies; encourage open space areas; expand solid waste and recycling program; implement	RM, RH

[134] Charles County Government. "Charles County Zoning Regulations Chapter 297 - Article VII Planned Development Zone Regulations." (2010) <http://www.charlescounty.org/pgm/publications/> Accessed April 14, 2011.

		county plans and policies; establish standards for evaluating projects; and contribute to historic and cultural heritage. 25% of tract must be kept as open space. One small site in the watershed near Bryans Road.	
Transit Oriented Development	TOD	Comprehensively planned, high density, transit-oriented developments. Additional purposes: flexible development near existing or future public transportation corridors; implement county plans and policies; reduce trips and travel time; encourage use of public transit; maintain historic structures, sites, and vistas; increase tourism by expanding or relocating businesses; reduce traffic congestion; orderly and staged construction of multi-use centers; architecturally integrated design; reduce urban sprawl and encourage wider variety of housing types; compatible residential and nonresidential uses; provide high density residential and commercial areas in urban core; sustain property values; and economic development; conform to appropriate design principles. 10% of zone must be kept as open space. There are TOD zones in the area north of Waldorf along Route 301.	RM, RH, CC, CB, BP, IG, IH

Overlay Zones

The county uses overlay zones to protect a specific resource or implement a county policy or goal. These zones apply to a specific type of geographic area, such as coast line or the road network. The four overlay zones in the county are the Critical Area Zone, Highway Corridor Zone, Resource Protection Zone, and Airport Zone. These zones essentially create special zoning requirements on top of the base zone or planned development zone requirements. The first three are described in Table 3-11; the airport overlay zone is not currently in use.

Table 3-11. Charles County overlay zones. [135]

Name	Code	Objective
Critical Area Zone – all land in zone (except federal) is furthered defined by categories below		Protect land and water resources in the Chesapeake Bay Critical Area through sensitive development activity. In Critical Area it is prohibited to develop, alter, or use land for residential, commercial, industrial, or institutional use nor conduct agricultural, fishery, or forestry activities, unless specific requirements are met.
Intense Development Zone	IDZ	Density specified by base zone.
Limited Development Zone	LDZ	Density specified by base zone, but in residential zones maximum density is four units per acre.
Resource Conservation Zone	RCZ	Residential density maximum is one unit per 20 acres, some exceptions. Clusters are allowed as long as overall density is not increased.
Highway Corridor	HC	Maintain aesthetic of land adjacent to major highways and orderly development, including visuals, natural resources, limited grading and clear-cutting, and minimized intersections and access points. Includes all land within 500 ft on each side of the following right-of-way: 301, 210, 228 (from 210 to Bealle Hill Road to 301, 5, and 205. Depending on the base zone and the road classification natural buffers are required.
Resource Protection Zone	RPZ	Protect stream valley habitat and water quality by preserving floodplains and associated wetlands, preventing erosion and sedimentation, and filtering stormwater. Also protect humans and property, scenic views, and provide recreational opportunities. Applies to county streams outside of the Critical Area Zone, including Mattawoman Creek and Old Woman's Run. It also encompasses stream valleys, steep slopes, associated wetlands and floodplains, and a buffer.

The Critical Area and Resource Protection zones are most pertinent to the WRR project as they explicitly protect natural resources. The zoning requirements of these two overlay zones are to be incorporated into the base zones for the parcels that fall within these areas. If the base zone densities and those for the protection zones do not match, the latter supersede the former.[136] As of March 2011, a zoning text amendment to update the Critical Area Overlay regulations was set for a vote before the Charles County Commissioners.[137]

The Critical Area Zone implements the Charles County Critical Area Program and the requirements of Maryland's critical area regulations (see Section 3.2.2.2). The Critical Area includes all land and water within 1,000 feet of the boundaries of state and private wetlands and the heads of tides. Within the Critical Area Zone a buffer extends a minimum of 100 feet landward of tidal waters and tributary streams in the Critical Area.

[135] Charles County Government. "Charles County Zoning Regulations – Articles IX - XII." (2010) <http://www.charlescounty.org/pgm/publications/> Accessed April 14, 2011.

[136] Karen Wiggen, Charles County Department of Planning and Growth Management. Personal communication. March 16, 2011.

[137] Karen Wiggen, Charles County Department of Planning and Growth Management. Personal communication. March 16, 2011. The 2009 version of the zoning ordinance is covered here as the update had not been approved at the time this document was written.

The buffer is to be either undisturbed natural forest vegetation or an area for enhancement with native vegetation, both managed to protect shoreline, streams, wetlands, and riparian biological communities. Land within this area is further categorized as being in an Intense Development, Limited Development, or Resource Protection zone. Certain areas within the zone can be reclassified to permit higher density development through the regulation's growth allocation system.

The 100 foot buffer can be extended if there are hydric or highly erodible soils or steep slopes. If these conditions exist, the buffer is expanded four feet for every one percent of steep slope or to top of slope, whichever is greater. New land uses and development activities are not allowed except as specified in the Zoning Ordinance (see table above).

If development is permitted, a County Buffer Management Plan is required. There are allowances for Buffer Exemption Areas (BEA) to be exempted from some requirements because of residential, industrial, commercial, or recreational development that existed as of December 1, 1985. Development in the BEA that creates impervious or semipervious surface is subject to offsets, such as requiring natural forest vegetation be planted on-site, covering twice the area of impervious surface created. All development in the Critical Area requires an approved site plan from the county.

Within the Resource Protection Zone a minimum 100 foot buffer is to remain undisturbed for third order streams or higher and a 50 foot buffer is required for intermittent streams or streams of first and second order. The extent of the buffer can be expanded for nontidal wetlands, floodplains, and steep slopes. In the county's Development District, buffers are required to include the area 25 feet from the outer edge of nontidal wetlands adjacent to the stream channel.

Outside of the Development District, the buffer is extended 50 feet from the edge of the nontidal wetlands adjacent to the stream channel for intermittent and perennial streams of first and second order and 100 feet for perennial stream of third and fourth order. The buffer is also extended up to 50 feet for intermittent and perennial streams of first and second order, and up to 100 feet for perennial streams of third and fourth order. Steep slopes (greater than 15 percent) within 25 feet of the original buffer are incorporated as well.

Mining or excavation activities, dredging, deposit or landfilling, alteration of the stream bed and bank, and clearing of vegetation and grading are all explicitly prohibited in the RPZ. Some exceptions are made for agriculture, timber harvesting, utility transmission lines, railroads, roads, stormwater management facilities, storm drainage, recreational nonmotorized trails, public environmental education facilities, and facilities for recreational use that meet specific requirements.

Cluster Development

The Zoning Ordinance also allows for cluster developments at the same density as the original base zone but configured on smaller sized lots. This allows dwellings to be clustered in smaller areas of the property, thus using less infrastructure (i.e. roads, water and sewer), and creating larger open spaces that can be used to meet other community needs. Encouraging this type of development preserves open space, farmland, and important natural resources. It can also provide areas for recreation and increase walking and biking opportunities.

Site Design

The site design standards are to establish minimum design and improvement standards for new development. One key requirement is that these developments preserve natural features and minimize environmental impacts to a site.

To do this, a site analysis is required. This analysis reviews the site in the context of the surrounding community. It also catalogues physical features of a site including its geology and soil, topography, climate, natural features, visual features, past and present use of the site, historic features, and existing vegetation.

If portions of a site meet certain criteria they are to minimize negative impacts from proposed development. Characteristics that would limit or preclude development include unique and/or fragile areas including tidal and nontidal wetlands, significant trees or stands of trees, land in the floodplain, steep slopes (greater than 25 percent over ten feet), habitat of endangered wildlife, and historically significant structures and sites.

Transferable Development Rights

Charles County's Transferable Development Rights (TDR) program incentivizes shifting development from agricultural areas to the Development District as a means of encouraging agricultural land preservation.[138] The TDR program allows property owners in the Agricultural Land Preservation District to sell their rights to develop that land for residential purposes to a person seeking to increase the allowed density of a parcel within the Development District. Applicable receiving areas for increased development include the following zones, with some restrictions: RL, RM, RH, CER, CRR, CMR, AUC, WC, PRD, TOD, or MX.

This regulation currently addresses the need in the county for agricultural land preservation and does not aim to protect natural resources. The nature of the program increases development in the Mattawoman Creek watershed by directing the development to the Development District which is almost entirely within the watershed.

3.3.2.1.1 Subdivision Regulations

The Subdivision Regulations ordinance ensures the "reasonable and consistent development of land within Charles County in order to promote the public health, safety, and general welfare and to provide for the creation of development sites suitable for building purposes and human habitation, and to provide for open space in a harmonious environment."[139]

The ordinance details design, siting, and development requirements; requirements for recreational areas and open space; protections for sensitive natural resources; and applicable application processes

[138] Charles County Government. "Charles County Zoning Regulations Chapter 297 – Article XVII Transferable Development Rights (TDRs) in Designated Agricultural Land Preservation Districts." (2010) <http://www.charlescounty.org/pgm/publications/> Accessed April 14, 2011.

[139] Charles County Government. "Subdivision Regulations." (2006) <http://www.charlescounty.org/pgm/planning/> Accessed March 15, 2011.

and administrative procedures. Those portions relevant to natural resource protection and stormwater management are reviewed in this section.

Natural Resource Protections

The portions of this ordinance that provide natural resource protections often refer to other county ordinances. For instance, the Zoning and Forest Conservation ordinances (Sections 3.3.2.1 and 3.3.2.3, respectively) are mentioned throughout the text. Compliance is required with these and other ordinances.

There are also provisions for subdivisions to incorporate recreational and/or open space areas into the project design. Requirements for this type of space differ depending on the location and size of the project. For the most part, open space is meant to protect existing site features. Open space areas may contain active recreation parks and can be agricultural land, but they cannot include tidal wetlands, road right-of-ways, or parking areas. Developers are also referred to the Comprehensive Plan to comply with open space and recreational park requirements.

Habitat Protection Plans are required for all projects. These plans identify Wetlands of Special State Concern, habitat areas, and DNR habitat protection areas for rare, threatened, and endangered species. Developers are to work with DNR to develop the required measures to protect these areas. When impacts are unavoidable, applicants must work to minimize them. These plans are submitted with preliminary subdivision plan applications and are subject to the approval from the Planning Director.

In addition to these protection requirements, there are specific conditions for subdivision projects within the Chesapeake Bay Critical Area Overlay Zones, as described in the Zoning Ordinance. The general, and minimum, requirements are covered in brief below:[140]

- Subdivisions must be suited to land, following land use pattern of the adopted Comprehensive Plan, Critical Area Program, and Zoning Ordinance.
- Take measures to protect trees, waterways, scenic points, historic sites and structures, other assets and landmarks.
- Minimum buffer of 100 feet of native vegetation on tracts of land bordering tidal water and wetlands or tributary streams in the Critical Area, unless there is an exemption. No structures are allowed in the buffer area unless specified in the Zoning Ordinance.
- Buffers are included in setback requirements for lots extending to water, wetlands, or stream beds.
- Buffers are expanded if there are "contiguous sensitive areas" that could impact stream or aquatic health if they were developed. Sensitive areas can include: hydric soils, highly erodible soils on slopes greater than five percent, and steep slopes greater than 15 percent. This is determined by the Planning Commission and in accordance with Zoning Ordinance.
- Use stormwater best management practices to ensure a ten percent reduction of predevelopment pollutant loadings in the Intense Development Overlay Zone. The developer shall indicate areas without impervious cover to have vegetation planted and justify why areas without vegetation are present. Plantings and vegetation are to be done according to Zoning Regulation.

[140] Charles County Government. "Subdivision Regulations – Article V General Design Requirements – Section 53 Chesapeake Bay Critical Area Overlay Zones." (2006) <http://www.charlescounty.org/pgm/planning/> Accessed March 15, 2011.

- Avoid siting roads, bridges, and utilities in areas that would disturb Habitat Protection Areas in the Limited Development and Resource Conservation Overlay Zones. If it is unavoidable, the developer must show how impacts have been minimized and why there are no viable alternatives.
- In the Limited Development and Resource Conservation Overlay Zones all stream crossings or developments adjacent to streams must follow Zoning Ordinance requirements.
- Design subdivisions to maintain wildlife and plant habitat on site and continuity with adjacent sites. Include wildlife corridors on development plats and include Habitat Protection Areas and large forested areas on or adjacent to the site.
- In the Limited Development and Resource Conservation Overlay Zones impervious surfaces are limited to 15 percent of any site proposed for development, except if the site is less than one acre in size in a post-1985 development (25 percent imperviousness allowed).

Subdivision projects are required to include a Site Design and Environmental Features Analysis. The analysis may include the following items, depending on the subdivision's location and specific situation: site context and history; geology, soil and topography; vegetation, fauna, and ecology (including the known location of any threatened or endangered species); visual features and their context; past and present use of the site; existing structures, and road networks. The information required by the Forest Conservation Ordinance is also to be included.

This analysis is used to guide development of the site to preserve natural resources when possible and to minimize impacts when they cannot be avoided. Additional development considerations are the county's Comprehensive Plan and the Comprehensive Water and Sewer Plan. These address the planned development patterns in the county and where public services are currently and where they are planned.

While the above items guide development into preferred areas, there are also areas to avoid. These include areas that may affect groundwater recharge and ones with unstable soils. Design practices to avoid are excessive cut and fill, unnecessary impervious cover, and ones that may negatively affect neighboring properties. There are also explicit restrictions on development in the following locations:[141]

- Unique and/or fragile areas, including tidal and non-tidal wetlands as defined in the Charles County Zoning Ordinance. This information is to be field verified by on-site inspection on the property and within 100 feet of the property boundary.
- Priority forest stands and/or specimen trees consistent with the Charles County Forest Conservation Ordinance.
- Lands in the flood plain.
- Steep slopes in excess of twenty-five (25) percent, or as required by Resource Protection Zone or Critical Area regulations, as measured over an area of 10,000 square feet, except where appropriate engineering measures concerning slope stability, erosion, and resident safety are taken.
- Habitats of rare, threatened and endangered species, as identified by the Secretary of the Maryland Department of Natural Resources or by the Federal Endangered Species Act.

[141] Charles County Government. "Subdivision Regulations – Article V General Design Requirements." (2006) <http://www.charlescounty.org/pgm/planning/> Accessed March 15, 2011.

- Other significant ecological areas, including but not limited to: Forest Interior Dwelling Bird Habitat, fish spawning areas, colonial waterbird nesting sites, and submerged aquatic vegetation.
- Historically significant structures and sites, as listed on federal, state, or County lists of historic places, or eligible for inclusion on the National Register of Historic Places.
- Information for off-site delineation of the above items, beyond the 100 feet specified, may be based upon the most recent topographic and historical information available at the time of submittal, provided that the sources used are clearly specified on the plan or plat document.

3.3.2.2 Stormwater Management

The county's Stormwater Management Ordinance is required by the State of Maryland Annotated Code Environment Article, Title 4, Section 4-202 (COMAR 26.17.02.08). The state requirements set general policy and, through the Maryland Stormwater Design Manual, specific criteria for addressing stormwater issues (see Section 3.2.1.2.2). The authority to set specific requirements has been delegated to local authorities as long as they are consistent with the Design Manual.

The Charles County ordinance regulates additional stormwater runoff generated from new development or redevelopment of land. The overarching goals of the regulation, in line with state goals, are "to maintain after development, as nearly as possible, the predevelopment runoff characteristics, and to reduce stream channel erosion, pollution, siltation and sedimentation, and local flooding by implementing Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP) and, for water quality purposes only when necessary, using appropriate structural best management practices (BMP)."[142] The MEP is defined in the ordinance as when "channel stability and one-hundred (100) percent of the average annual predevelopment groundwater recharge are maintained, nonpoint source pollution is minimized, and structural stormwater management practices are used only if determined to be absolutely necessary."

The ordinance covers the process for Stormwater Management Plan review and approval, agency input on Stormwater and Erosion and Sediment Control Plans, exemptions and waivers, criteria for Stormwater Management Plans, implementation, maintenance, and penalties.[143] It also incorporates the following documents that detail additional requirements: 2000 Maryland Stormwater Design Manual Volumes I and II and revisions, USDA Natural Resources Conservation Service Maryland Conservation Practice Standard Pond Code 378 and revisions, COMAR 27.01.02.03D for Intensely Developed Areas, and the Charles County Plan Preparation Packages.

Development and Redevelopment Projects

Approved Stormwater Management Plans are required for projects causing any land disturbance activity, development or redevelopment of land, and projects creating new impervious surfaces.

[142] Charles County Government. "Stormwater Management Ordinance." (2010) <http://www.charlescounty.org/pgm/planning/> Accessed December 29, 2010.
[143] Charles County Government. "Stormwater Management Ordinance." (2010) <http://www.charlescounty.org/pgm/planning/> Accessed December 29, 2010.

At various stages in the development of these projects the County Engineer reviews the iterative stormwater plans: Concept Stormwater Management Plan, Site Stormwater Management Plan, and Final Stormwater Management Plan. These plans are required to be consistent with any approved watershed and/or floodplain management plans. A number of agencies and departments can provide input on these plans, including but not limited to Planning, Zoning, Public Facilities, and the Charles Soil Conservation District. The resulting stormwater systems are required to be protected through an easement or an inspection and maintenance agreement.

There are a number of exemptions and waivers to the stormwater management requirements. The one of interest to this project is the waiver that allows for off-site implementation. This can be done through a fee-in-lieu, the granting of an easement, and/or the dedication of land. Also relevant are waivers for in-fill developments within a Priority Funding Area if there is water, sewer, and stormwater conveyance, and environmental site design to the maximum extent practical has been implemented.

The dedication of land is only available if there is an approved watershed management plan in the watershed where the activity will occur (refer to the Stormwater Management Ordinance for conditions that allow for exemptions and waivers). To do this, the applicant must apply for a water quantity waiver that shows the watershed management plan can address the stormwater requirements specified in the Stormwater Management Ordinance and that there are no stormwater or erosion problems downstream.

Redevelopment projects have to reduce on-site impervious surface by 50 percent, implement ESD to the MEP on 50 percent of existing impervious surfaces, or do a combination of both for at least 50 percent of existing surface. If both impervious surface reduction and ESD have been implemented to the MEP, then on-site and off-site structural BMPs can be considered to treat an area greater than or equal to 50 percent of existing impervious surface. A combination of all the options to treat 50 percent or more of existing impervious surfaces may also be considered. If none of the options are appropriate then the following options can be considered:[144]

1. A combination of ESD and on-site or off-site structural BMP;
2. Retrofitting including existing BMP upgrades, filtering practices, and off-site ESD implementation;
3. Participation in a stream restoration project;
4. Pollution trading with another entity;
5. Payment of a fee-in-lieu; or
6. A partial waiver of the treatment requirements if ESD is not practicable.

Stormwater Management Design Criteria

The ordinance sets the minimum stormwater quantity control requirements and specifies the design criteria for stormwater projects that follow the specifications of Natural Resources Conservation Service, MDE-WMA, and SHA. The first priority in stormwater management is to implement ESD to the MEP. Only after this is done can structural BMPs be considered.

[144] Charles County Government. "Stormwater Management Ordinance – 6.0 Redevelopment." (2010) <http://www.charlescounty.org/pgm/planning/> Accessed December 29, 2010.

The basic water quantity requirement is to limit the number of out-of-bank floods that occur from a ten-year storm based on the pre-development frequency. Structural means can be used to meet this requirement after ESD has been implemented to the MEP. This requirement may be met with an adequate outfall, regional or off-site stormwater facility, or discharges to a regulatory floodplain. If there are potentially negative downstream impacts, runoff from larger storms may have to be addressed.

Land use planning and land treatment measures are to be used to implement ESD to the MEP. Suggested techniques include:[145]

ESD Planning:

1. Preserving and protecting natural resources;
2. Conserving natural drainage patterns;
3. Minimizing impervious surfaces;
4. Reducing runoff volume;
5. Using ESD practices to maintain one-hundred (100) percent of the average annual predevelopment Groundwater recharge volume for the site;
6. Using green roofs, permeable pavements, reinforced turf, and other alternative surfaces;
7. Limiting soil disturbance, mass grading, and compaction;
8. Clustering development if allowed by the Zoning Ordinance, and
9. Any practices approved by the Administration.

ESD Treatment:

1. Disconnection of rooftop runoff;
2. Disconnection of non-rooftop runoff;
3. Sheet flow to conservation areas;
4. Rainwater harvesting;
5. Submerged gravel wetlands;
6. Landscape infiltration;
7. Infiltration berms;
8. Dry wells;
9. Micro-bioretention;
10. Rain gardens;
11. Swales;
12. Enhanced filters; and
13. Any practices approved by the Administration and the County.

If ESD treatments are not sufficient, Structural Stormwater Management Measures are required:

1. Stormwater management ponds;
2. Stormwater management wetlands;
3. Stormwater management infiltration;
4. Stormwater management filtering systems; and
5. Stormwater management open channel systems.

Stormwater Management Plans

A series of iterative stormwater management plans are submitted by the land owner or developer to ensure state and local requirements are met. A concept plan, site plan, and final plan are all required at

[145] Charles County Government. "Stormwater Management Ordinance – 8.0 Design Criteria." (2010) <http://www.charlescounty.org/pgm/planning/> Accessed December 29, 2010.

various stages in the design phase of a project. These plans have to be consistent with adopted watershed and flood management plans. Once the project is completed, "as-built" plans are to be submitted to the county. Additionally, the final Erosion and Sediment Control Plan is to be submitted at this time.

3.3.2.3 Forest Conservation

The Charles County Forest Conservation Ordinance implements Maryland's Forest Conservation Act (see section 3.2.2.3).[146] Its main goal is to retain existing forest when possible and use afforestation and reforestation to conserve tree cover during development activities.

The regulation requires forest stand delineations and forest conservation plans for development projects disturbing 20,000 or more square feet of forest. This applies to subdivisions, county projects, site plans, grading, or sediment control applications. It also applies to non-exempt public utilities, though there are a number of exemptions.

These regulations apply regardless of the presence of regulated nontidal wetlands. Trees in nontidal wetlands are priority areas for tree retention and replacement.

Applicants subject to this regulation are required to submit a forest stand delineation and forest conservation plan. Approved techniques must be used to protect any remaining forest.

In addition to cataloging the forest resources in the delineation, a Forest Conservation Plan details how retention or afforestation and restoration requirements will be met by the applicant. The first priority is to retain existing forest on site. If this is not possible, and can be demonstrated, on-site afforestation and/or reforestation will be required. For projects located in the Development District, off-site afforestation, reforestation, and retention are options. The final option, if the others are shown not to be feasible, is to pay into the county's Forest Conservation Fee-in Lieu Fund.

A Preliminary Forest Conservation Plan is submitted with the Preliminary Plan for the development project, but before any applications for grading or sediment control. The plan is to include the forest delineation, site information (total tract area, existing forest area, proposed forest area to be cleared, area of conservation required, area of conservation proposed on and off-site), forest conservation graphic, how provisions for retaining forest have been met, and limits of disturbance.

The final version of the plan will contain the same elements plus construction or improvement plan drawings and the application for the site plan, grading permit, or sediment control approval (if applicable). Forest necessary to comply with this ordinance is required to be protected in perpetuity through Forest Conservation Easements recorded in the County Land Records.

As mentioned, retaining existing trees on site is the highest priority. Retention is further prioritized by location in the following areas (listed from highest to lowest priority):

- Resource Protection Zone;
- 100-year floodplain;

[146] Charles County Government. "Forest Conservation Ordinance." (2004) < http://www.charlescounty.org/pgm/publications/> Accessed March 15, 2011.

- intermittent and perennial streams and their forest management buffers;
- steep slopes; nontidal wetlands and critical habitat areas;
- contiguous forest;
- rare, threatened, or endangered trees, plants, or shrubs;
- trees on, or associated with, a historic site;
- champion trees; and
- large trees of a specific size.

Following retaining existing forest, the preferred options are afforestation or reforestation and then off-site easements.

The preferred locations for off-site easements is within the same 8-digit DNR watershed and in the Development District, then in the Development District but in a different watershed, and finally outside both the watershed and Development District (this option requires the highest protection ratio of 4:1). The County maintains a list of approved off-site forest conservation banks for the use of applicants wishing to comply using an off-site location.

The final option, if no other is available, is payment into the Forest Conservation Fee-in-Lieu Fund.

3.3.3 Charles County Municipal Separate Storm Sewer System Discharge Permit

Charles County received its first MS4 Discharge Permit in 1997. The county is currently operating under the last permit issued in 2002 (permit number 02-DP-3322). This permit has expired, but a new one has not been reissued because of complications related to the issuance of a permit Montgomery County.[147]

The Charles County permit covers the MS4 system in the county's Development District. Generally, only MS4 discharges receive permits to discharge into the system. All other discharges require a separate NPDES discharge permit, with some exceptions.

In addition to programmatic and monitoring requirements described below, annual reports submitted to MDE's Water Management Administration are required to ensure the county is meeting all permit conditions. There are six categories of permit conditions:

- pollutant source identification,
- discharge characterization,
- management programs to control stormwater discharges in the Development District,
- prioritized watershed restoration,
- implementation cost analysis, and
- estimates of expected pollutant load reduction.

The county's 2010 annual report, covering the period from July 2009 through June 2010, describes the county's progress toward satisfying the permit conditions. Highlights include stream and outfall monitoring, GIS source identification, illicit discharge investigations, and watershed restoration

[147] Charles County Government. "NPDES Annual Report – July 2009-June 2010." (2010) <http://www.charlescounty.org/pgm/planning/plans/environmental/npdes/default.htm> Accessed March 15, 2011.

projects.[148] Because most of the Development District lies within the Mattawoman Creek watershed, many of the monitoring stations and restoration projects are within the watershed.

As part of its requirement to identify sources of pollution, the county collects extensive spatial datasets for the Development District. These include impervious surfaces (derived from aerial photography), stormwater BMPs and the corresponding treated drainage areas, storm drains, pipes, and outfalls. The report indicates that there were 637 stormwater BMPs in the Development District and a total of 1,081 sites county-wide. There were no new major outfalls (greater than 36 inches in diameter) or corresponding drainage areas added to the county's database in 2010. Figure 3-5 shows the location of stormwater BMPs as an example of the types of spatial data the county is collecting.

To meet the discharge characterization requirements, the county and its partners conduct chemical, biological, and physical monitoring of streams. The chemical monitoring currently being conducted is not located within the Mattawoman watershed. A monitoring site for biological and physical conditions is on a tributary to the Mattawoman (between Berry Road and Acton Lane, off of Timberbrook Lane[149]).

The report indicates aggradation and erosion at the cross-sections monitored, but that, in general, the channel has not changed significantly over time. In terms of biological health, the site has had a poor or fair IBI score since 2006. Additional physical and chemical monitoring is done through a partnership with the U.S. Geological Survey in the Mattawoman Creek at USGS Station 01658000.

Another discharge characterization requirement is to monitor the effectiveness of the implementation of the policies and practices of the *2000 Maryland Stormwater Design Manual*. The monitoring site for this analysis is on Piney Branch in the Mattawoman watershed. The monitoring here is meant to determine whether or not the implemented changes are sufficient to protect channels receiving stormwater. This site was chosen because at the time of selection, development was slated to occur but had not yet fully gotten underway. The assessment includes annual profile surveys to determine changes in stream morphology. The report indicates little change and a relatively stable stream channel in the 2009 survey.

As part of the stormwater management program requirements, the county conducts stormwater facility inspections, repairs facilities, investigates illicit connections to the MS4 system, and conducts outreach and education activities. The county inspects stormwater facilities at least once every three years. A database of conditions is maintained and structures considered to be in unacceptable condition are repaired. Inspections in calendar year 2009, found 52 percent of 140 facilities in acceptable condition.[150]

The county also passed an updated Stormwater Management Ordinance to implement the environmental site design requirements of Maryland's Stormwater Management Act of 2007. These

[148] Charles County Government. "NPDES Annual Report – July 2009-June 2010." (2010) <http://www.charlescounty.org/pgm/planning/plans/environmental/npdes/default.htm> Accessed March 15, 2011.
[149] Charles County Government. "NPDES Annual Report – July 2009-June 2010." (2010) <http://www.charlescounty.org/pgm/planning/plans/environmental/npdes/default.htm> Accessed March 15, 2011.
[150] Charles County Government. "NPDES Annual Report – July 2009-June 2010." (2010) <http://www.charlescounty.org/pgm/planning/plans/environmental/npdes/default.htm> Accessed March 15, 2011.

new requirements serve to minimize stormwater runoff from developments in the Development District and the rest of the county.

A screening program is conducted to identify illicit connections and identify their sources. In 2010, 100 sites were sampled for water quality parameters if there was flow present during dry conditions. The report identified flow at 21 of 100 sites observed. Eleven of these tested positive for detergents, but not at a level above the water quality threshold.

The watershed restoration portion of the permit requires the county to prioritize watersheds for restoration within the MS4 area. Building on studies done in 2004 and 2007, the county took on a new study to identify watersheds to treat an additional ten percent of the impervious surface in the Development District (286 acres). The analysis identified 32 potential sites for retrofits. These sites are being pared down based on suitability through aerial photography and field visits. To date, the county has restored 45 acres of impervious surface.

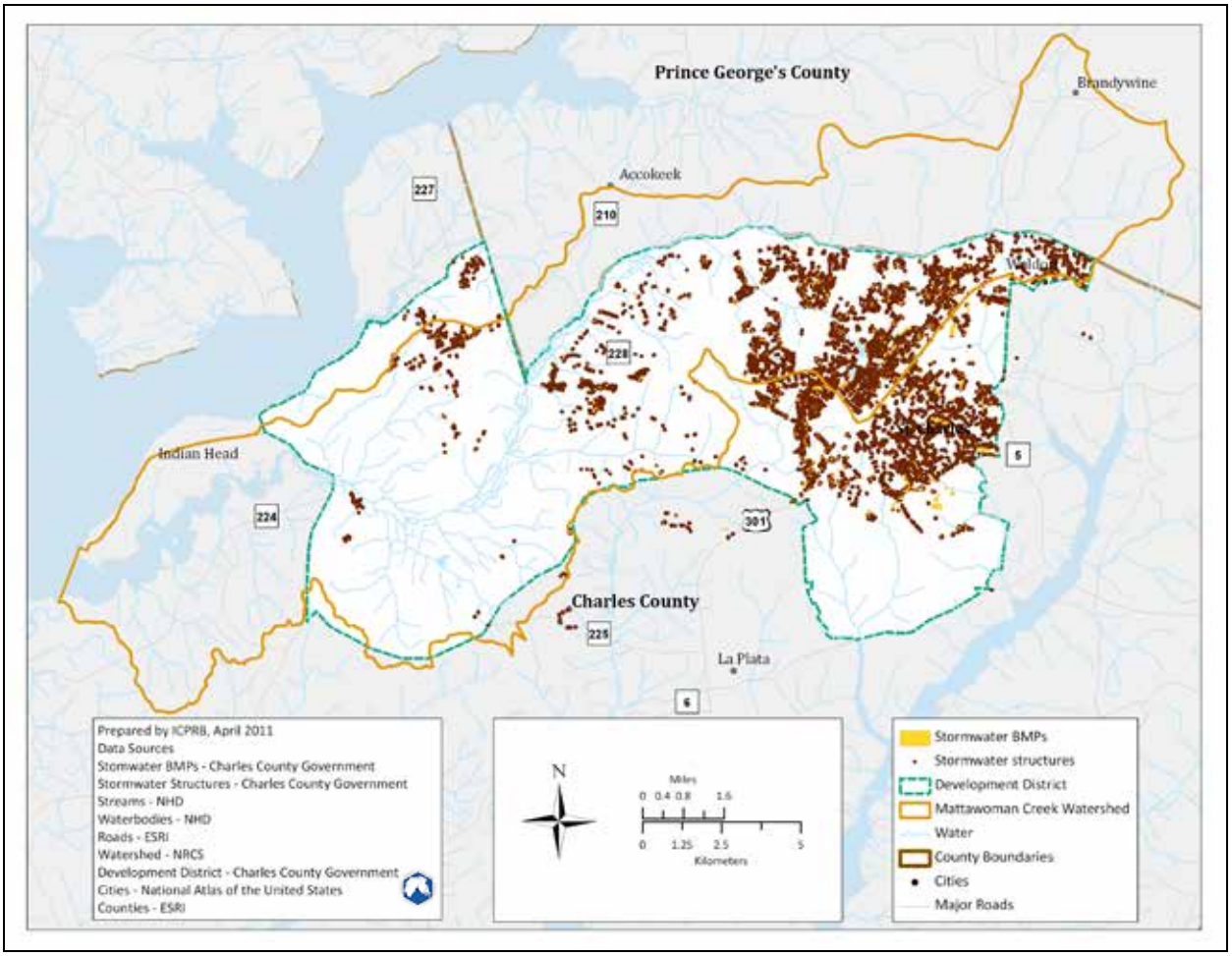

Figure 3-5. Stormwater BMPs and structures in the Charles County Development District (Source: Charles County Government, March 2011).

4 Application of the Watershed Resources Registry to the Mattawoman Creek Watershed in Charles County, Maryland

The Mattawoman has long been recognized as one of the healthiest, most productive watersheds in the Potomac River and Chesapeake Bay systems. At the same time, stream health indicators are starting to show signs of a stressed ecosystem. The decline in health can be correlated to the rapid development experienced in Charles County over recent decades.

This section illustrates how the Watershed Resources Registry can be used to protect and restore the Mattawoman Creek watershed. The examples that follow show how the tool addresses both regulatory and non-regulatory agency needs. They also show how it can help remove barriers between programs, identify project sites that can have multiple benefits, and improve permitting processes. These examples can be grouped into six general categories:

- Wetland mitigation,
- conservation,
- local-level planning,
- stormwater management,
- transportation, and
- regulatory integration.

The Registry itself consists of eight opportunity analyses:

1. Wetland preservation,
2. wetland restoration,
3. upland preservation,
4. upland restoration,
5. riparian zone preservation,
6. riparian zone restoration,
7. natural stormwater infrastructure preservation, and
8. compromised stormwater infrastructure restoration.

Each analysis includes absolute and relative factors. Absolute factors determine the basic physical suitability of a site. Relative factors rank the suitable sites based on preferred conditions and agency priorities (see Section 1.3 for an explanation of the scoring factors). The result is a set of eight maps that rank sites on a scale from one to five, five indicating those meeting the most relative factors (see Figure 4-1 through Figure 4-8).

It should be noted that at the time this report was completed (August 2011), the desktop and ground-truthing reviews had not yet been finalized. Results shown here may differ slightly from future versions of the WRR depending on the findings of the reviews and subsequent updates. The most up-to-date version can be accessed at http://watershedresourcesregistry.com.

The discussion that follows develops scenarios for potential use by a variety of stakeholders. They are based on the WRR results and are often combined with other spatial datasets. The maps generated for this purpose used the geographic information system (GIS) outputs from the WRR analysis as opposed to those that can be generated using the WRR's online interface. The results are exactly the same in the two interfaces, but the GIS application allows more complicated scenarios to be developed.

It is noted when additional GIS files were used or if an analysis was done that the online version cannot replicate as it is currently constructed.

All maps presented in this section are displayed in a larger size in the appendix.

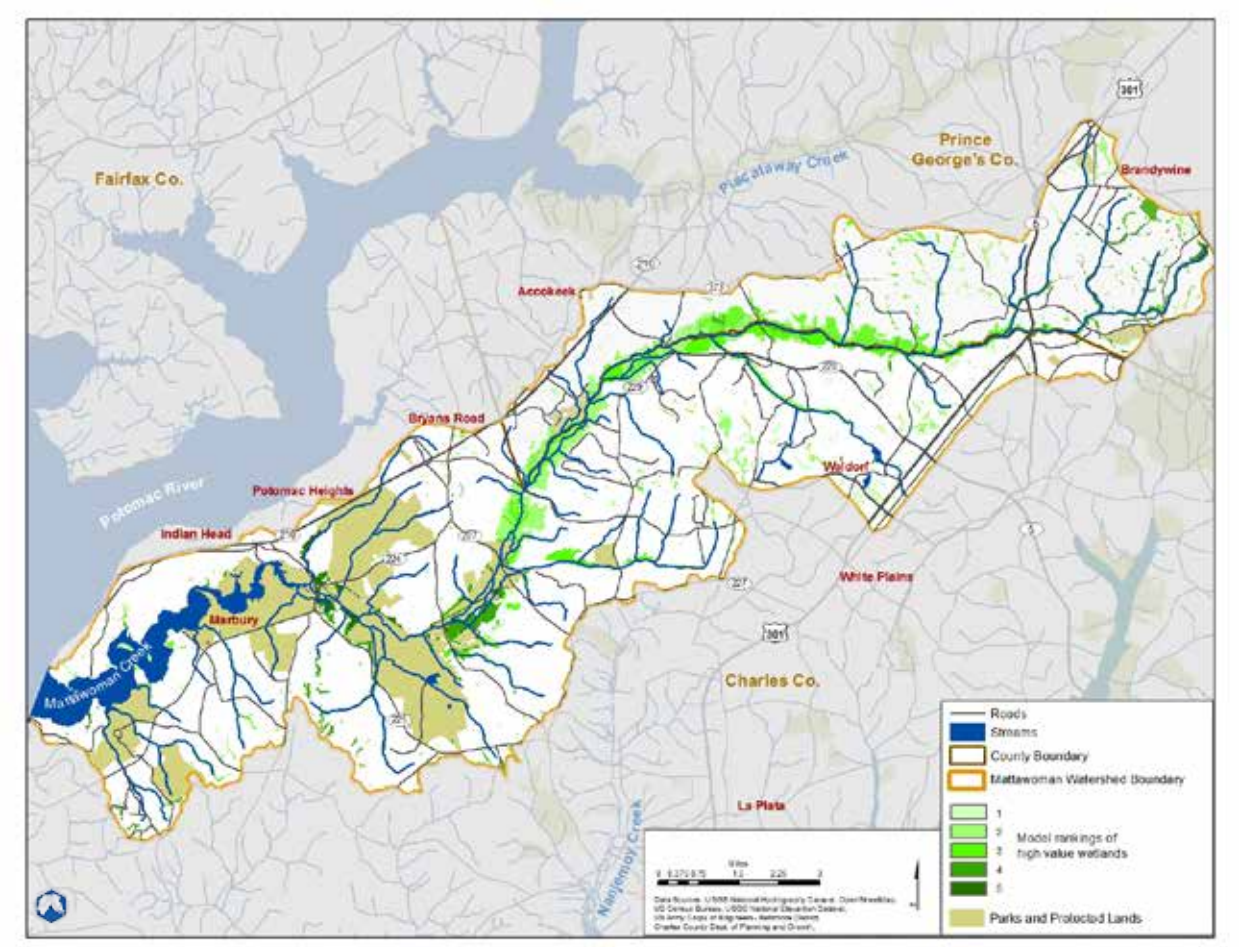

Figure 4-1. WRR rankings for wetland preservation sites in the Mattawoman watershed. (WRR - June 2011)

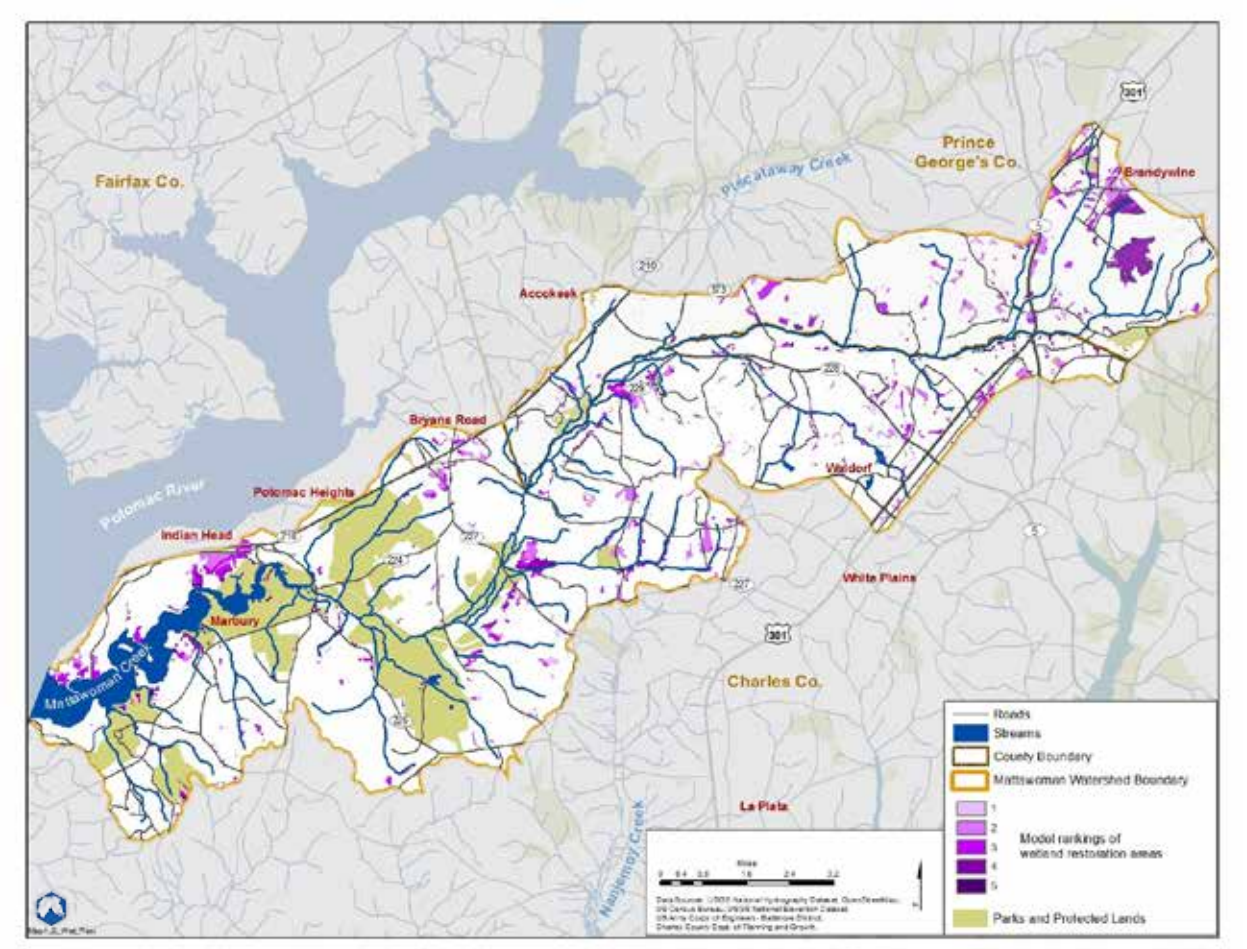

Figure 4-2. WRR rankings for wetland restoration sites in the Mattawoman watershed. (WRR - June 2011)

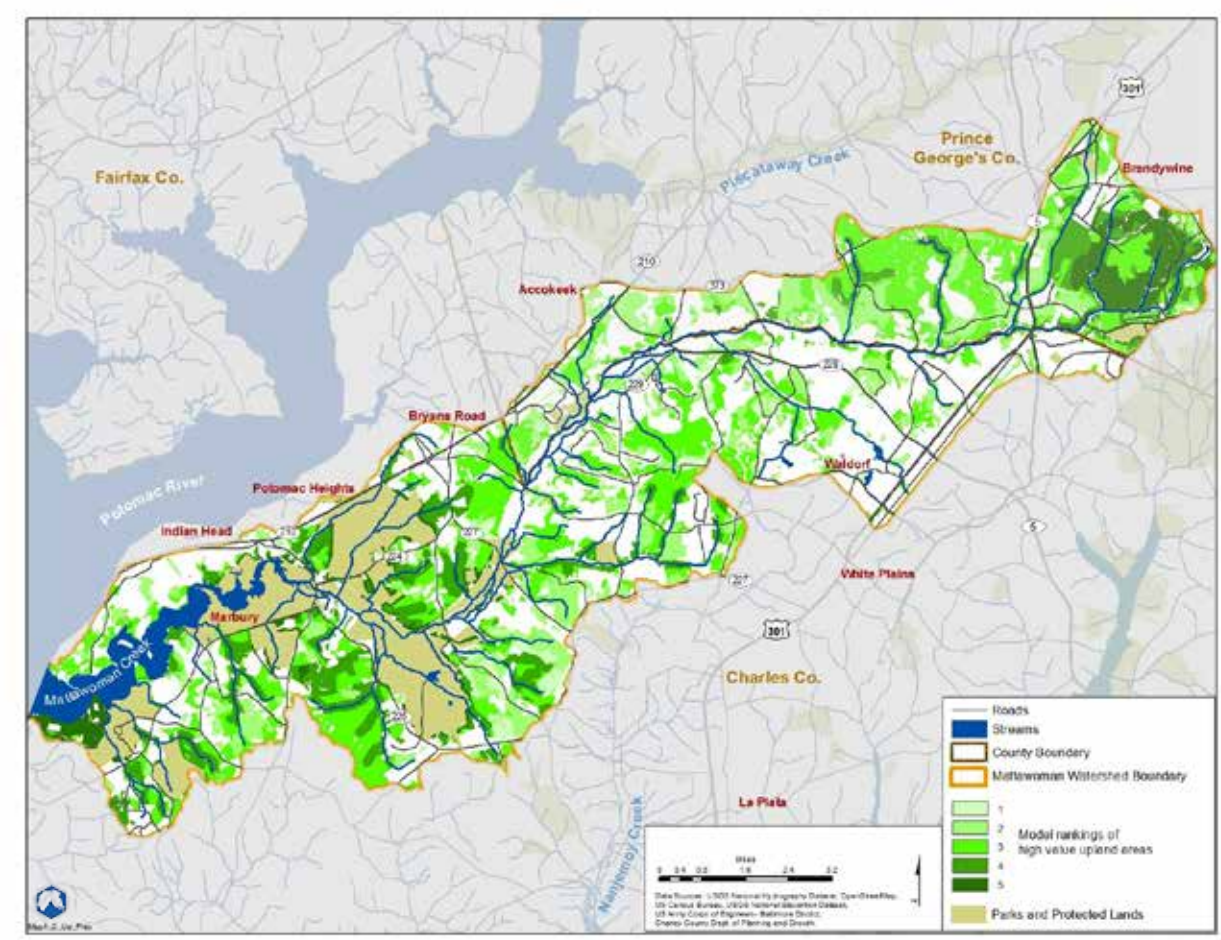

Figure 4-3. WRR rankings for upland preservation sites in the Mattawoman watershed. (WRR - June 2011)

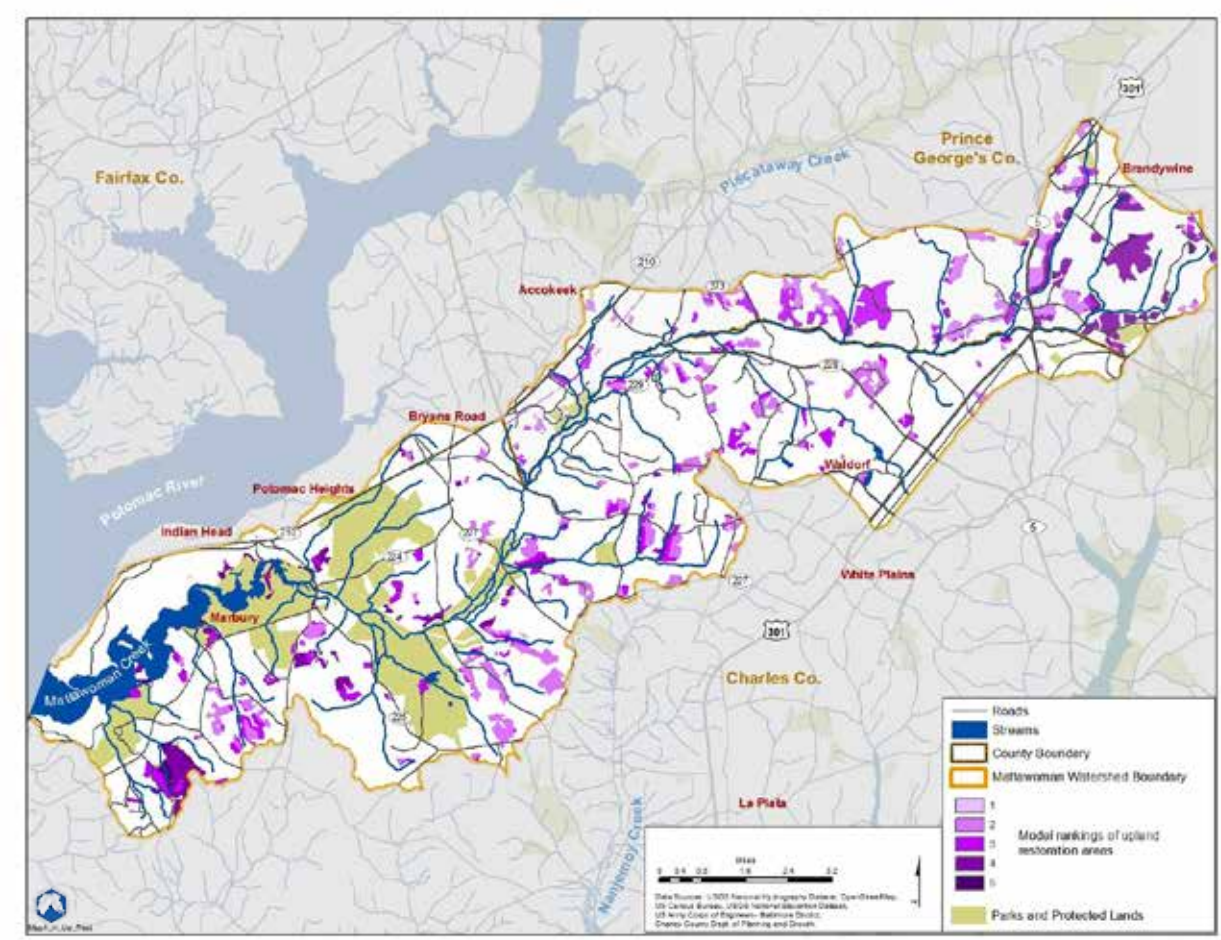

Figure 4-4. WRR rankings for upland restoration sites in the Mattawoman watershed. (WRR - June 2011)

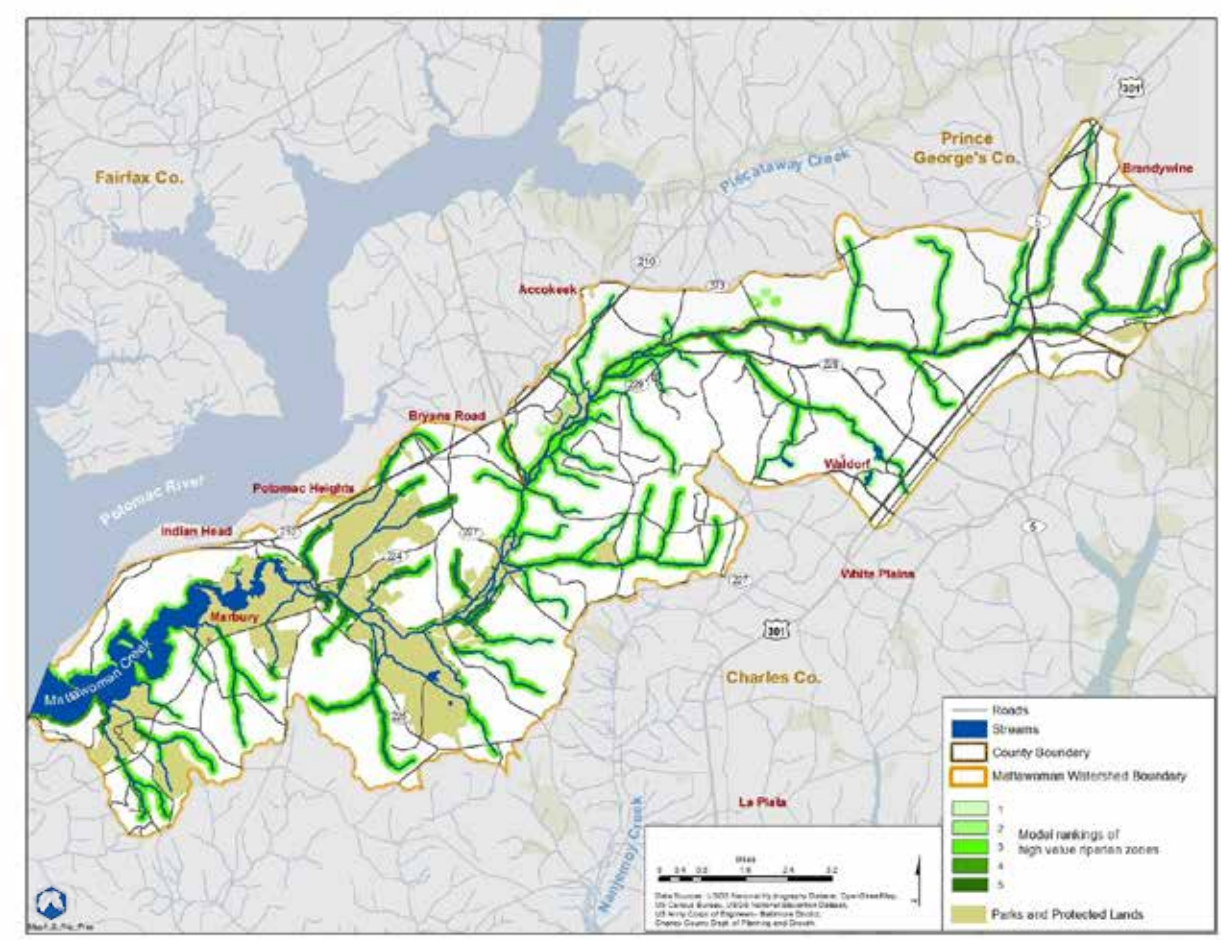

Figure 4-5. WRR rankings for riparian zone preservation sites in the Mattawoman watershed. (WRR - June 2011)

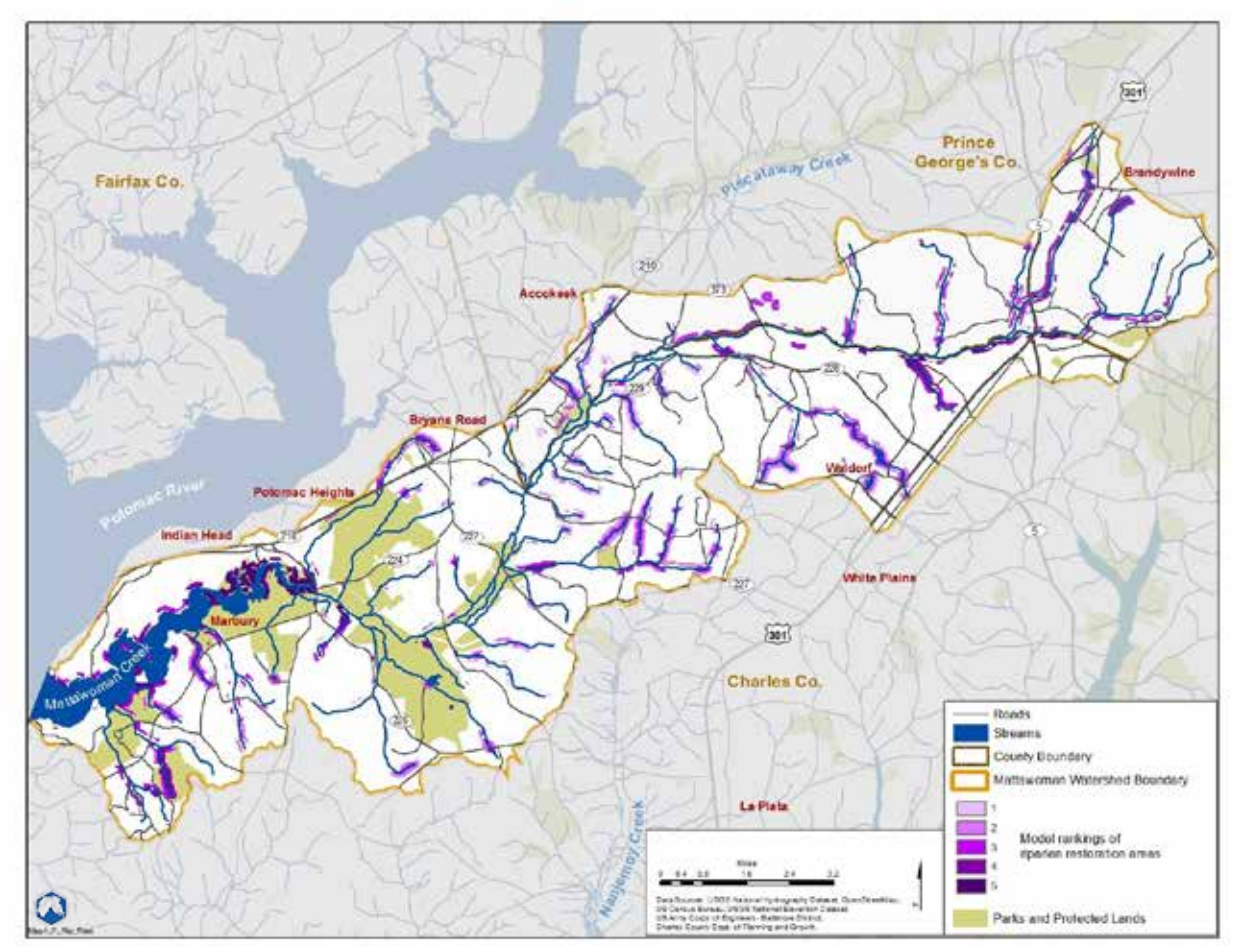

Figure 4-6. WRR rankings for riparian zone restoration sites in the Mattawoman watershed. (WRR - June 2011)

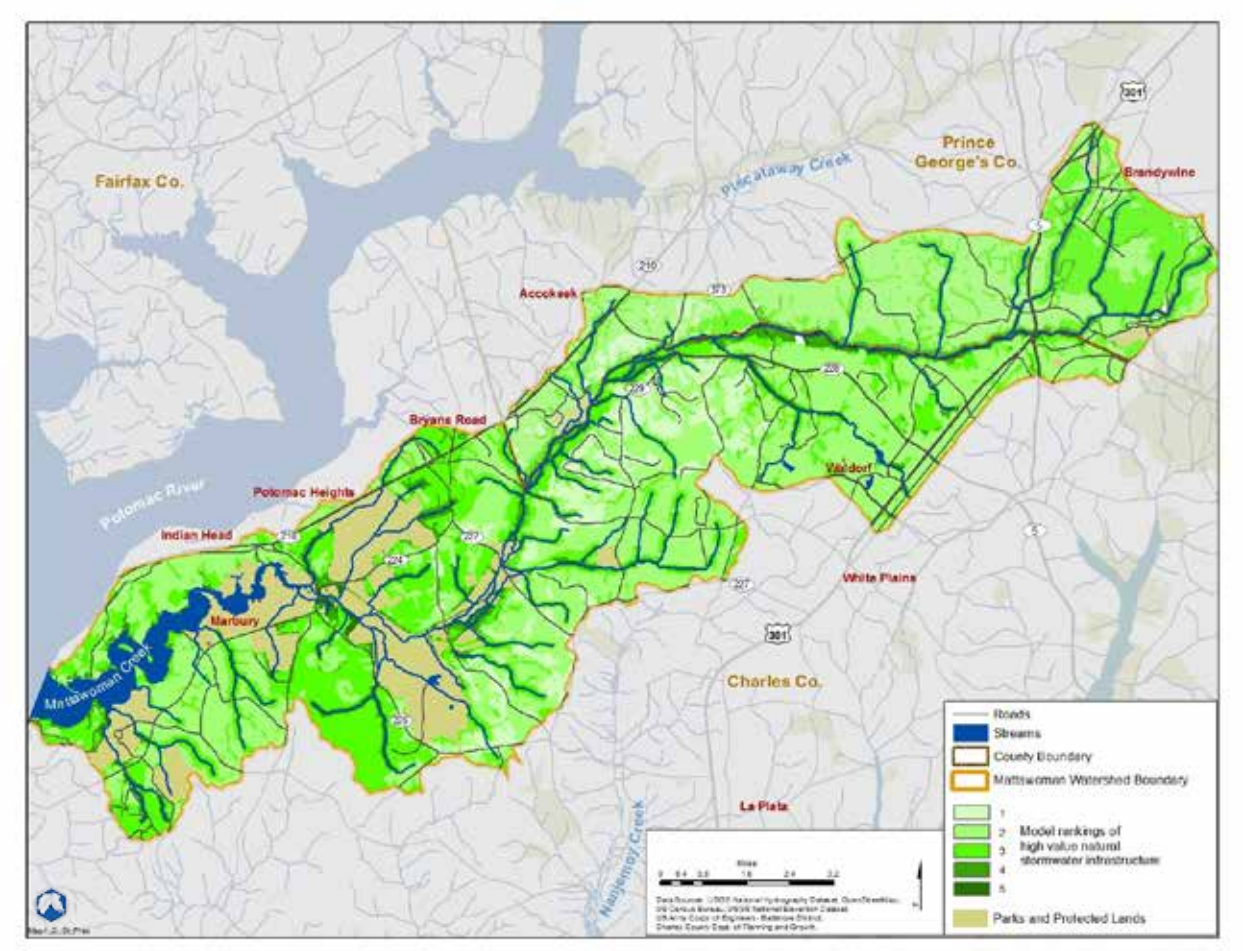

Figure 4-7. WRR rankings for natural stormwater infrastructure preservation sites in the Mattawoman watershed. (WRR - June 2011)

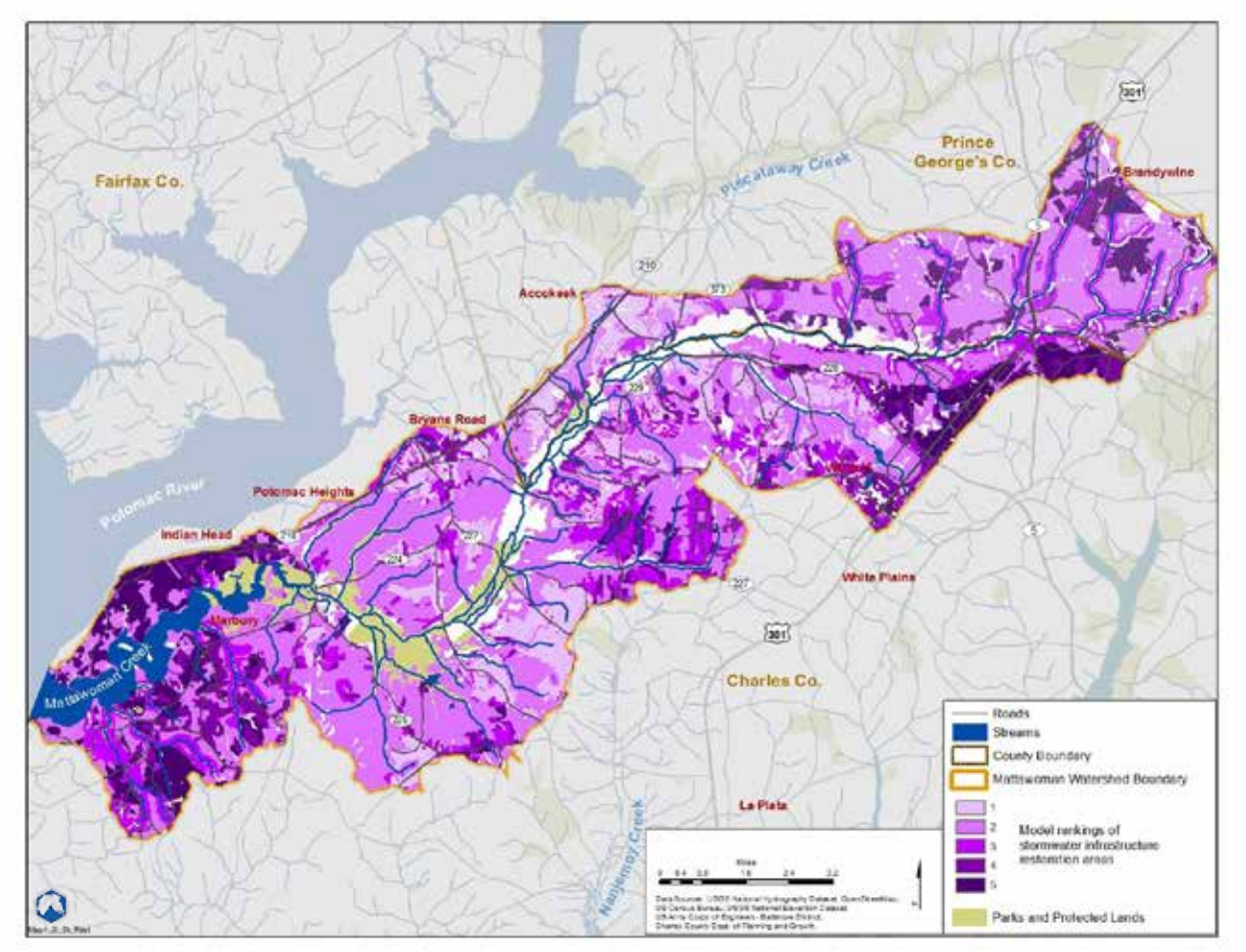

Figure 4-8. WRR rankings for compromised stormwater infrastructure restoration sites in the Mattawoman watershed. (WRR - June 2011)

4.1 Wetland Mitigation

The need to identify opportunities for wetland mitigation using the watershed approach was one of the initial forces behind the development of the Watershed Resources Registry and its predecessor, MDE' s *Priority Areas for Wetland Restoration, Preservation, and Mitigation* (2006). This need became more critical after the 2008 Compensatory Mitigation Rule that clarified Clean Water Act 404 requirements and priorities.

This rule re-emphasized the requirement to first avoid environmental impacts, then minimize them, and lastly, compensate for unavoidable impacts through mitigation projects. The rule focused on requirements for compensatory mitigation and clarified those for starting and using mitigation banks for compensation.

Clean Water Act Section 404

As discussed in Section 3.1.2.1.5, Section 404 of the Clean Water Act regulates the discharge of dredged or fill materials into U.S. waters, including wetlands. When required, sites and projects that meet identified watershed needs are to take priority as mitigation sites. All in all, this new approach weighs watershed needs over small, on-site mitigation projects.

The 2008 rule also facilitated mitigation banking. The rule allows them to be used for all permitted impacts. Because banks tend to be larger and run by an organization invested in its success, results are often better.

In response to this change, MDE's Wetland and Waterways Program is updating its policies for using the In-lieu Fee program that allows a permitee to pay into a fund for mitigation instead of conducting their own mitigation project. A Compensation Planning Framework is under development by MDE and will be provided to the Army Corps of Engineers for review. Per federal regulations, the framework must include:[151]

> (i) The geographic service area(s), including a watershed-based rationale for the delineation of each service area;
>
> (ii) A description of the threats to aquatic resources in the service area(s), including how the in-lieu fee program will help offset impacts resulting from those threats;
>
> (iii) An analysis of historic aquatic resource loss in the service area(s);
>
> (iv) An analysis of current aquatic resource conditions in the service area(s), supported by an appropriate level of field documentation;
>
> (v) A statement of aquatic resource goals and objectives for each service area, including a description of the general amounts, types and locations of aquatic resources the program will seek to provide;
>
> (vi) A prioritization strategy for selecting and implementing compensatory mitigation activities;
>
> (vii) An explanation of how any preservation objectives identified in paragraph (c)(2)(v) of this section and addressed in the prioritization strategy in paragraph (c)(2)(vi) satisfy the criteria for use of preservation in § 332.3(h);
>
> (viii) A description of any public and private stakeholder involvement in plan development and implementation, including, where appropriate, coordination with federal, state, tribal and local aquatic resource management and regulatory authorities;
>
> (ix) A description of the long-term protection and management strategies for activities conducted by the in-lieu fee program sponsor;
>
> (x) A strategy for periodic evaluation and reporting on the progress of the program in achieving the goals and objectives in paragraph (c)(2)(v) of this section, including a process for revising the planning framework as necessary; and
>
> (xi) Any other information deemed necessary for effective compensation planning by the district engineer.

[151] Code of Federal Regulations. "Mitigation banks and in-lieu fee programs." Title 33, Chapter II, Part 332.8. <http://www.access.gpo.gov/nara/cfr/waisidx_10/33cfr332_10.html> Accessed May 3, 2011.

The WRR is one of the tools being incorporated into the state's plan for meeting this requirement. The tool is well suited to identify and prioritize restoration projects using the watershed approach and has already engaged federal, state, and local stakeholders in the process.

To comply with the 2008 rule, the WRR was designed to more heavily weight factors that account for needs in a given watershed. For instance, in the wetland restoration analysis, points are given to sites near a 303(d) listed stream and to those watersheds designated by MDE's Non-point Source Program as a Biological Restoration Initiative priority. Both of these indicate a restoration need within a watershed. Because the WRR ranks sites that meet more priorities higher than others, its results can be viewed as a watershed plan that prioritizes sites for project implementation.

MDE's 2006 document, *Prioritizing Areas for Wetland Restoration, Preservation, and Mitigation*, and associated rankings also provide these results.

Figure 4-9 illustrates one way potential mitigation sites can be identified using the WRR. The map shows large parcels (greater than five acres) in the Mattawoman watershed identified as opportunity sites for wetland preservation and restoration. The map contains small sites as well.

Both the GIS and online versions of the WRR can be used to search for a specific size and/or rank of a site. This allows a user to identify sites that meet certain project requirements.

To achieve added watershed benefits, wetland mitigation sites can be selected that meet other needs such as stormwater management (see Figure 4-30 below for an example).

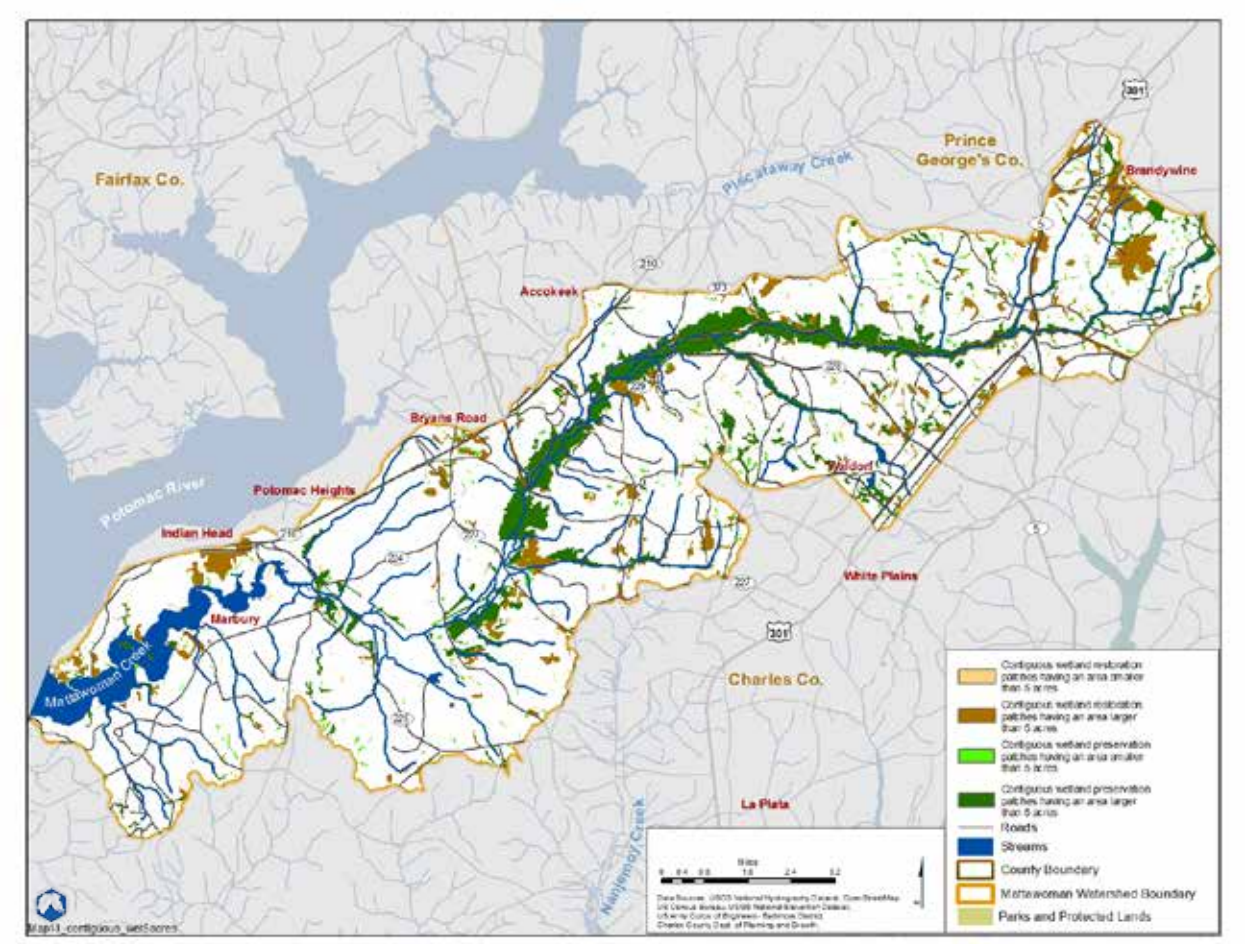

Figure 4-9. Wetland preservation and restoration opportunities by size (larger than five acres; smaller than five acres). (WRR - June 2011)

Mitigation for Highway Projects

New highway projects are often contentious given the associated development and environmental impacts they bring. Building highways requires the involvement of many federal, state, and local agencies, as well as non-governmental stakeholders.

Both the Federal Highway Administration and the Maryland State Highway Administration are involved in large projects in Maryland, the impacts of which must be mitigated. Quick identification of potential mitigation sites would provide significant benefits to both agencies.

The WRR allows the agencies to not only easily identify sites, but also to identify sites that are known priorities to the agencies that regulate their activities. The hope is that the WRR will improve identification of better mitigation sites and make the site selection process easier for all the stakeholders involved.

To illustrate how the WRR can be used for an individual project, the proposed Cross County Connector is used as an example. According to documents submitted to MDE by Charles County, the proposed alignment would require 11.44 acres of wetland mitigation.[152] Figure 4-10 shows the largest contiguous areas for wetland restoration in the Charles County portion of the Mattawoman. Figure 4-11 shows the highest value wetland restoration areas (rank of three, four, or five) by area in the vicinity of the proposed Cross County Connector.

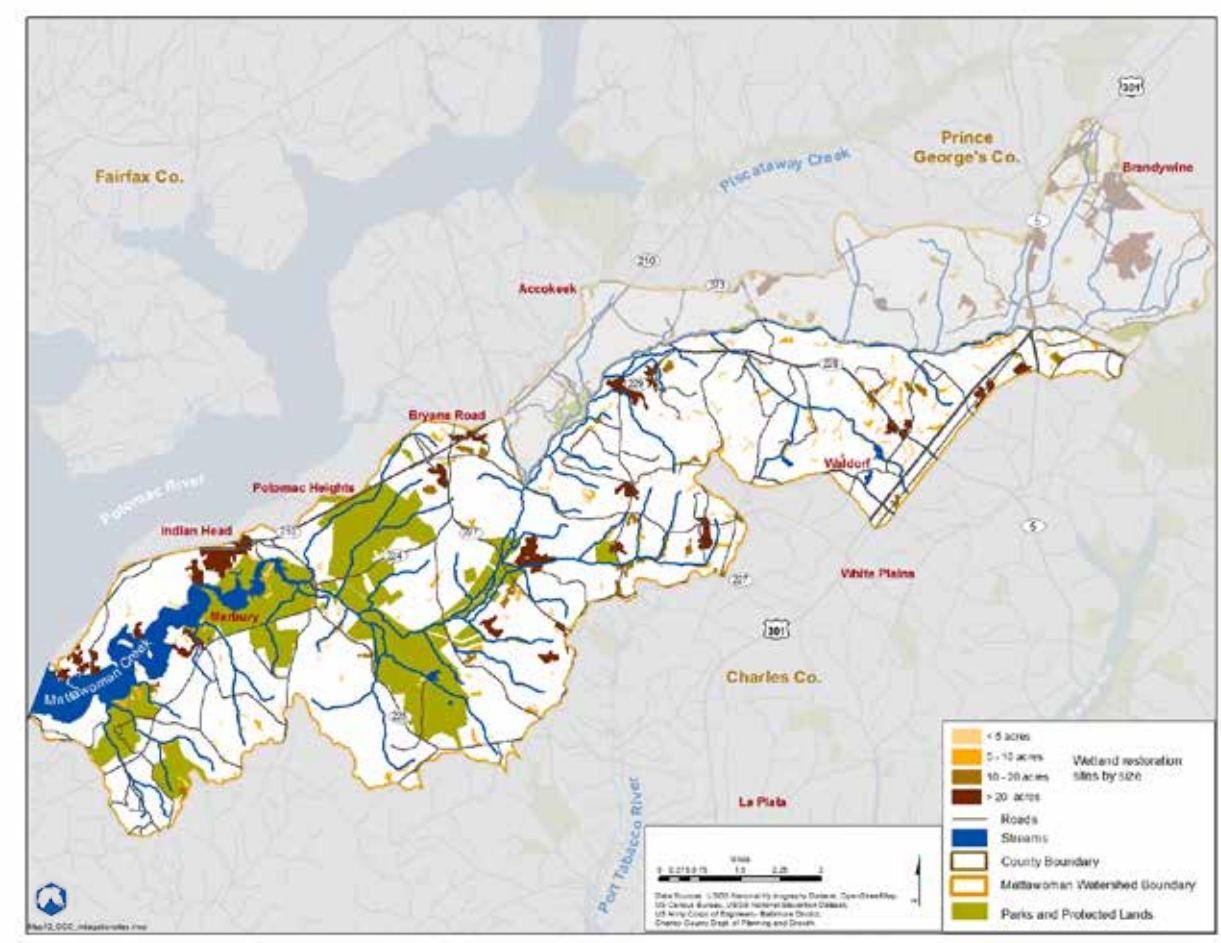

Figure 4-10. Wetland restoration opportunities (rank one through five) in the Charles County portion of the Mattawoman Creek watershed ordered by size. (WRR - June 2011)

One limitation in using only these maps is that many off-site mitigation projects are still creation, rather than restoration. The WRR tool does not identify such opportunity sites. Priorities described in text documents, such as MDE's 2006 prioritization document, will remain critical to the mitigation process.

[152] Neff, Kelly. Maryland Department of the Environment. Personal communication. February 16, 2011.

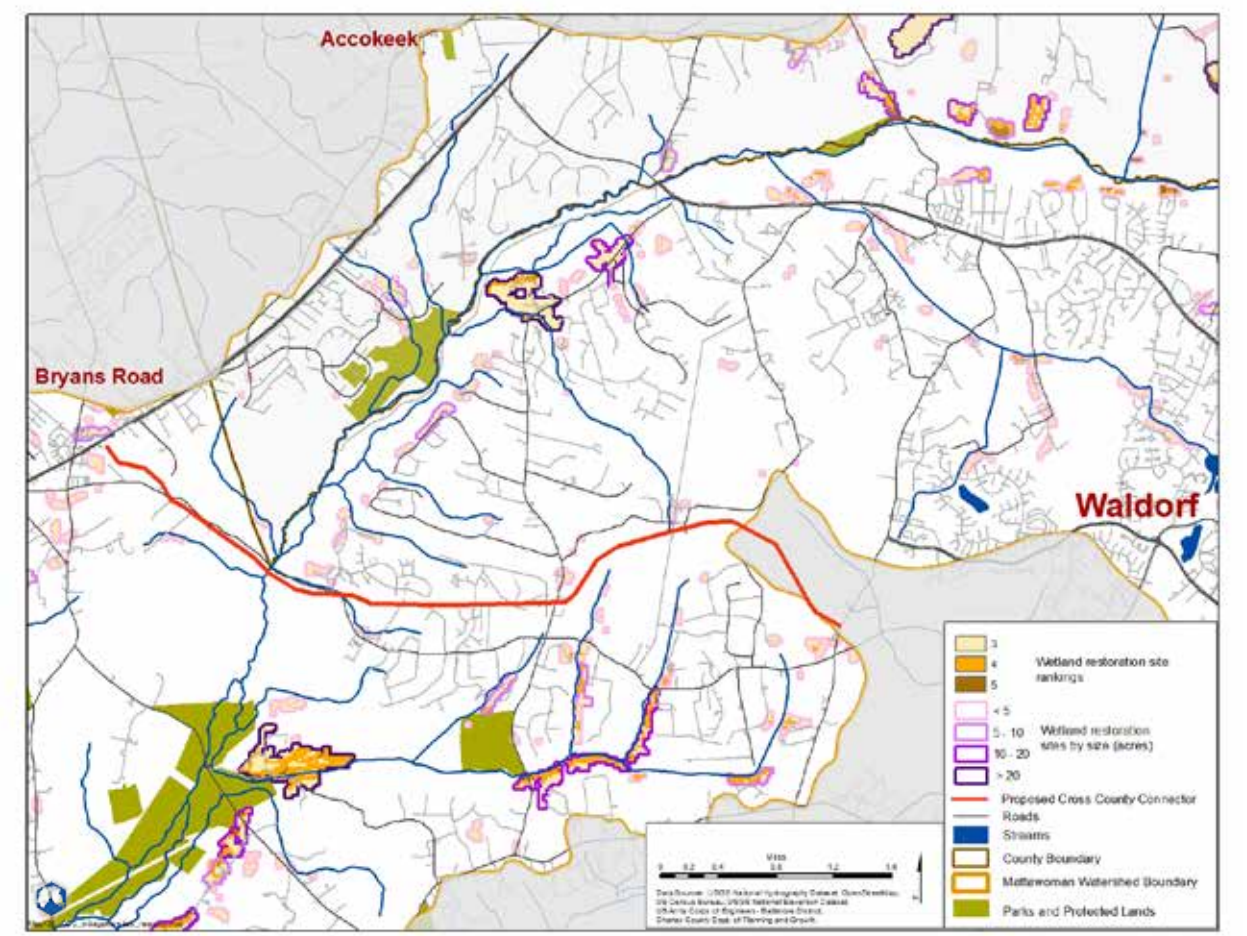

Figure 4-11. Wetland restoration opportunities near the proposed Cross County Connector, by rank and size. (WRR - June 2011)

Maps similar to Figure 4-11, which use information not included in the opportunity analyses or not provided in the WRR's online version, require the use of GIS software. Specifically, for the map above, MDE provided the GIS file for the proposed Cross County Connector. The rank and size information is available in the online version, though would be displayed differently than it is seen here.

MDE Phase I Mitigation Plan

The WRR could be used in conjunction with other tools to meet the site identification requirements for a MDE Phase I mitigation plan. Phase I plans are submitted with the Wetlands and Waterways permit application to MDE for initial review. These plans must cover four items:[153]

[153] Maryland Department of the Environment. "Phase I Mitigation Plan – Required Information." Received from Kelly Neff, Wetland and Waterways Program. January 4, 2011.

1. A written description of the type and acreage of the proposed nontidal wetland loss, including the types of wetland plant communities and the associated dominant species in the existing wetland, the amount (in square feet) of wetlands that will be lost due to the permitted activity, and the functions that the existing wetland presently provides.

2. A location map and description of the proposed wetland mitigation project(s) and how they will replace proposed nontidal wetland losses in acreage and function.

3. A description of the mitigation site selection process and a justification for the selection of the proposed mitigation site.

4. A draft copy of the selected protection mechanism(s) to be used for each mitigation site.

5. Additional information that must be considered:

   Does the proposed mitigation site contain any Rare Threatened and Endangered species?

   Does the proposed mitigation site contain any Maryland Historical Trust concerns?

   Will the proposed mitigation site impact waterways or floodplains? If so, you will have to get authorization to impact these resources.

   Has the applicant secured a bond or other financial assurance PRIOR to permit issuance?

The WRR wetland restoration and preservation analyses can be used to address parts of items two and three of the requirements. The WRR's online tool allows a user to select sites and print out maps directly from the website. This may reduce the amount of time and effort required to submit these plans.

An added benefit to using the WRR for this process is that MDE helped design the registry. Therefore, the agency understands the tool's ranking system and is invested in its use. MDE plans to prepare clarifying guidance on how to present WRR information as part of Phase I plans.[154]

4.2 Conservation of Land and Water Resources

The WRR can assist organizations deciding where to spend time and money on conservation projects. It can be especially useful for identifying sites that meet multiple goals (i.e. habitat protection and improved water quality), and thus efficiently use limited funds.

Government agencies and non-governmental organizations are both likely to use the WRR for these purposes to meet both regulatory and non-regulatory needs. Interested non-governmental organizations could include land conservancies and environmental groups.

Priority Conservation Site Identification

Organizations conduct conservation activities for a variety of reasons. Some may strictly value resource conservation; others may be interested in the environmental benefits from conservation, such as water quality benefits from a restored wetland; and some may only be interested because of a legal requirement.

[154] Clearwater, Denise. Maryland Department of the Environment. Personal communication. June 24, 2011.

Regardless of the impetus for conservation, the WRR can identify sites that have the potential to meet these needs and that inherently meet multiple environmental goals. All eight opportunity analyses include factors for environmental needs and priorities in their scoring.

To do this, the WRR can simply be used to identify preservation and restoration sites in a given watershed. These results for the Mattawoman are shown above in Figure 4-1 through Figure 4-8. (Refer to Table 1-1 for the layers used in the WRR and the information they contain, and Table 1-2 for how they were scored in each opportunity analysis).

The maps below show the highest ranking (scores of four and five) preservation and restoration areas for wetlands, uplands, and the riparian zone (Figure 4-12 and Figure 4-13). These maps could be used by land conservancies to develop strategic plans for conservation. Higher ranking sites can be viewed as priorities because they meet more factors used in the opportunity analyses.

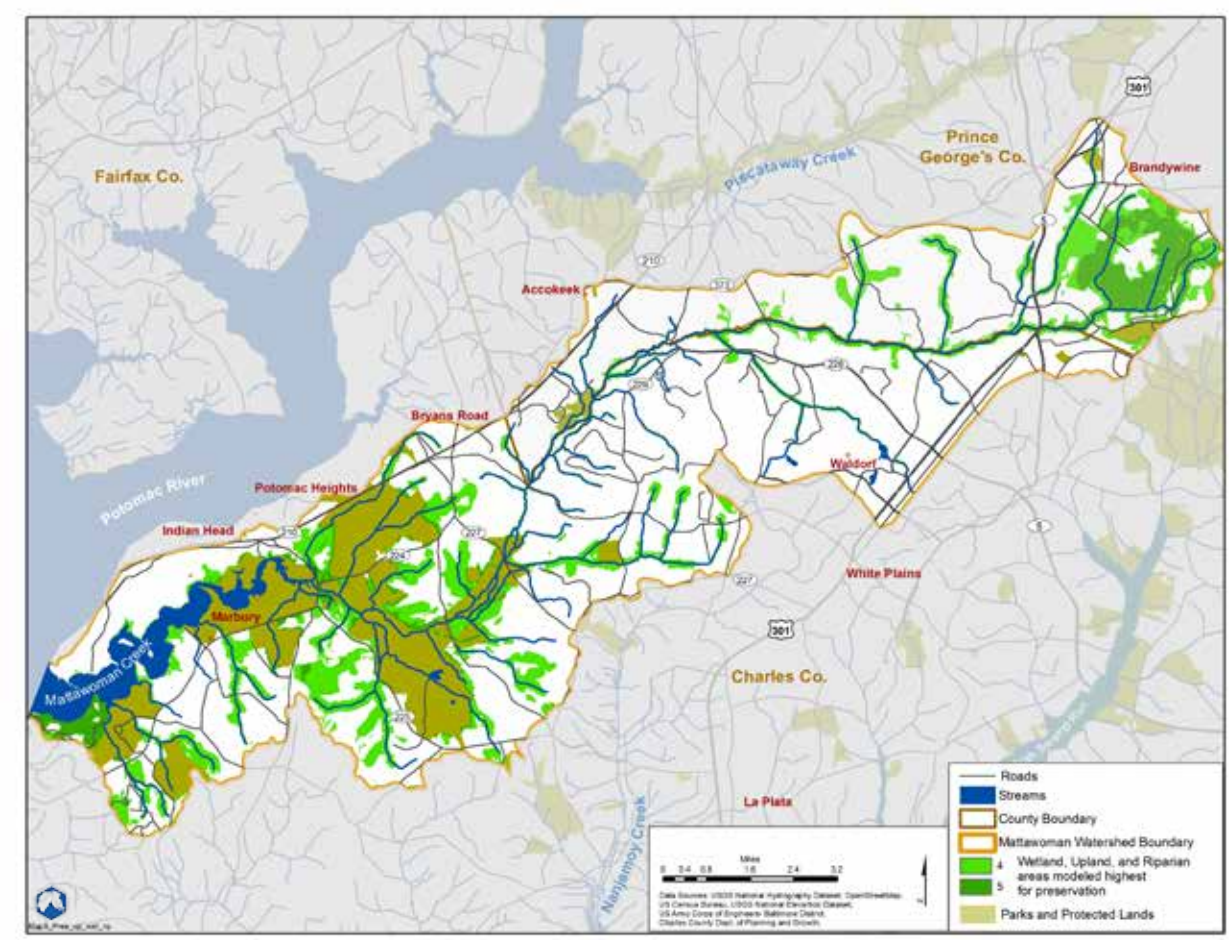

Figure 4-12. High-value wetland, upland, and riparian preservation opportunities. (WRR - June 2011)

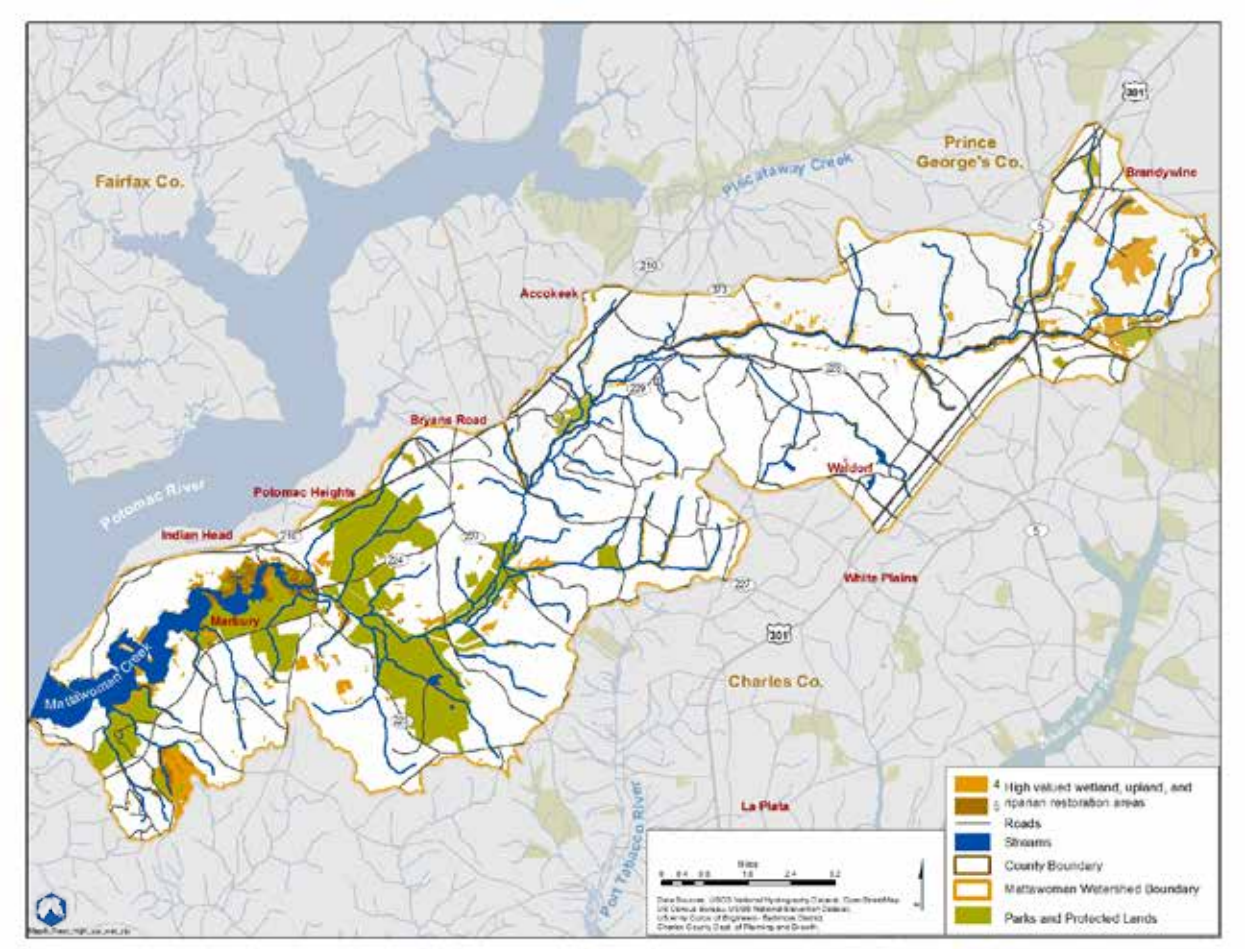

Figure 4-13. High-value wetland, upland, and riparian restoration opportunities. (WRR - June 2011)

Figure 4-12 illustrates another potential use of the WRR. Preservation sites that receive a high rank are likely to be priority areas for multiple federal and state agencies. Such high scoring areas could suggest to permit applicants that one or more agency is likely to submit comments to the regulatory agency requesting permit conditions or denial. Public access to the WRR results and agency data provide a more transparent understanding of agency priorities. This could minimize prolonged application processes by helping applicants to avoid priority areas and identify alternatives.

The information contained in the maps above can be derived from the online WRR, but cannot currently be displayed in the same way. These maps combine the sites that rank a four or a five in the wetland, upland, and riparian analyses into one visual representation. The online tool, as it stands now, allows a user to view all, but not subsets, of the ranking sites for more than one analysis. Additionally, for a specific location, a user can find out the rank of the site for each opportunity analysis.

Meeting Specific Conservation Goals

More advanced applications of the WRR can help organizations identify sites for conservation that would meet a specific goal. For instance, if an organization wanted to maximize the benefit of preserving or restoring a site, it might consider prioritizing results from the restoration and preservation analyses that are adjacent to existing protected areas (Figure 4-14). This would serve to protect larger tracts of land which are more likely to provide sustained environmental benefits.

The GIS analysis done for Figure 4-14 groups all the ranked sites for riparian, wetland, and upland preservation or restoration together and then identifies only those adjacent to existing protected land.

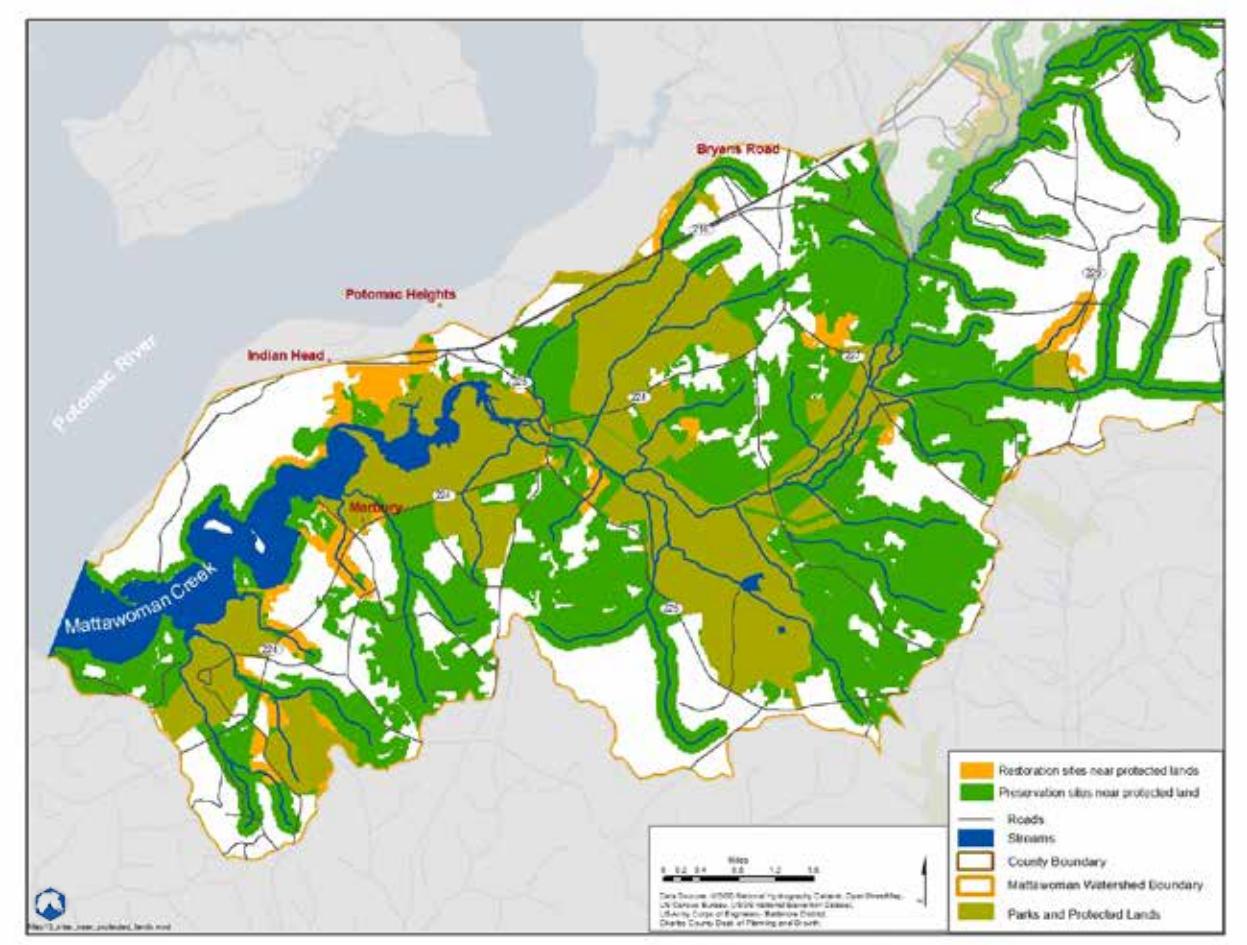

Figure 4-14. Wetland, upland, and riparian preservation and restoration opportunities adjacent to existing protected lands in the lower Mattawoman watershed. Opportunities were grouped regardless of rank to identify larger parcels connected to protected lands. (WRR - June 2011)

The WRR could similarly be used by an organization interested in expanding the Green Infrastructure network in the Mattawoman watershed. WRR results could be overlaid with the network

to identify priority areas to target (Figure 4-15). The map below shows the sites in the four preservation analyses with a rank of four or five that are also in the GI network.

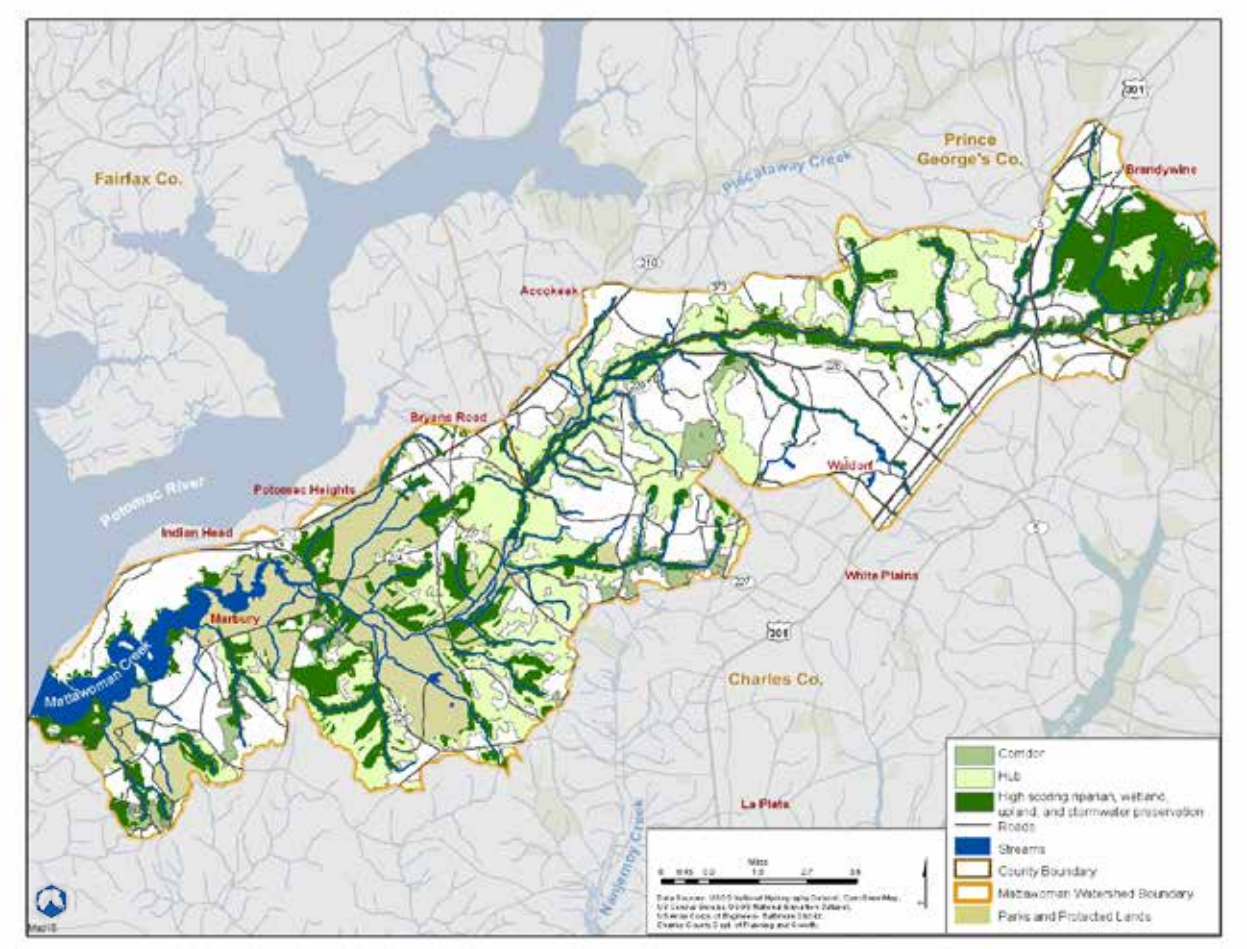

Figure 4-15. Green Infrastructure network in the Mattawoman watershed and the high-value (rank of four or five) preservation opportunities within that network. (WRR - June 2011)

The WRR could also be used by MDE's Non-point Source Program (see Section 3.2.1.1.1). The program receives funding from the EPA through Section 319 of the Clean Water Act. Maryland's program focuses on addressing non-point source pollution through watershed planning, BMP implementation, and restoration projects.

The WRR is well suited to identify potential sites for both BMP implementation and restoration projects. The WRR could be used to prioritize activities as part of a watershed plan. Figure 4-13 shows the high ranking restoration sites in riparian, wetland, and upland areas of the Mattawoman watershed. These sites could be considered for non-point source control sites in a 319 plan.

As with previous maps, similar information can be derived from the online WRR, but would not be displayed in the same way. Both protected lands and the GI network are additional layers of information that can be viewed with analysis results in the online WRR.

4.3 Local Level Planning

The WRR can also be used as a tool for county planning and other planning-related decisions.

Not all counties have staff with extensive natural resource or environmental expertise. Because the tool was developed by state and federal natural resource and environmental staff and incorporates their data, counties can make use of their knowledge. Counties can use the tool to easily identify sites for preservation and restoration projects using the online tool. More advanced applications, using the GIS version, could help inform a county's planning process.

Land Use Planning

The results from the preservation analyses could be interpreted as indentifying sites to protect from development. Figure 4-16 shows the areas in the Mattawoman watershed suitable for wetland, upland, or riparian preservation. These sites are existing ecologically healthy areas. Charles County could use this to guide comprehensive planning efforts and zoning regulations that would protect these resources. Depending on the county's needs, preservation sites could be narrowed down by selecting only higher ranking sites.

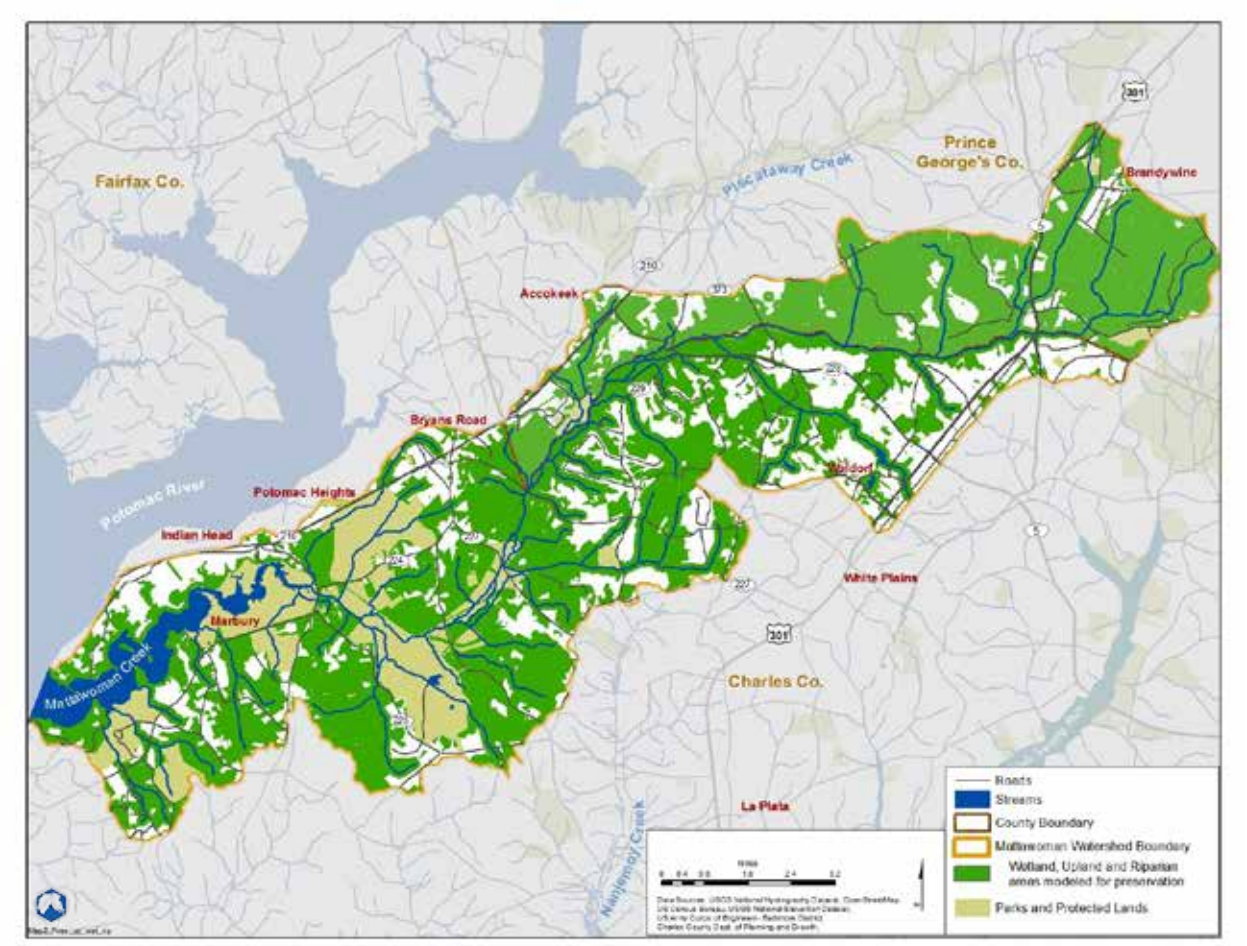

Figure 4-16. Wetland, riparian, and/or upland preservation opportunity areas in the Mattawoman watershed of any rank (one through five). (WRR - June 2011)

The current boundaries of the Charles County Development District were determined based on the location of sewer lines that drain to the Mattawoman Wastewater Treatment Plant. There is merit in this method, especially when considering that a wastewater treatment is a main component in maintaining healthy waters as described in the Chesapeake Bay TMDL Phase II Watershed Implementation plan.

A more discerning method for determining boundaries of the Development District would include natural resource and transportation considerations. Figure 4-17 identifies the top preservation opportunities in the county's current Development District. In this map, preservation opportunities are ranked by the cumulative score received across the four preservation analyses.

This type of analysis is currently not available using the online WRR.

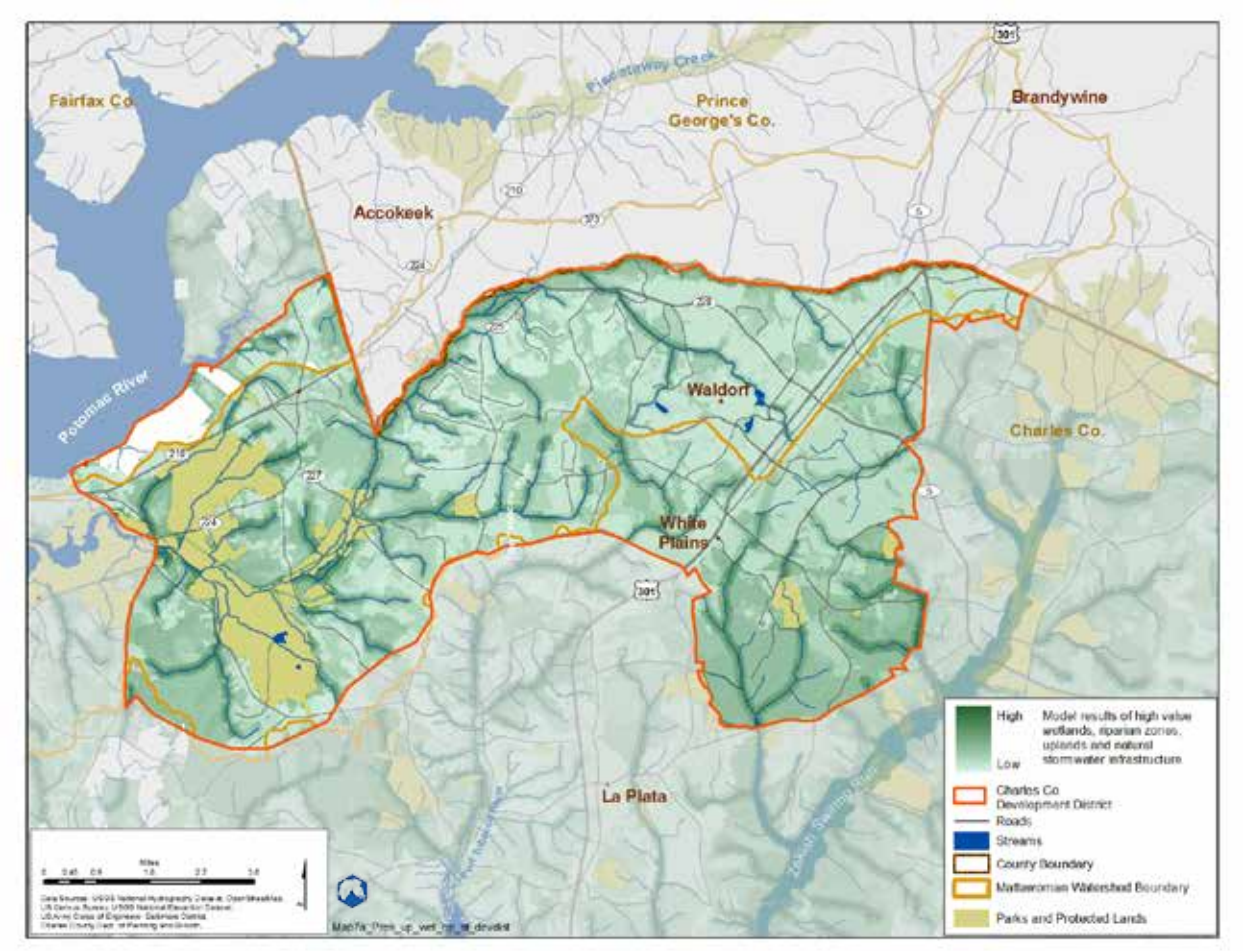

Figure 4-17. Preservation opportunities in the Charles County Development District. Scores from the four preservation analyses were summed at each location to get a cumulative preservation value. (WRR - June 2011)

This map also serves as an example of how the WRR can support the EPA's Healthy Watersheds Initiative (Section 3.1.2.2). This program aims to protect healthy watersheds facing development pressure. Combining the WRR with local planning information can easily identify areas in need of protection.

Transferable Development Rights

Another potential use of the WRR in Charles County is the development of a Transferable Development Rights program targeting priority natural resource areas in the Mattawoman. As discussed in Section 3.3.2.1, the county's existing program exclusively targets agricultural preservation. Because environmental concerns are only one factor in planning decisions, Charles County would have to decide how to interpret and use this information given their unique circumstances.

Figure 4-18 shows wetland, upland, and riparian preservation opportunities that received a rank of four or five. These areas could act as sending zones for the TDR program. This would result in these areas being zoned at a lower density.

Receiving zones could potentially be identified as areas that were deemed unsuitable for preservation by the WRR in the Development District. Figure 4-19 shows the sites unsuitable across the wetland, upland, and riparian preservation opportunity analyses.

The stormwater preservation analysis was not included in this scenario because the resulting opportunities cover the majority of the watershed. Omitting it allowed for differentiation of suitable sites.

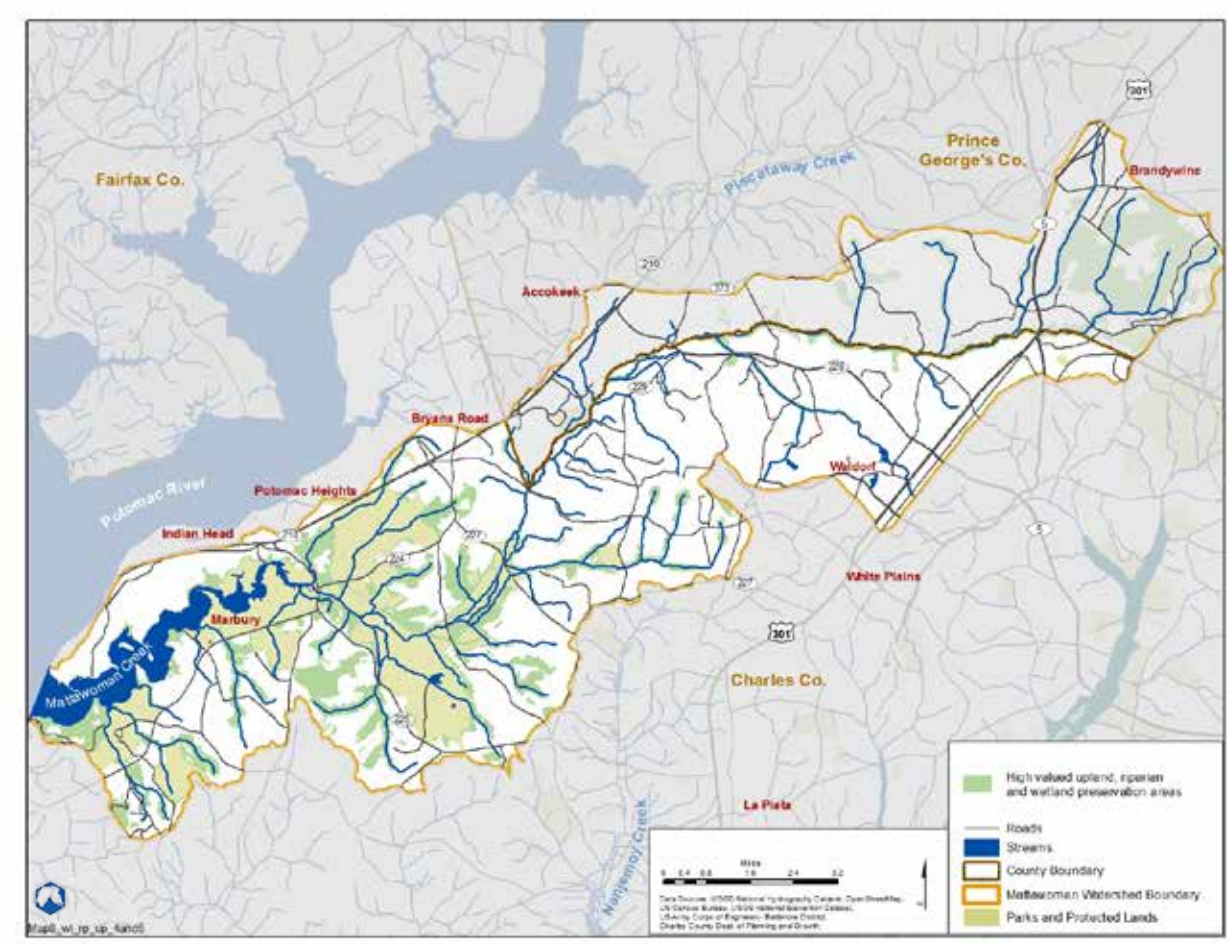

Figure 4-18. High priority (rank four or five) wetland, upland, riparian preservation opportunities in the Charles County portion of the Mattawoman watershed. These sites could be used for a natural resource-focused TDR program as sending zones. (WRR - June 2011)

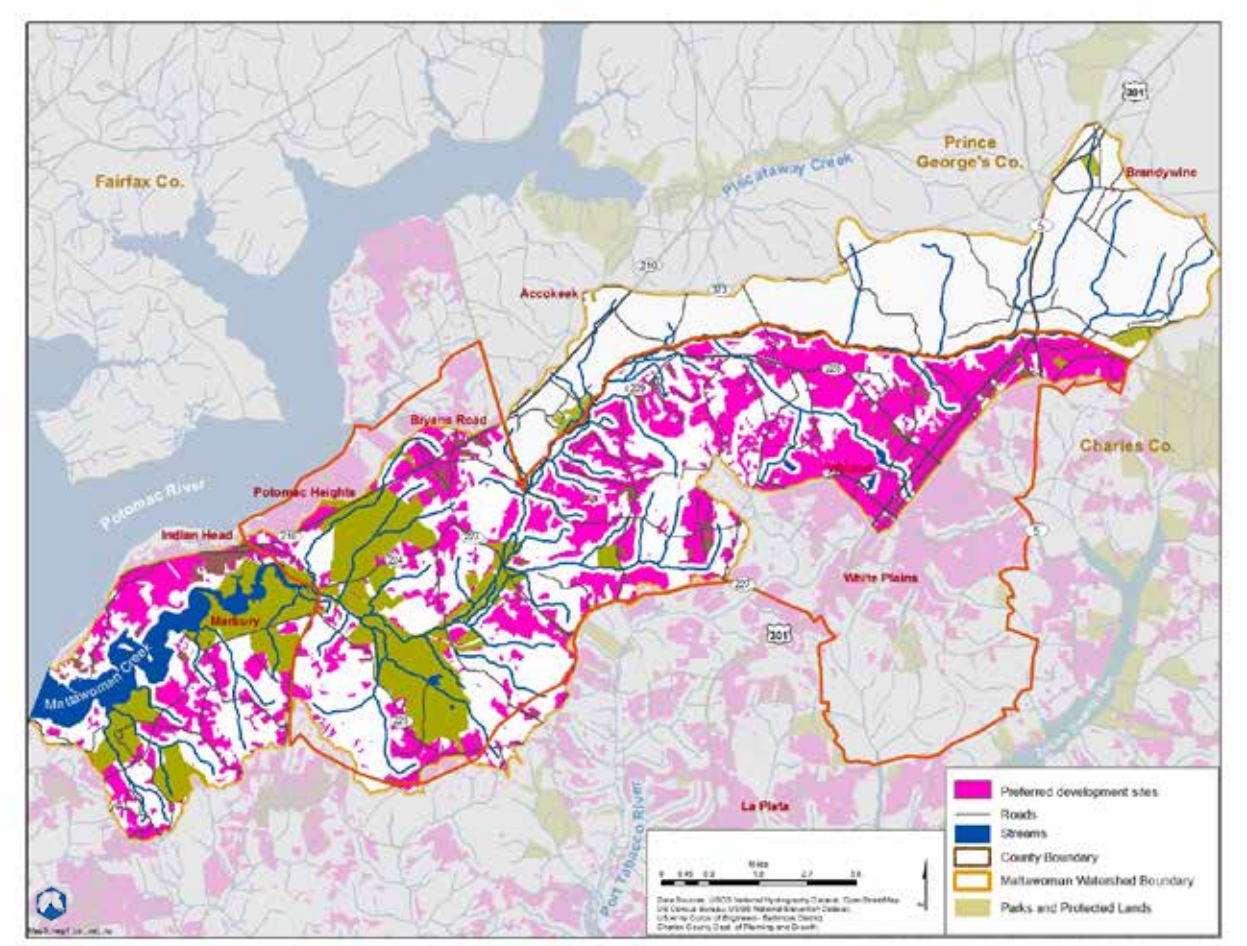

Figure 4-19. Sites in Charles County deemed unsuitable for wetland, riparian, and upland preservation. Sites are unsuitable for all three analyses. Sites unsuitable for one or two of the analyses are not shown. These sites could be used as the basis for TDR receiving zones. (WRR - June 2011)

Natural Resource Protection

In addition to land use planning purposes, the WRR could inform how Charles County protects its natural resources. For instance, the county could choose to expand its existing Resource Protection Zone (Figure 4-20). The RPZ is an overlay zone in the county that limits development to protect stream valley habitat and water quality (Charles County zoning is discussed in Section 3.3.2.1). Expanding the RPZ would ensure the protection of priority natural resources and support efforts to protect water quality.

Figure 4-20 shows the sites ranked as a four or a five in the any of the four preservation opportunity analyses which are not currently protected by the RPZ.

The RPZ GIS file was provided by the Charles County Planning Division. A county with access to the WRR GIS files could easily reproduce this analysis.

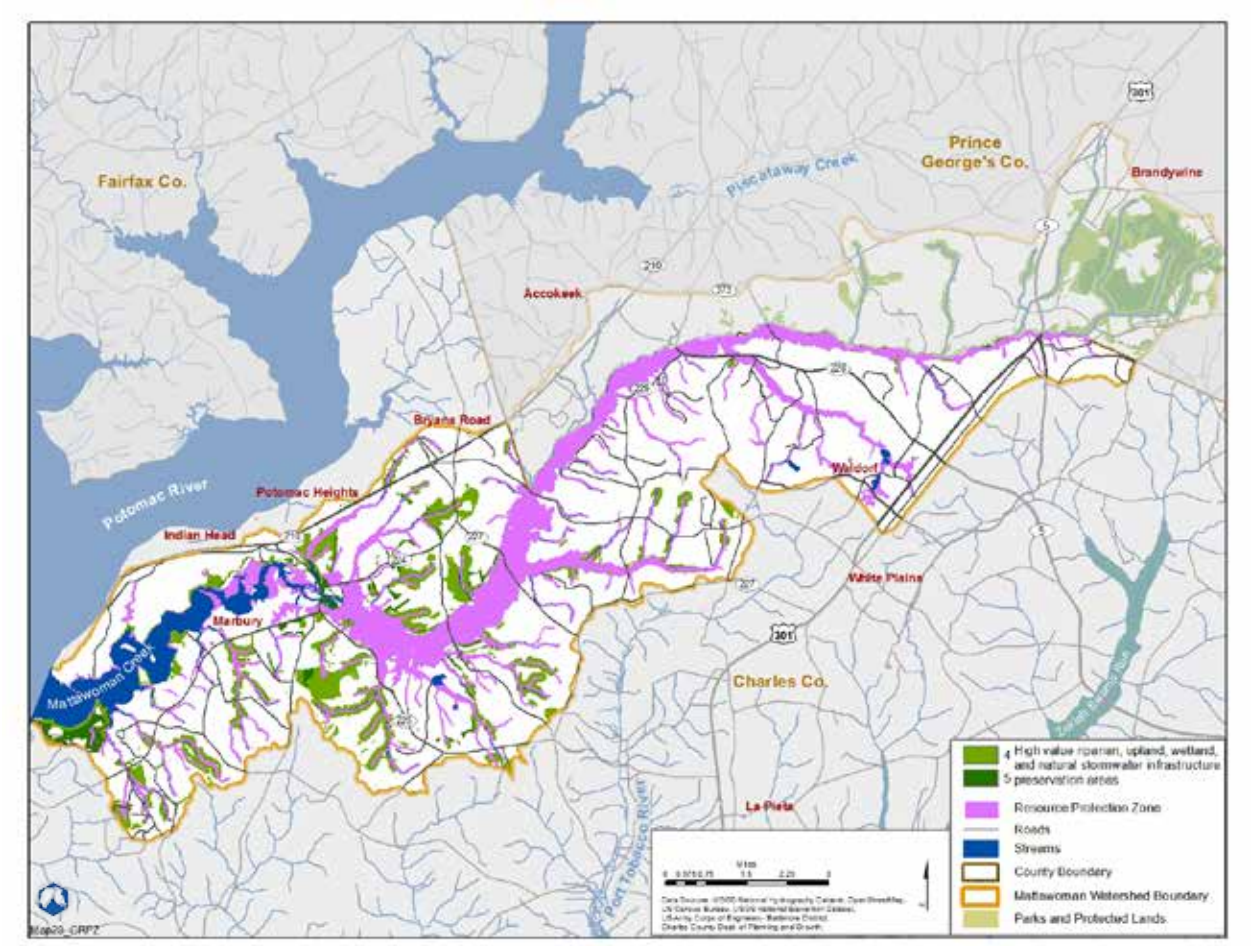

Figure 4-20. High-value (rank four or five) preservation opportunities in the Mattawoman watershed that could be added to the existing Resource Protection Zone in Charles County. (WRR - June 2011)

For many years, one of the county's goals has been to identify land for an open space network. This has been discussed in the county's Comprehensive Plan; Land Preservation, Parks, and Recreation Plan; and the Waldorf Sub-Area Plan. Figure 4-21 shows contiguous preservation opportunities and highlights sites that are suitable for two or more preservation analyses. These sites could be the starting place to achieve such a network through easements and the efforts of land conservancies.

It is important to consider that even if land is currently preserved, it may still encounter adverse impacts from adjacent land uses. These impacts are not considered in the current version of the WRR. This could be accounted for in zoning and ordinance decisions and other natural resource protection measures.

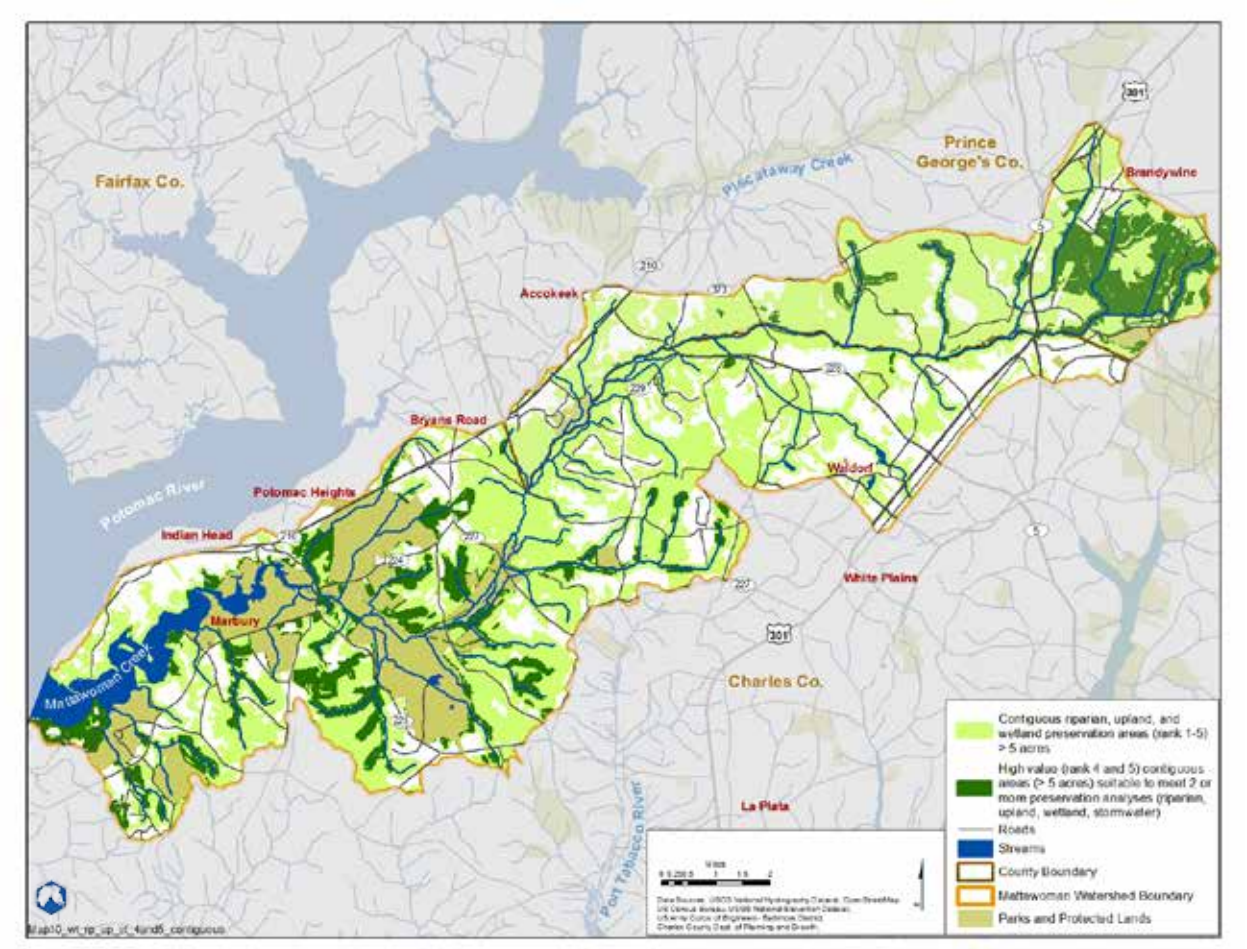

Figure 4-21. Contiguous preservation opportunities that could serve as the basis for an open space network in the Mattawoman watershed. (WRR - June 2011)

In this section, similar information as that presented in Figure 4-16, Figure 4-18, and Figure 4-19 could be derived from the online WRR. Figure 4-17 and Figure 4-20 use information specific to Charles County and require GIS software. Figure 4-21 also requires the use of GIS software to identify contiguous areas, suitable in more than one analysis.

4.4 Stormwater Management

Stormwater management is addressed by two analyses in the Watershed Resources Registry.

Preserving Natural Stormwater Infrastructure identifies sites where natural conditions support infiltration or reduce overland flow and where implementing BMPs would help maintain healthy watershed conditions. Factors that indicate healthy watersheds, such as DNR's Stronghold Watershed designation, are also included in the ranking of sites.

The Restoring Compromised Stormwater Infrastructure opportunity analysis focuses on developed areas in watersheds where there is not likely to be stormwater controls or where they are likely to be insufficient. Sites identified in this scenario could benefit from BMPs that would improve water quality.

Clean Water Act Section 402 and Maryland's 2007 Stormwater Management Act specify how to manage stormwater resulting from construction and municipal separate storm sewer systems. Maryland's stormwater regulations require the implementation of environmental site design to the maximum extent practical (discussed in Section 3.2.1.2.2). Basically, ESD means using smaller, non-structural techniques to design projects in a way that does not generate additional runoff.

The WRR is not well suited to locate areas for some of these techniques because of the scale of the analysis. At the same time, it could assist with some of the larger options suggested by MDE. These include directing sheetflow to conservation areas, protecting natural resources, and constructing vegetated swales.

If ESD is not sufficient, larger off-site projects can be considered as options. The WRR could be used to identify such sites.

Use by the Maryland State Highway Administration

The WRR can play a role in meeting SHA's MS4 requirements by identifying sites to handle additional stormwater runoff and for watershed restoration projects. As mentioned in Section 3.2.3.1, MDE allows SHA to administer a water quality banking program. This means SHA can protect water quality off-site, but within the same watershed as a specific highway project. The WRR could be used to identify large, contiguous, high-value sites to do this.

Given the impending requirements of the Chesapeake Bay TMDL, SHA will be required to treat a large land area to meet its water quality improvement requirements. A set of potential sites for water quality banking could by identified by the WRR, speeding up the process of identifying appropriate land areas. SHA will prioritize projects on SHA-owned land first and hopes to accumulate credits by doing extra stormwater projects on this land.[155]

Figure 4-22 shows contiguous high-value opportunities for the Restoring Compromised Stormwater Infrastructure and Preserving Natural Stormwater Infrastructure analyses. These types of sites may become important as SHA is required to do more extensive mitigation projects. The land area along highways is often limited and expensive. Going off-site to high priority areas that meet the needs of the watershed may also provide greater benefits than conducting smaller projects along a highway.

[155] Pujara, Karuna. State Highway Administration. Personal communication. February 4, 2011.

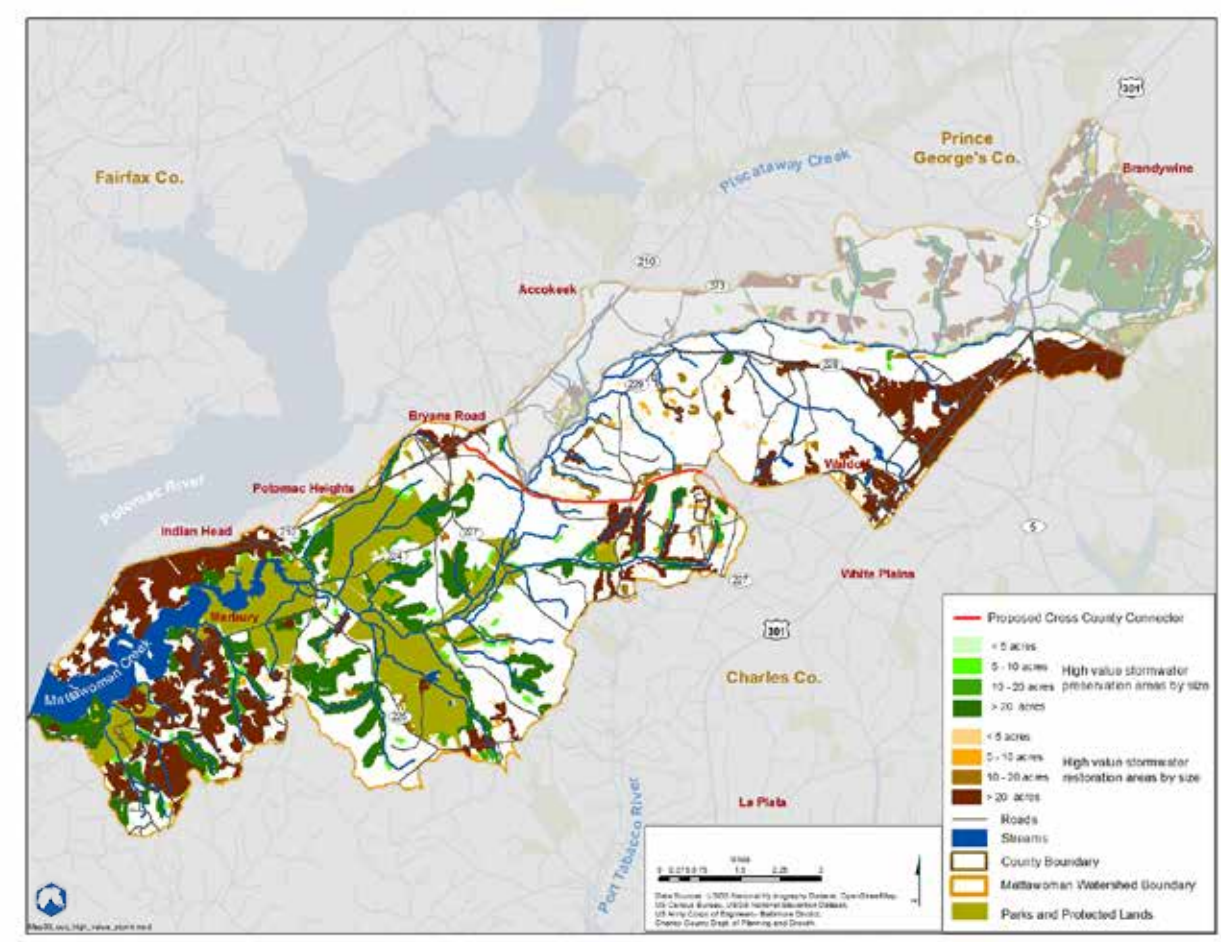

Figure 4-22. High-value (rank of four or five) stormwater restoration and preservation opportunities shown by size. (WRR - June 2011)

Information shown on the map above can be derived from the online WRR, but GIS software is required to display it in this manner.

Use by Charles County

Charles County also has its own MS4 requirements to meet. The county's MS4 area is the region covered by public water and sewer services, essentially the Development District. Figure 4-23 and Figure 4-24 show the results for the stormwater analyses in the County's MS4 area. Figure 4-25 compares these results to the location of the county's existing stormwater BMPs. The stormwater analyses could be used by the county to improve site selection for the BMPs required under the MS4 permit.

The county could also consider using the WRR stormwater analyses in conjunction with its stormwater management ordinance (see Section 3.3.2.2). Specifically, the tool could be used to identify potential preservation or stormwater locations in the required stormwater management concept plans.

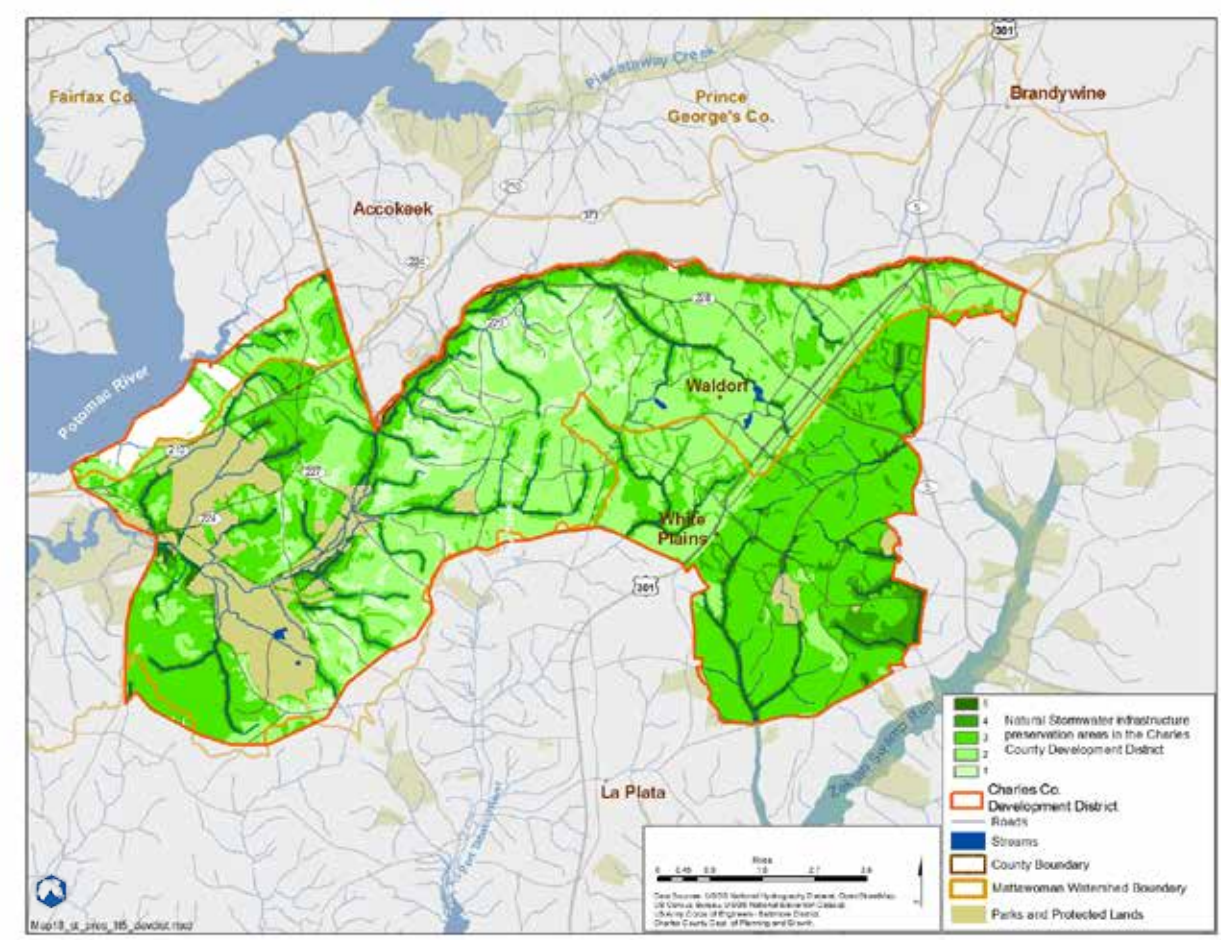

Figure 4-23. Natural stormwater infrastructure preservation opportunities in Charles County's MS4 area. (WRR - June 2011)

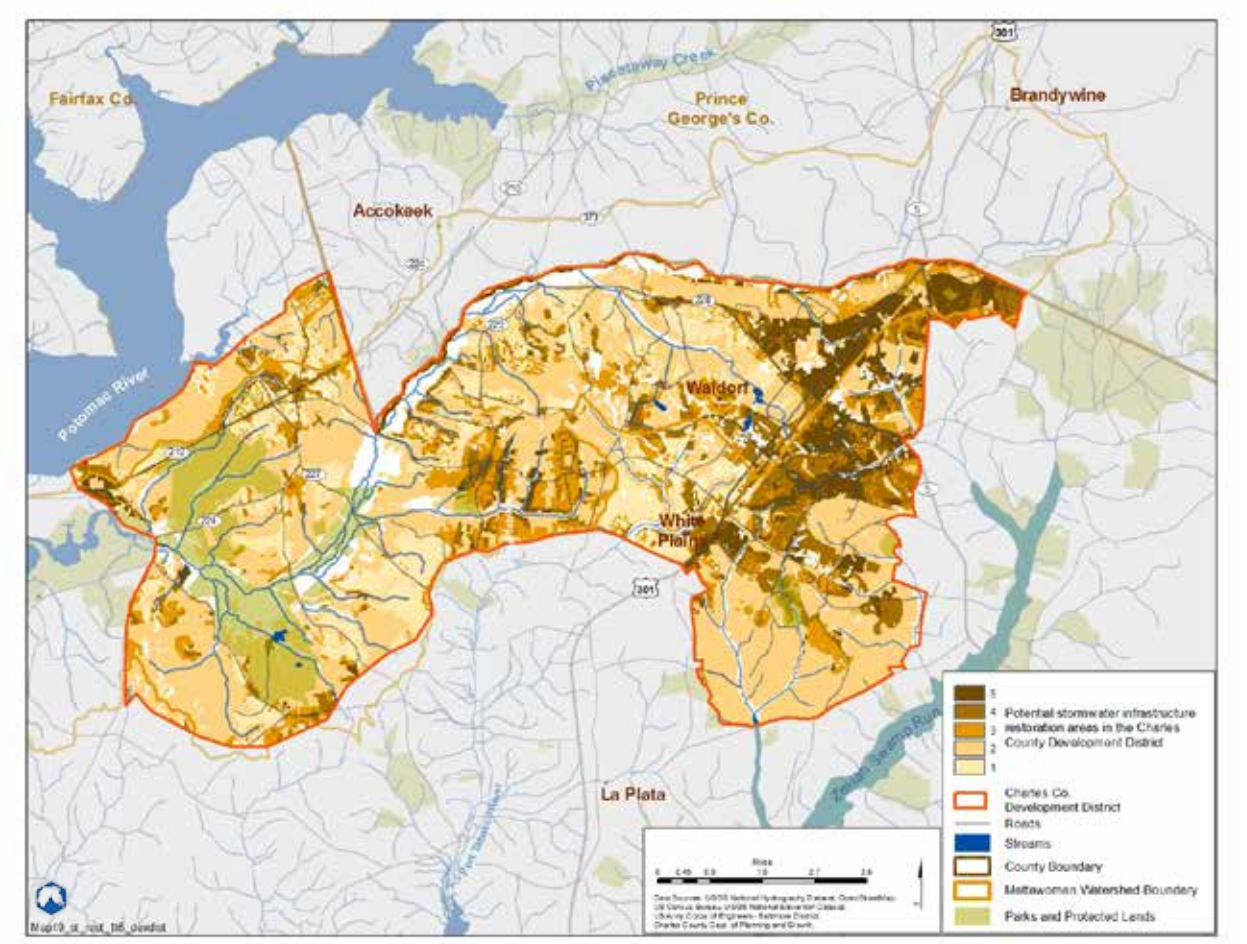

Figure 4-24. Opportunities to restore compromised stormwater areas in Charles County's MS4 area. (WRR - June 2011)

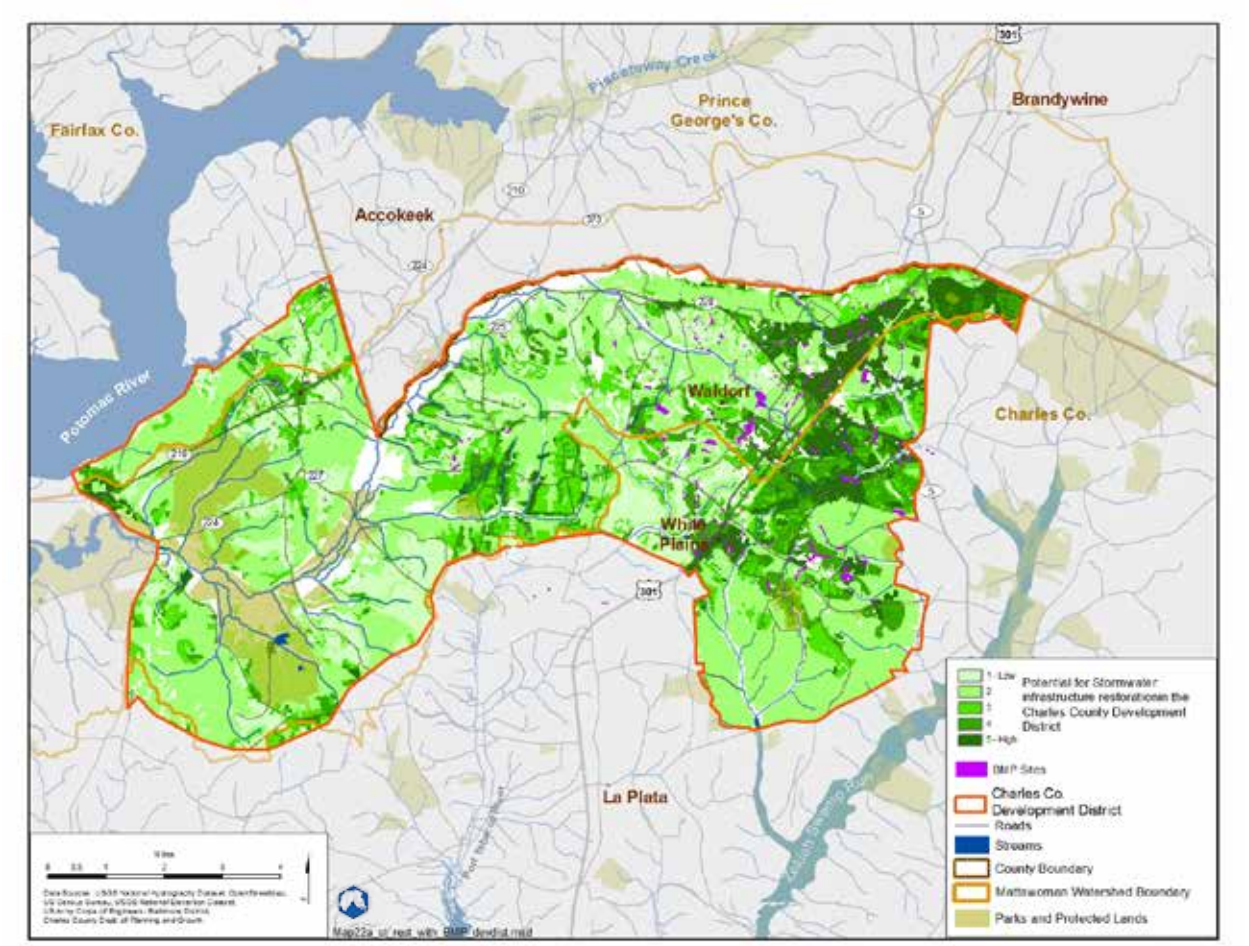

Figure 4-25. Existing stormwater BMPs in the MS4 area compared with locations for potential natural stormwater infrastructure preservation. (WRR - June 2011)

Figure 4-23, Figure 4-24, and Figure 4-25 make use of Charles County-specific information (Development District and stormwater BMPs). The WRR results shown in all the maps are available in the online version.

4.5 Transportation

The WRR can be used for multiple purposes in the transportation sector. First, it can be used in the highway planning process. Proposed highway alignments can be overlaid with the four preservation analyses to determine which options are least harmful to priority areas. This would help the Maryland State Highway Administration meet the federal requirements to avoid and minimize environmental impacts.

Additionally, once a highway alignment option is selected the WRR can be used to identify potential mitigation sites. This would be required if the project is subject to Section 404 of the Clean Water Act and it impacts wetlands.

SHA is also required to implement environmental site design techniques and is subject to its MS4 permit requirements in Charles County. Highway projects receiving federal funding are also to comply with Title 23, Chapter 1, Part 771 of the Code of Federal Regulations requiring alternatives with less environmental impact be considered, and Part 777 that requires impacts to be mitigated. These are both discussed in Section 3.1.4.

Highway Planning

As an example of how impacts can be avoided and minimized, Figure 4-26 shows the proposed alignment for the Cross County Connector (CCC). The map highlights sites from the four preservation opportunity analyses that received scores of three, four, or five, that also cross the CCC. These represent sites to avoid developing. The lengthy review process to avoid sites could be reduced by using the WRR in the early stages of planning.

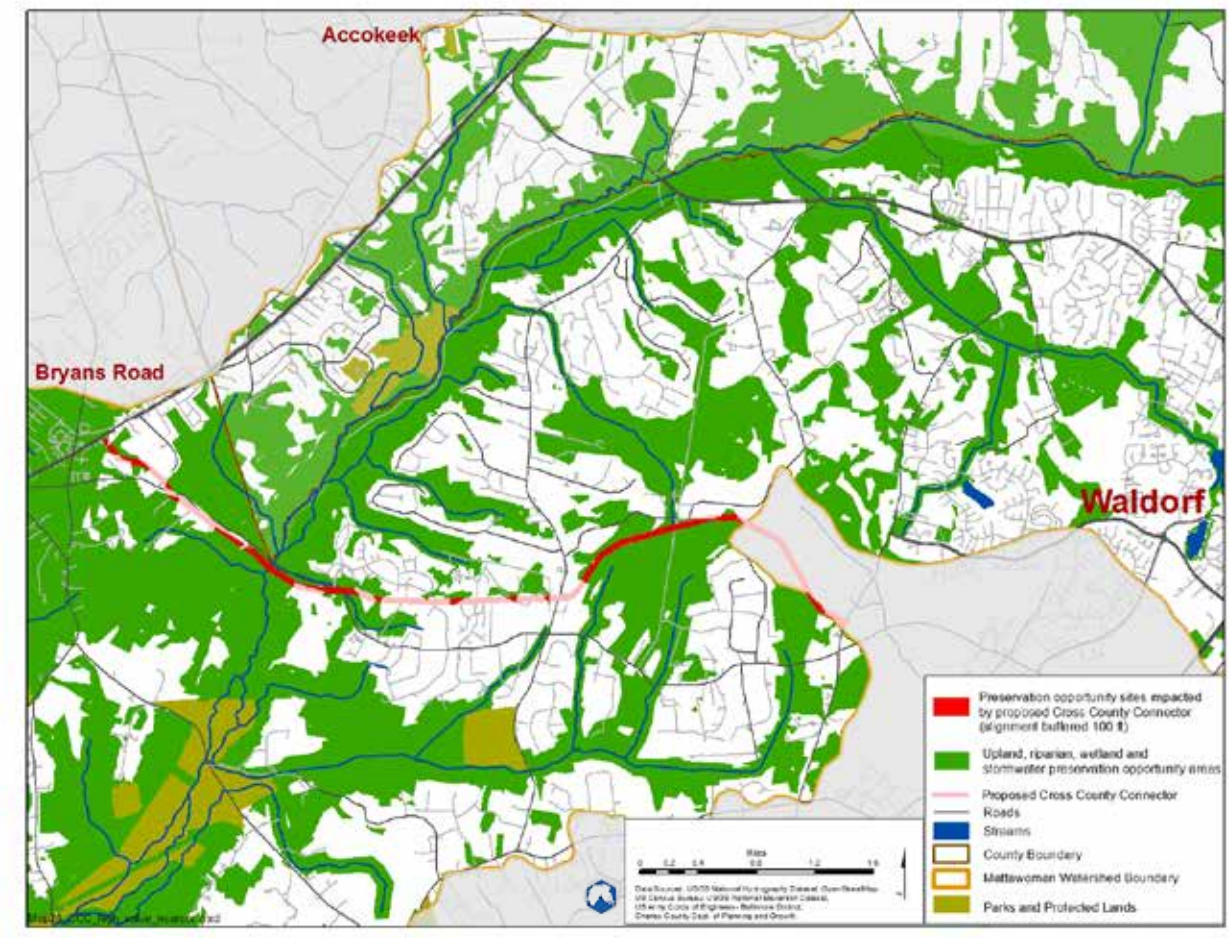

Figure 4-26. Preservation areas that would be impacted by the proposed Cross County Connector. The map shows areas from the four preservation analyses that received a rank of three, four, or five. (WRR - June 2011)

Producing this map required the proposed Cross County Connector alignment from MDE. The representation of sites ranking three, four, and five in the preservation opportunity analyses with the CCC alignment requires GIS software.

Mitigation for Highway Projects

The proposed highway runs through the catchment for Old Woman's Run, a tributary to Mattawoman Creek. This tributary is designated as a Tier II watershed.

Projects in Tier II watersheds are subject to MDE's antidegradation review. This review determines if a watershed could assimilate the expected additional pollutant load. If the watershed cannot accommodate additional loads, mitigation projects may have to be conducted to offset the impacts. Antidegradation reviews also require an alternatives assessment. If no alternatives are available, mitigation of the impacts is required.

As discussed in Section 3.2.1.1.1, this analysis has been done for Old Woman's Run. The results indicate that the watershed would not be able to handle additional loads. Therefore, new development would have to be mitigated.

Figure 4-27 shows opportunities for reducing the amount of run-off from the highway and associated development in the Old Woman's Run catchment using the stormwater restoration analysis. The upland and riparian zone restoration analyses could also be used to identify sites for mitigation.

Generating results for a specific catchment at the scale of Old Woman's Run is not currently possible using the online WRR. The result could be viewed, but GIS software is required to isolate and display them as shown here.

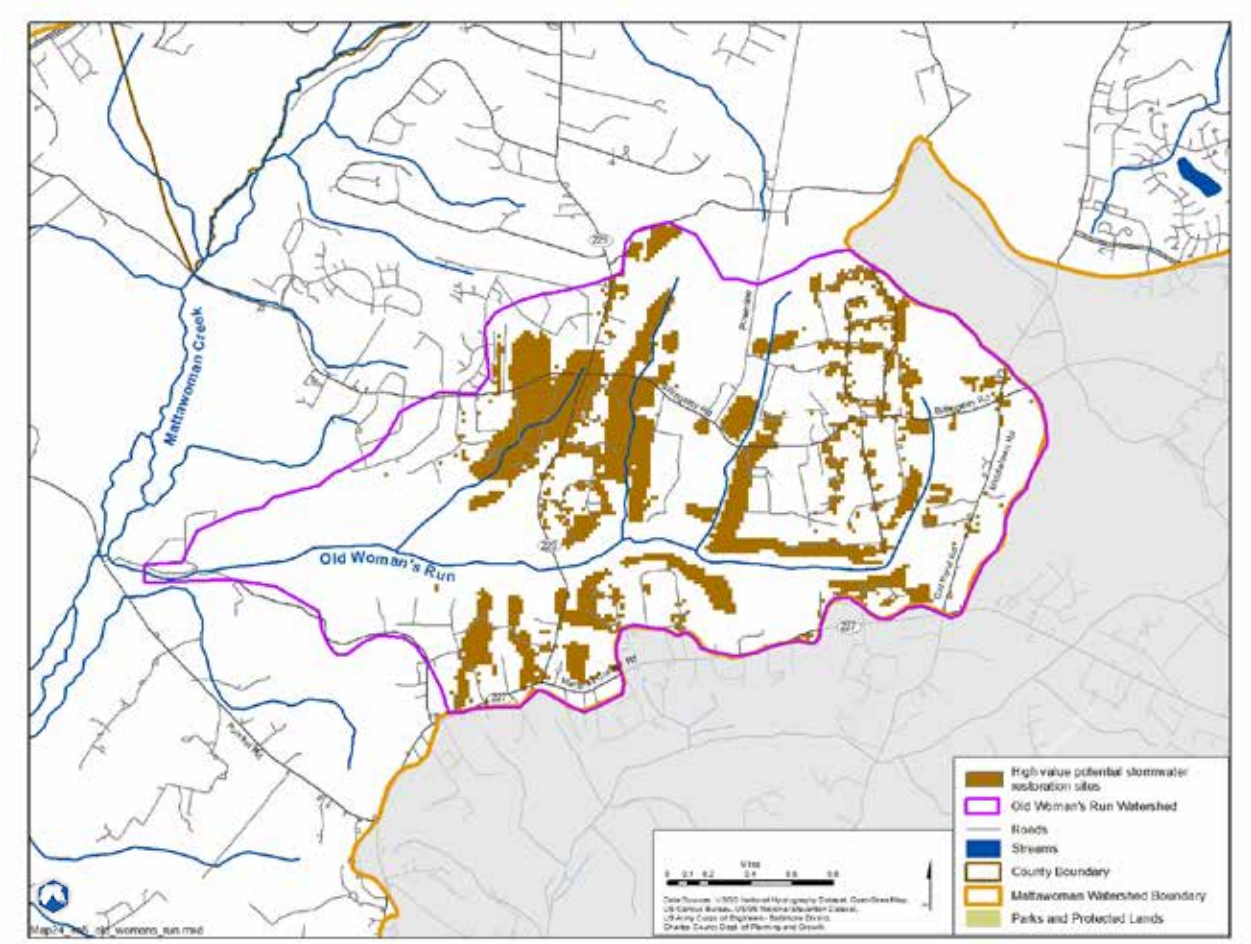

Figure 4-27. High priority opportunities to improve stormwater management in the Old Woman's Run catchment. (WRR - June 2011)

This type of evaluation prior to applying for permits could reduce the length of the review process as sensitive areas are easily identifiable and can be avoided. Most highway projects require extensive review with local, state, and federal agencies, as well as consultations with non-governmental stakeholders. Organizations typically involved include:[156]

- Local jurisdictions and relevant departments,
- local watershed and community groups,
- Maryland Department of Planning,
- Maryland Department of the Environment,
- Maryland Department of Natural Resources,
- Maryland Department of Agriculture,
- Critical Areas Commission,
- Board of Public Works,
- Maryland Historical Trust,

[156] Hertz, Sandy. State Highway Administration. Personal communication. June 18, 2010.

- U.S. Fish and Wildlife Service,
- U.S. Army Corps of Engineers,
- U.S. Environmental Protection Agency,
- National Marine Fisheries Service,
- Federal Highway Administration, and
- Maryland Department of Transportation.

Because the development of the WRR included many of these stakeholders, their interests are integrated into the analyses. If the WRR is used to its full potential in the planning phase, siting highways and selecting mitigation sites should be more efficient.

While the WRR can quickly identify valuable sites to avoid developing and locations for stormwater BMPs, many other factors have to be considered before work on a project can begin. Other factors include the presence of wetlands, existing landscape, costs, amount of pavement draining to the area, and amount of hydrologic work that would have to be done to make it a viable project.[157]

The WRR was not intended as a final site selection tool. Potential sites identified by the WRR need to be visited and evaluated to determine suitability for specific projects.

4.6 Regulatory Integration

One of the most valuable applications of the WRR is the identification of sites that meet multiple goals. It is able to do this in two ways. First, each WRR opportunity analysis accounts for multiple priorities in its final rankings. Thus, selecting higher ranking sites within one analysis will meet more priorities.

Secondly, sites that rank high in more than one opportunity analysis can be selected. For instance, sites can be identified that have both stormwater and riparian zone benefits. Overlapping priority sites for natural stormwater infrastructure preservation and the other three preservation analyses are shown in Figure 4-28, Figure 4-29, and Figure 4-30.

These types of maps, that combine rank values between opportunity analyses, require the use of GIS software. The online WRR currently allows a user to view results from multiple analyses at the same time, but does not sum scores.

Meeting Multiple Clean Water Act Authorities

Dynamic uses of the WRR results can break down some of the barriers that exist between regulatory programs. Figure 4-30 shows potential sites that represent both stormwater and wetland preservation opportunities. Using these results to identify sites for potential projects would help integrate Sections 402 and 404 of the Clean Water Act (see Section 3.1.2.1).

Each of the four preservation analyses include as relative scoring factors other Clean Water Act-related factors. They all factor in whether or not a given location "drains to a Stream Classification Use II,

[157] Pujara, Karuna. State Highway Administration. Personal communication. February 4, 2011.

III, or IV." The upland preservation analysis includes a factor for being located "within 100 feet or 500 feet of a 303(d) listed stream." Both of these factors are derived from CWA Sections 303 and 305.

As discussed in previous examples, the WRR can also identify sites that can be used as part of a CWA Section 319 watershed plan, to meet antidegradation requirements, and to address TMDLs.

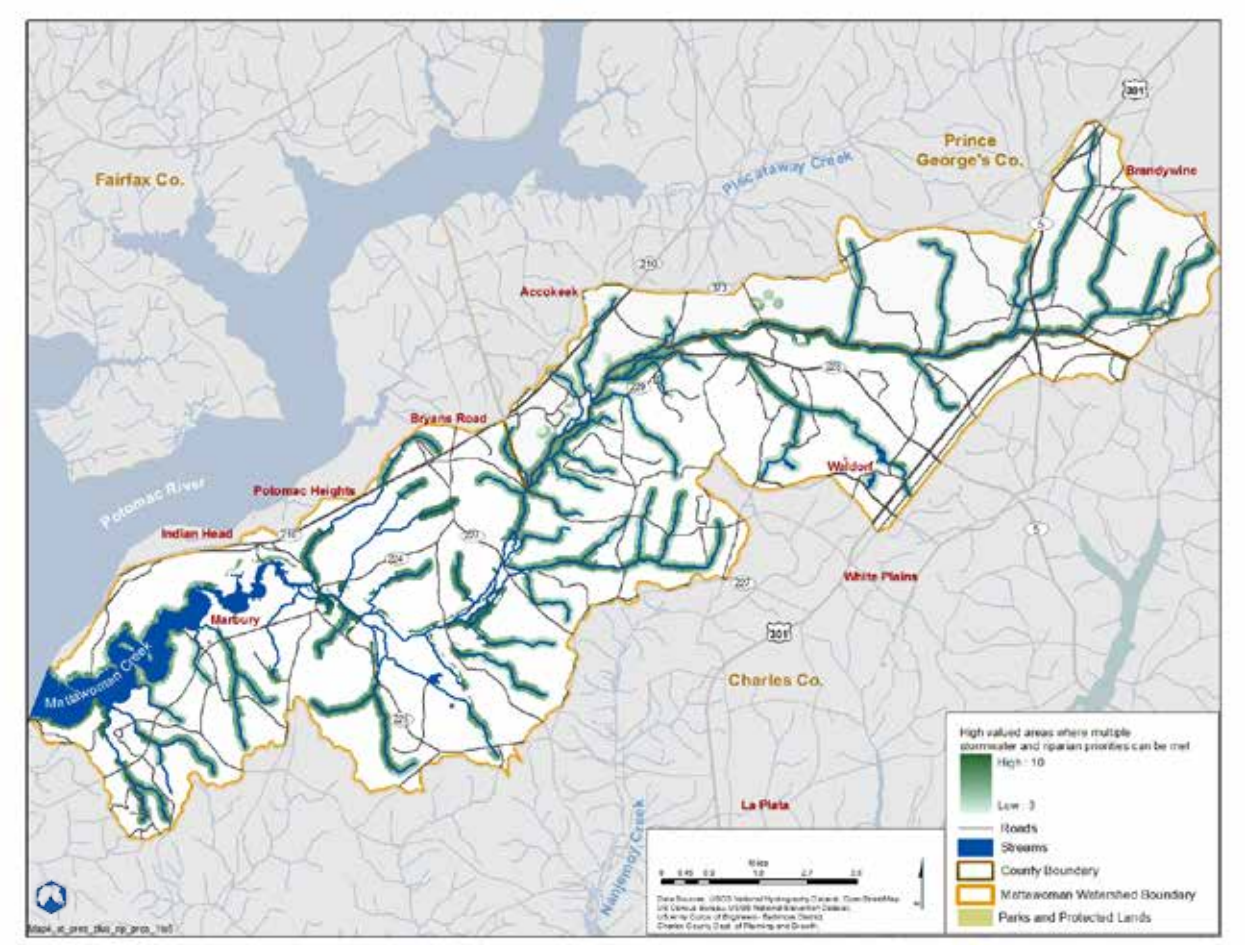

Figure 4-28. Natural stormwater infrastructure and riparian preservation opportunities. Results shown are the sum of the scores from both analyses. Thus, if a location received a five for stormwater preservation and a three for riparian preservation, its new value is eight. (WRR - June 2011)

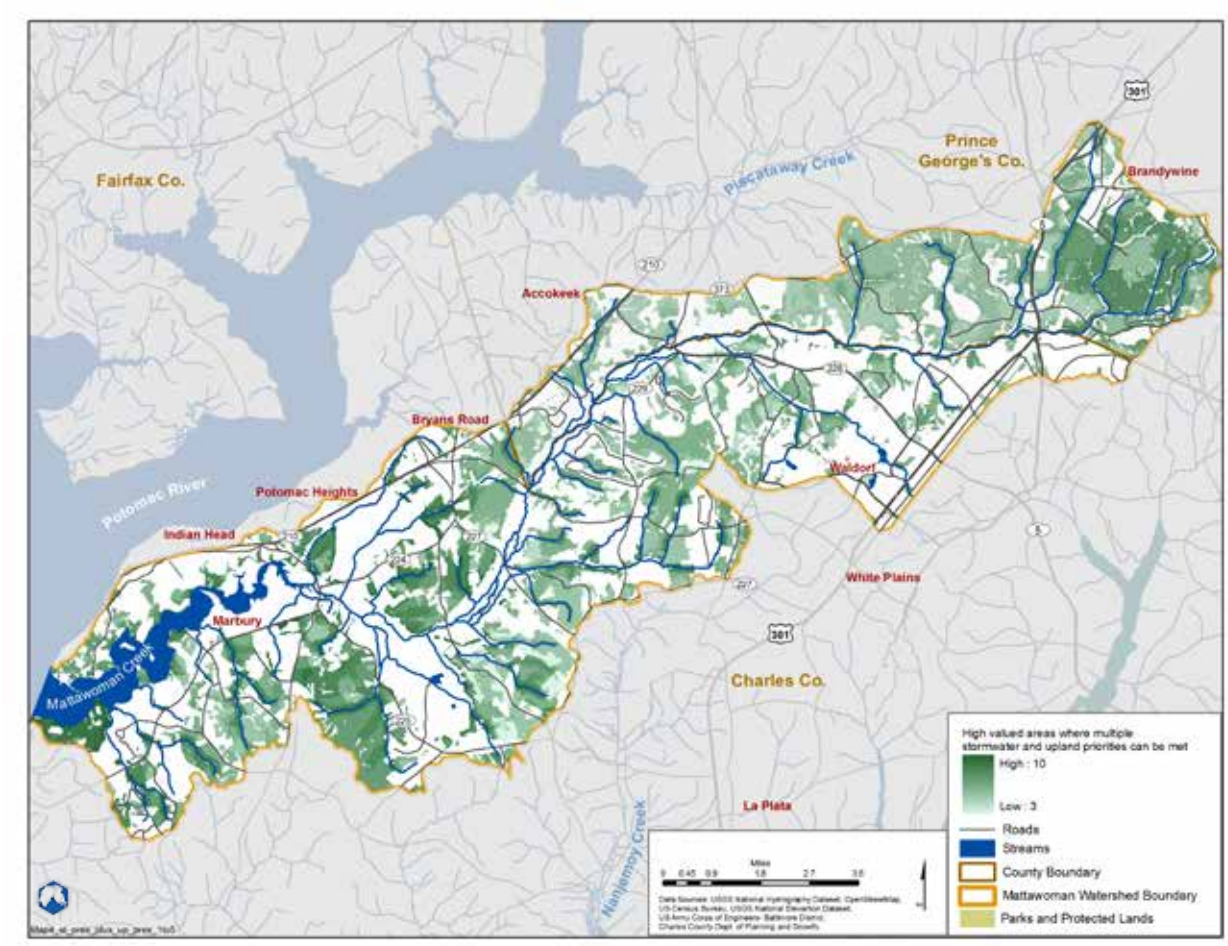

Figure 4-29. Natural stormwater infrastructure and upland preservation opportunities (summed results). (WRR - June 2011)

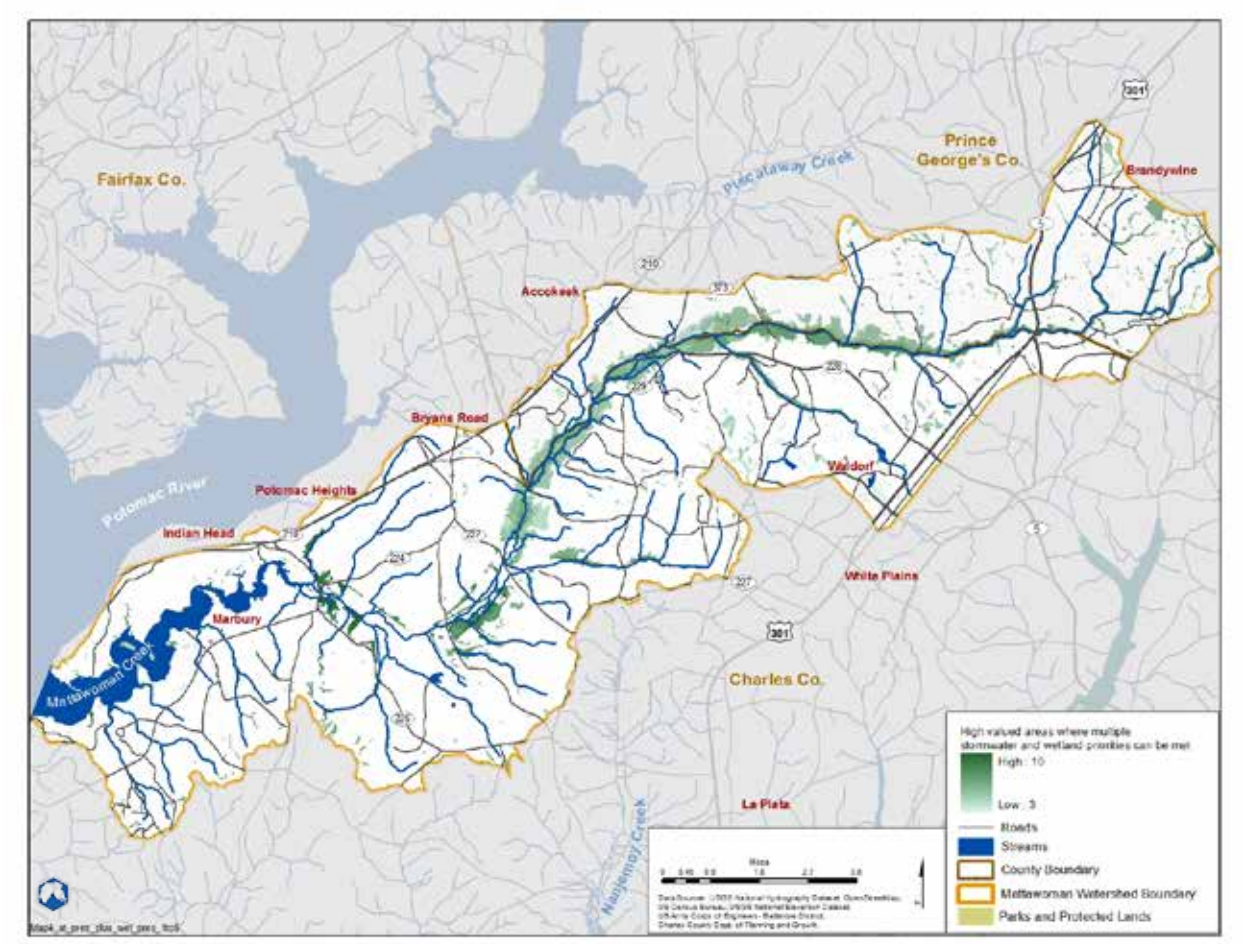

Figure 4-30. Natural stormwater infrastructure and wetland preservation opportunities (summed results). (WRR - June 2011)

The WRR's results can also be viewed in the context of other spatial datasets to meet agency priorities. A recent EPA report on stormwater and green infrastructure states that using GI "to manage rain water as a resource, is a win-win-win approach and a fundamental component of the U.S. Environmental Protection Agency's (EPA) sustainable community efforts. By helping urban communities manage stormwater, while also providing additional benefits such as increased recreational space and improved pedestrian safety, communities can be made both more attractive and livable."[158]

The WRR could be used to identify priority sites for stormwater management in the green infrastructure network. This would be achieved by overlaying stormwater preservation and restoration opportunity sites with the watershed's green infrastructure network (Figure 4-31).

[158] U.S. Environmental Protection Agency. "A Strategic Agenda to Protect Waters and Build More Livable Communities Through Green Infrastructure." (2011) <http://cfpub.epa.gov/npdes/home.cfm?program_id=298> Accessed May 3, 2011.

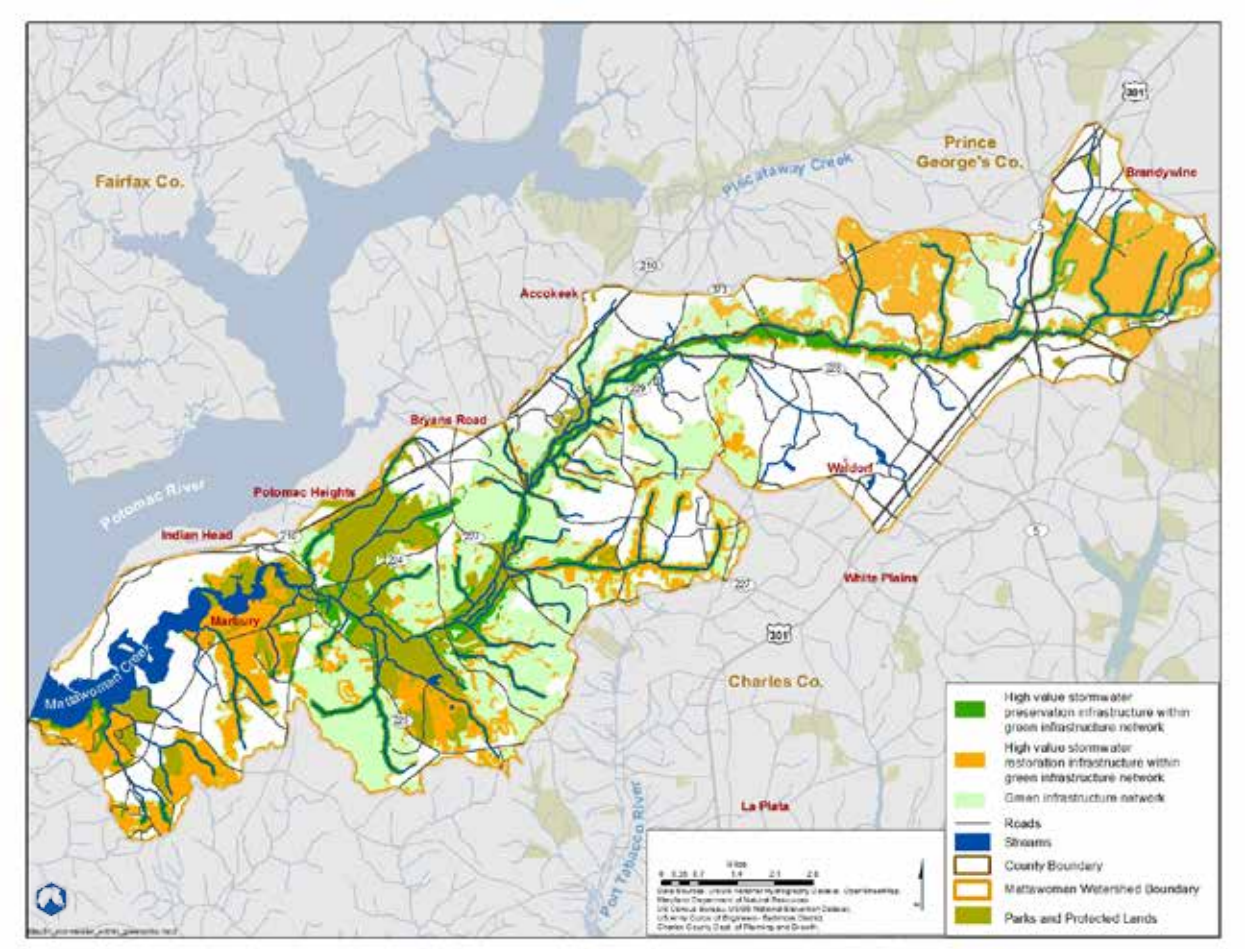

Figure 4-31. High-value stormwater preservation and restoration opportunities in the green infrastructure network. (WRR - June 2011)

Maryland State Agency Priorities

The same method can be applied using DNR's Targeted Ecological Areas layer (Figure 4-32 and Figure 4-33). While being in or near a TEA is a relative factor for all the analyses (except for compromised stormwater restoration) sites that ultimately appear as opportunities are not necessarily in a TEA.

Overlaying TEA information with WRR results would verify whether or not a site would be a DNR priority. This could be especially useful to organizations looking to receiving funding from DNR's Program Open Space (see Section 3.2.2.3).

The online tool for the WRR allows a user to do this evaluation without requiring GIS software. Layers, such as those mentioned in this section, are not only used in the ranking of sites, but are also available in the web interface. These layers can be turned on to be seen in conjunction with the opportunity results.

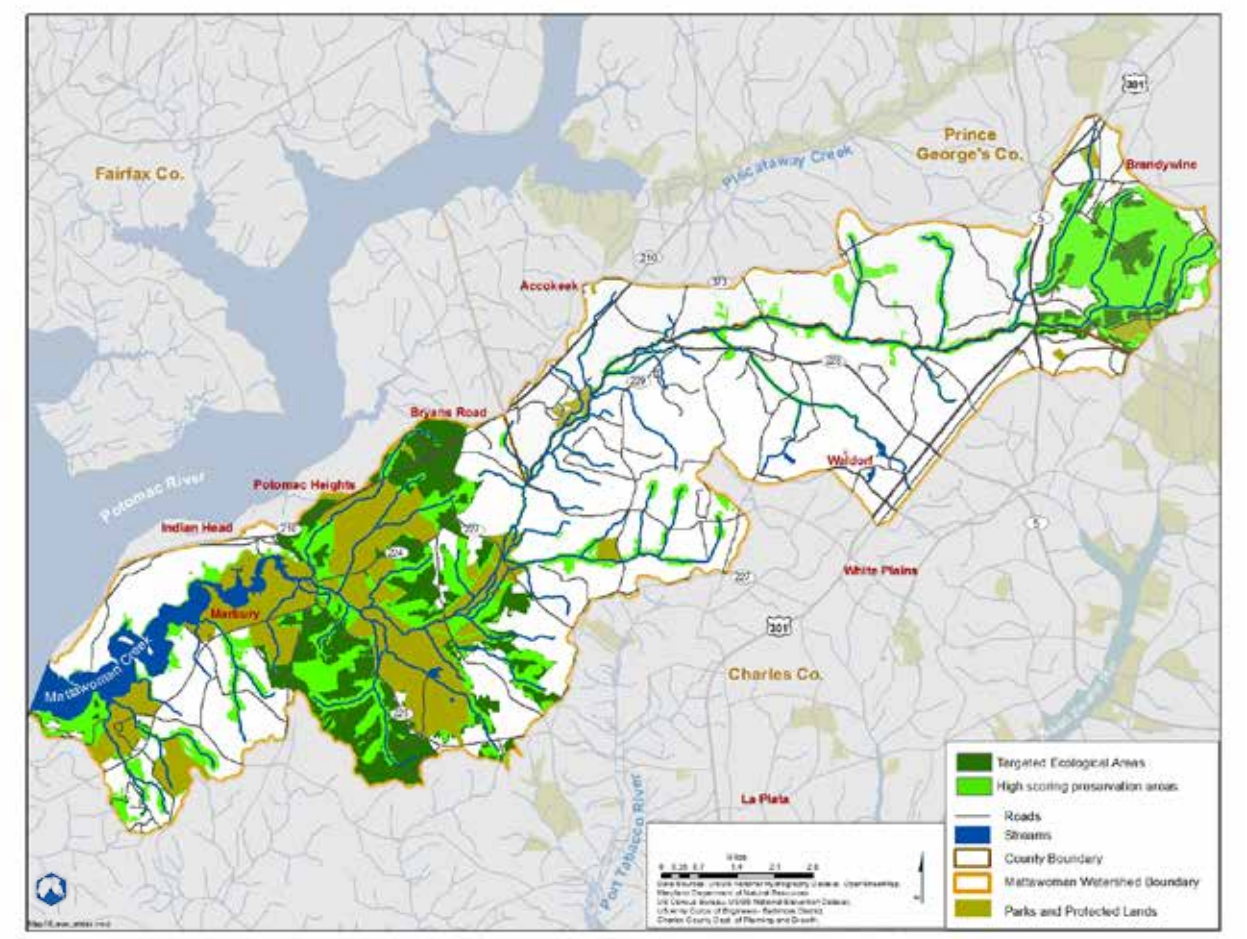

Figure 4-32. High priority (rank of four or five) wetland, upland, riparian, and stormwater preservation opportunities in Targeted Ecological Areas. (WRR - June 2011)

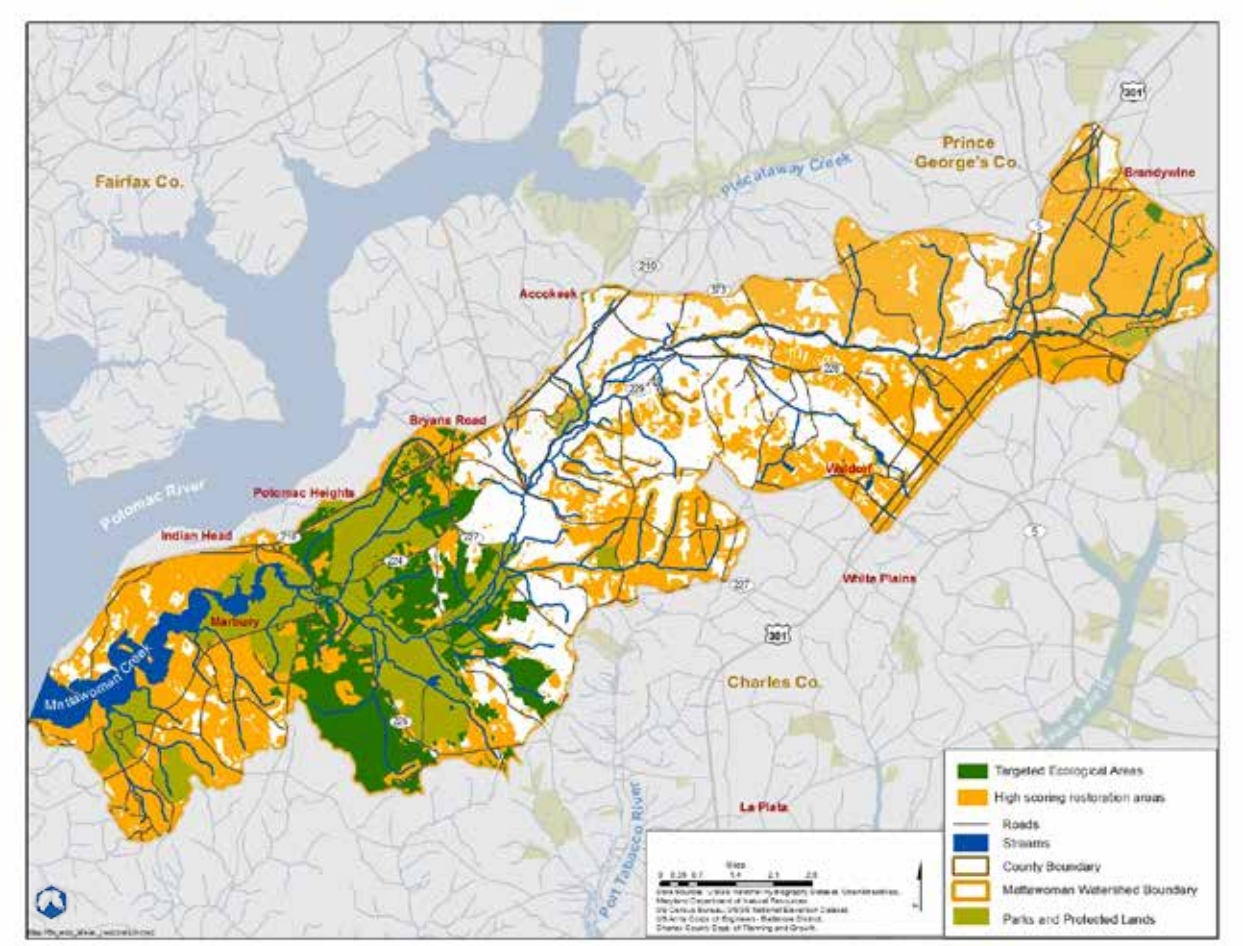

Figure 4-33. High priority (rank of four or five) wetland, upland, riparian, and stormwater restoration opportunities in Targeted Ecological Areas. (WRR - June 2011)

A similar application of the tool can be used to address MDE's Biological Restoration Initiative priority areas. Areas in a BRI watershed are sometimes scored higher in the WRR, but it is not an absolute factor. Therefore, priority opportunities may show up in the results that are not in a BRI watershed. Priorities from the upland, riparian, and wetland restoration analyses can be easily identified by overlaying the opportunity results with the BRI data layer (Figure 4-34).

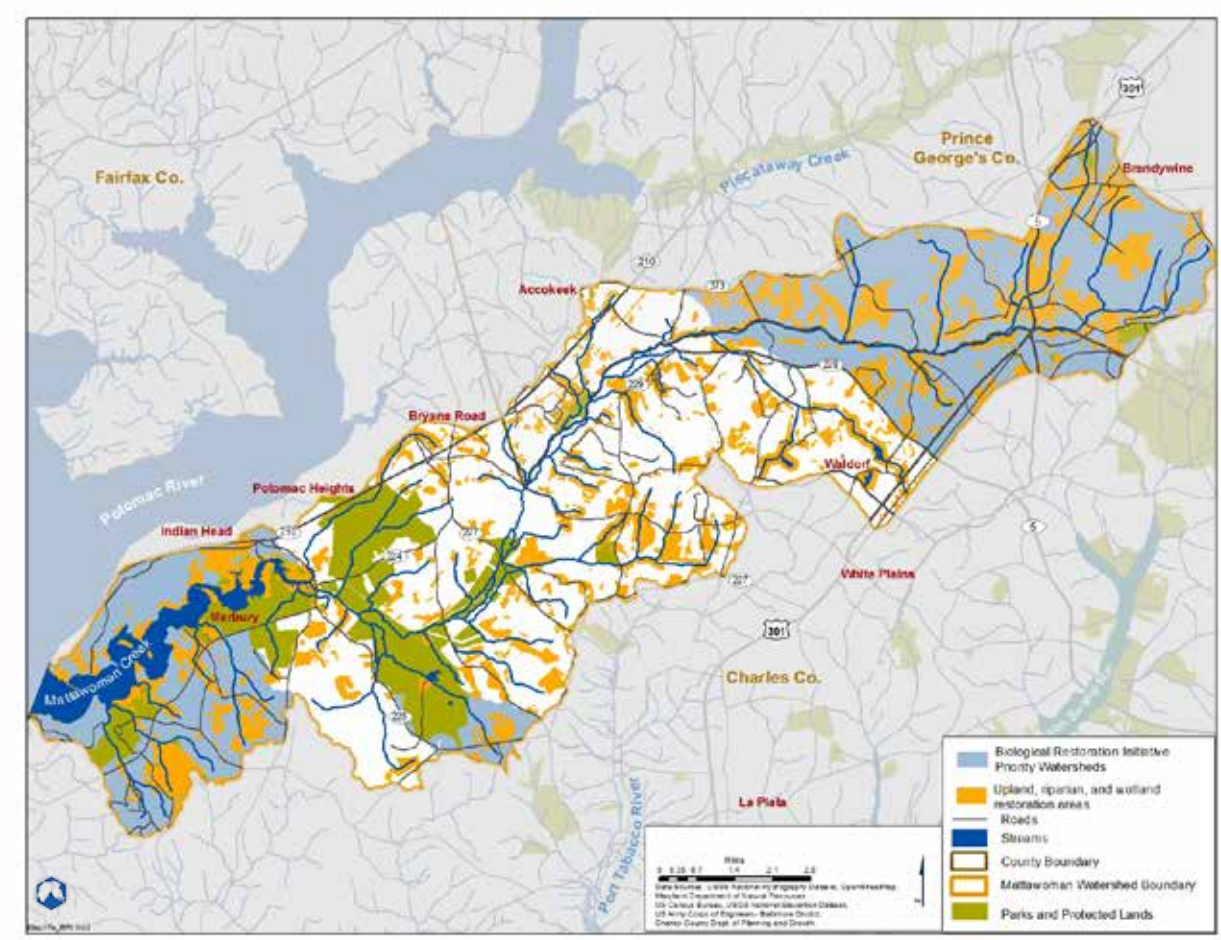

Figure 4-34. Overlapping areas of the Biological Restoration Initiative priority watersheds and opportunities for upland, riparian, and wetland restoration. (WRR - June 2011)

Similar analyses, as those shown in Figure 4-32, Figure 4-33, and Figure 4-34, could be done using the online WRR by viewing the GI network, TEAs, and BRI watersheds alongside the results from the two stormwater opportunity analyses.

Implementation Scenario Maps

Figures 4-1 through 4-34

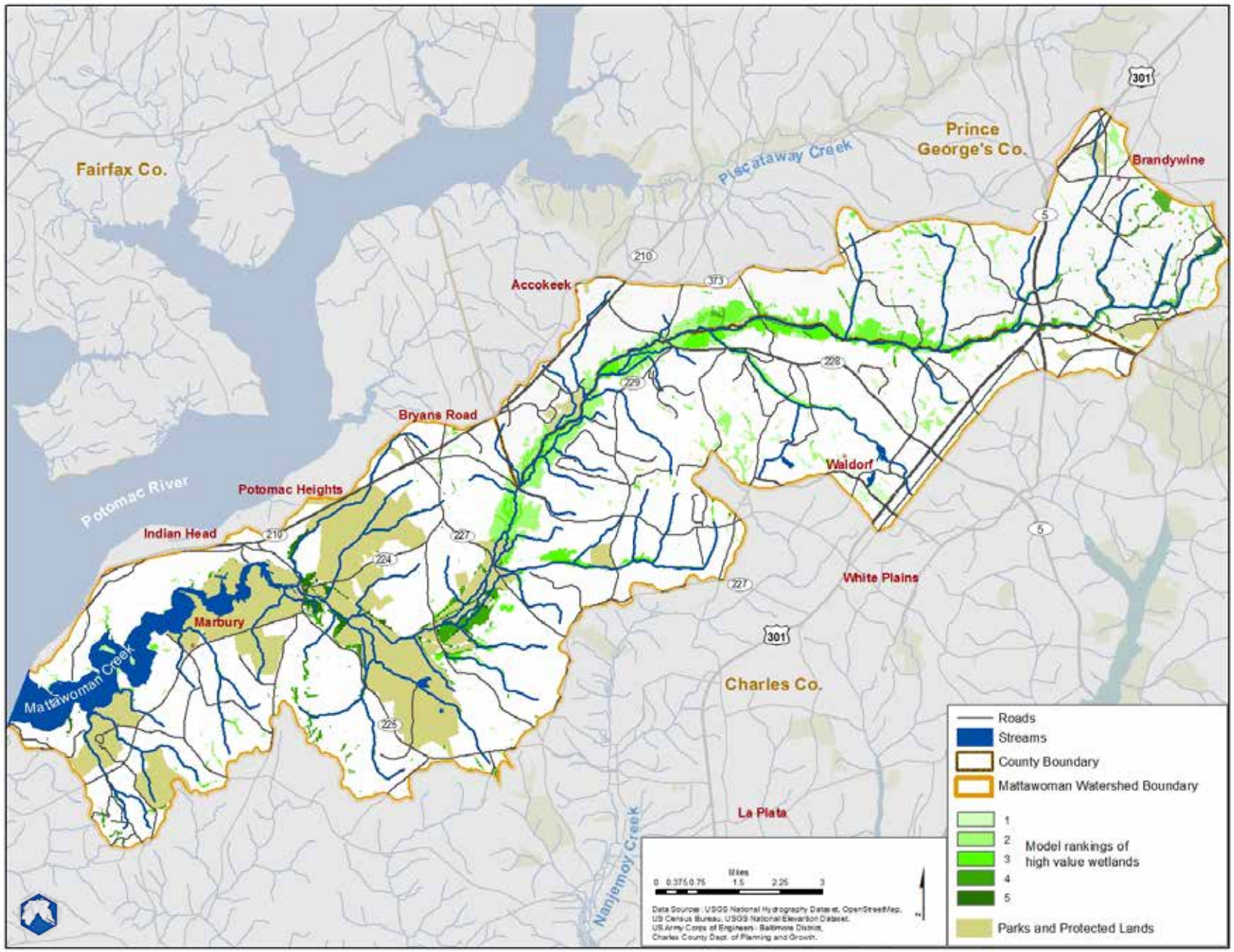

Figure A-1. WRR rankings for wetland preservation sites in the Mattawoman watershed. (WRR - June 2011)

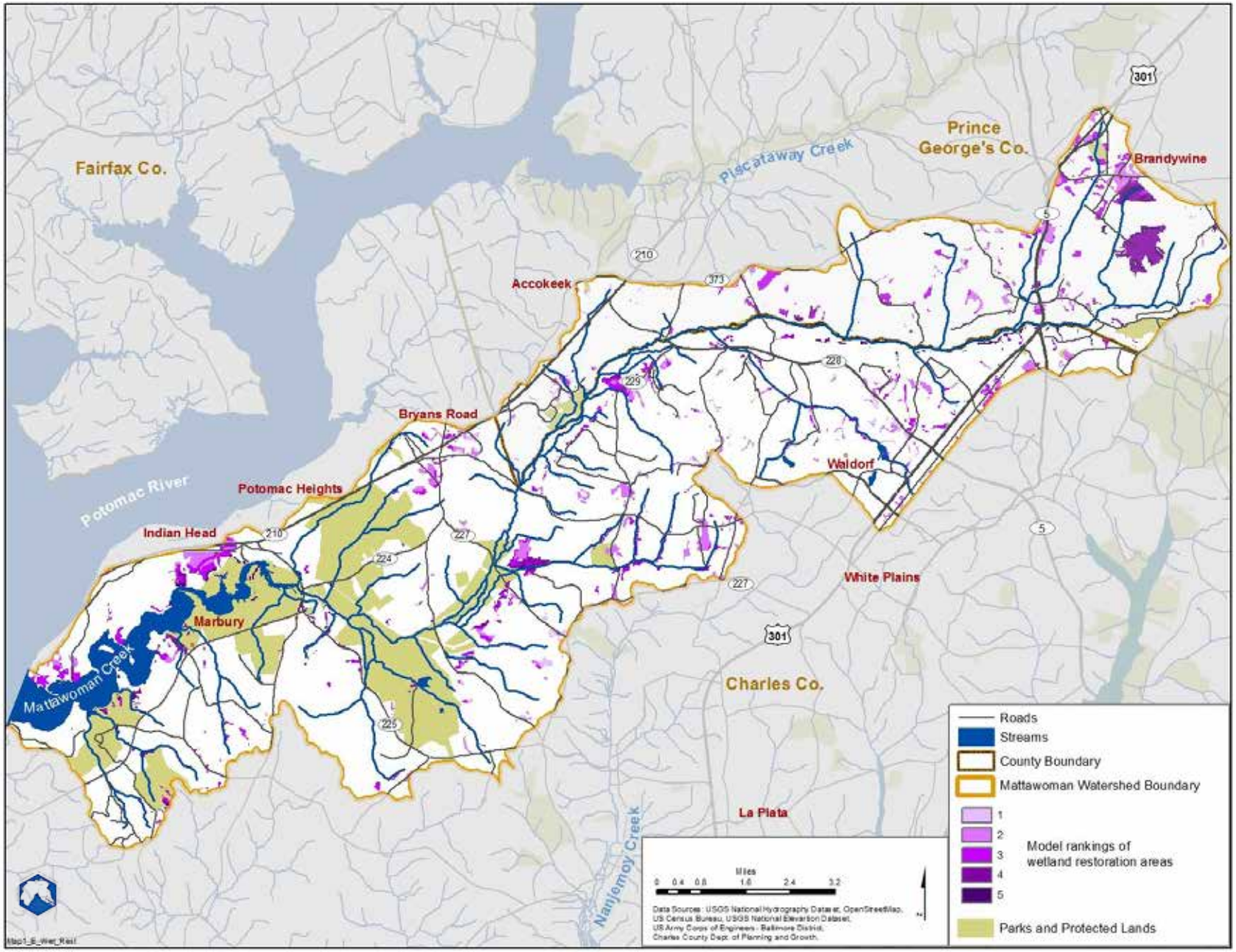

Figure A-2. WRR rankings for wetland restoration sites in the Mattawoman watershed. (WRR - June 2011)

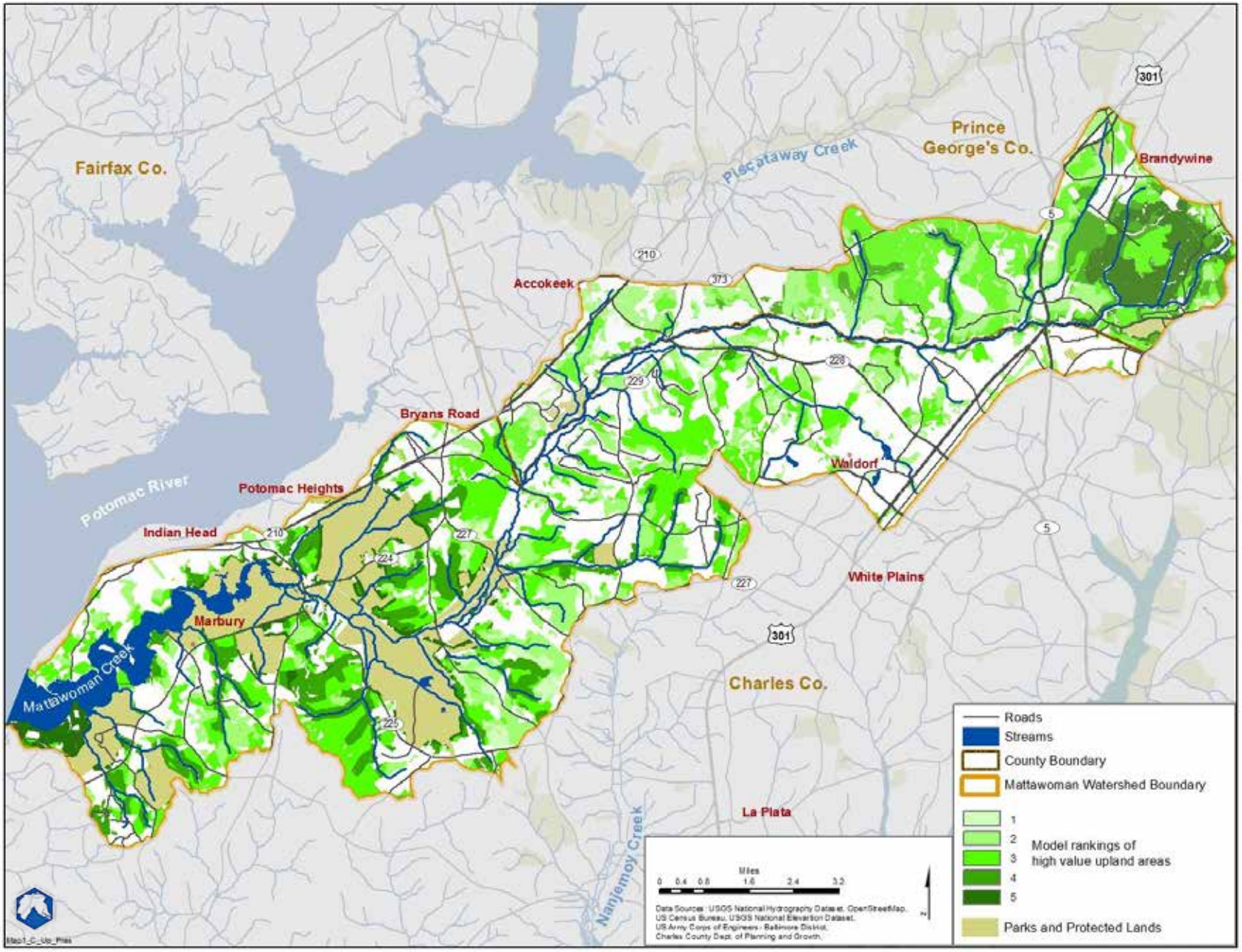

Figure A-3. WRR rankings for upland preservation sites in the Mattawoman watershed. (WRR - June 2011)

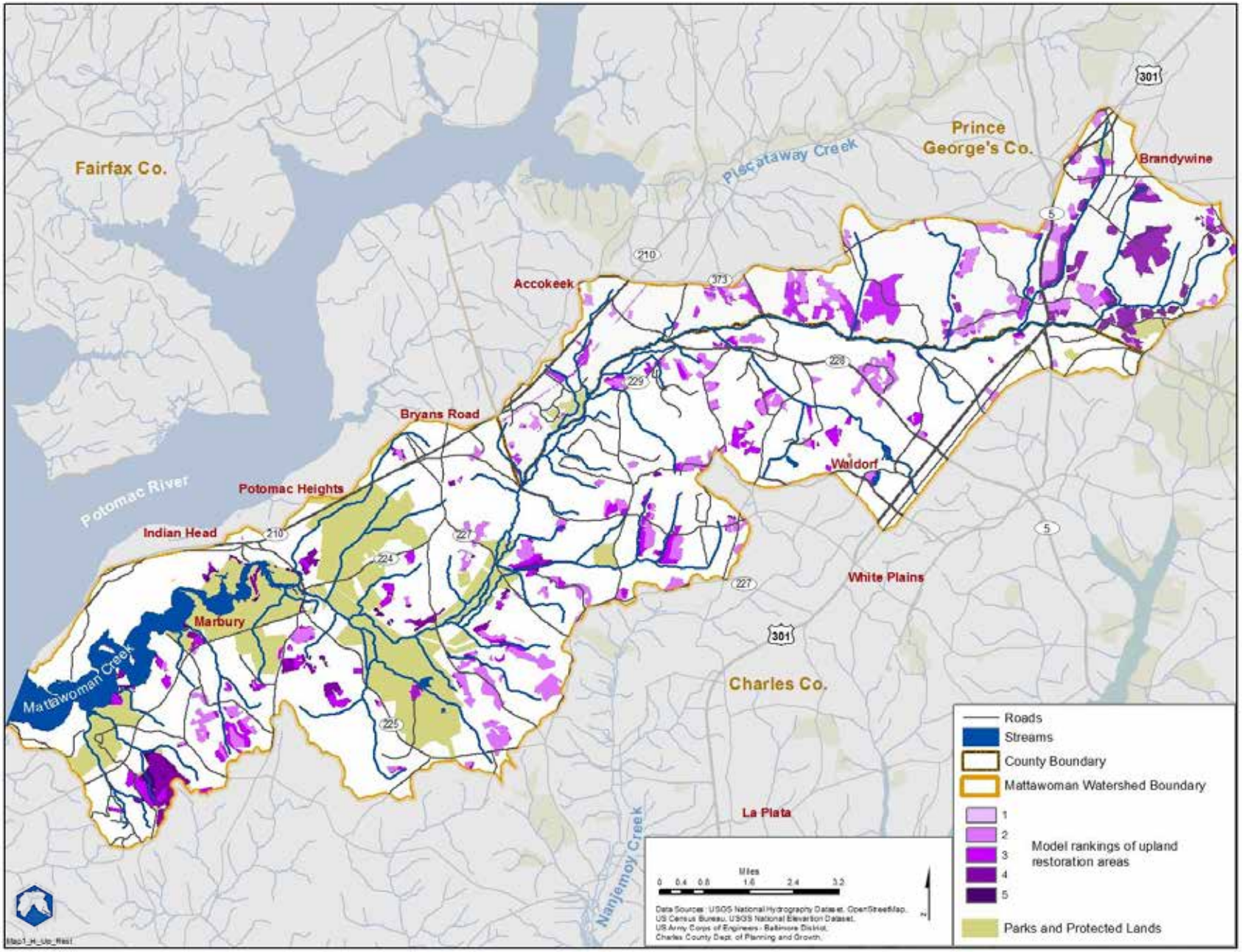

Figure A-4. WRR rankings for upland restoration sites in the Mattawoman watershed. (WRR - June 2011)

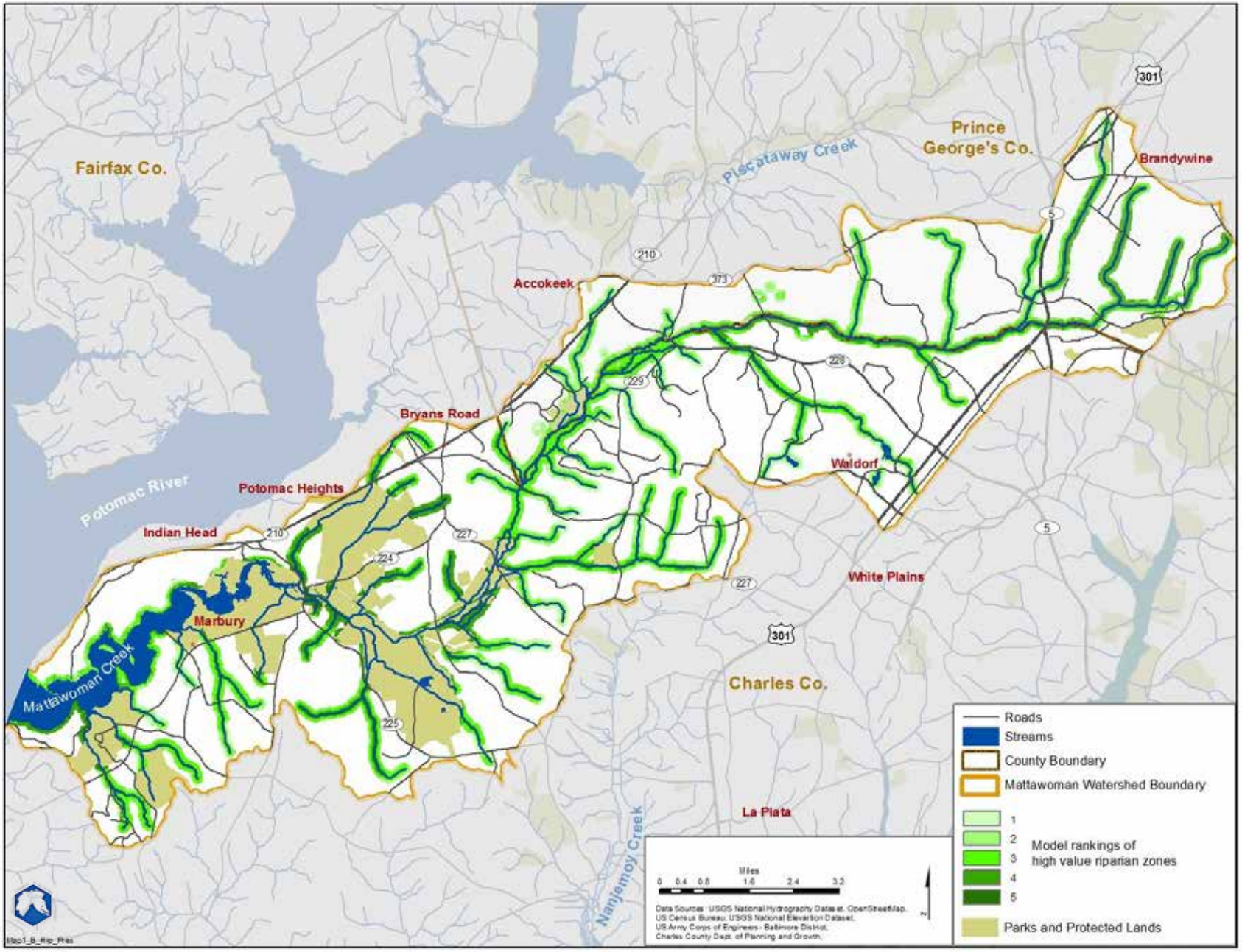

Figure A-5. WRR rankings for riparian zone preservation sites in the Mattawoman watershed. (WRR - June 2011)

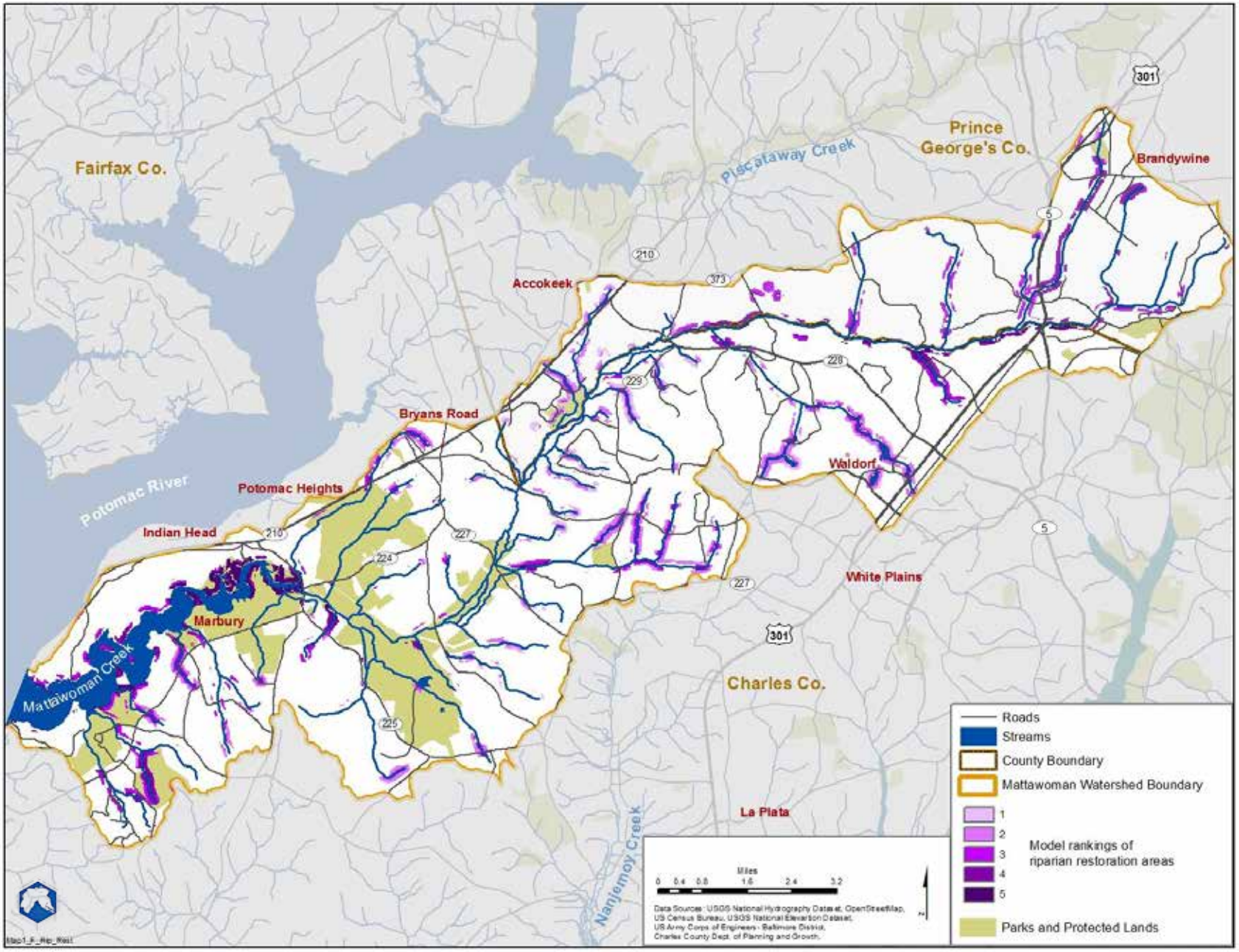

Figure A-6. WRR rankings for riparian zone restoration sites in the Mattawoman watershed. (WRR - June 2011)

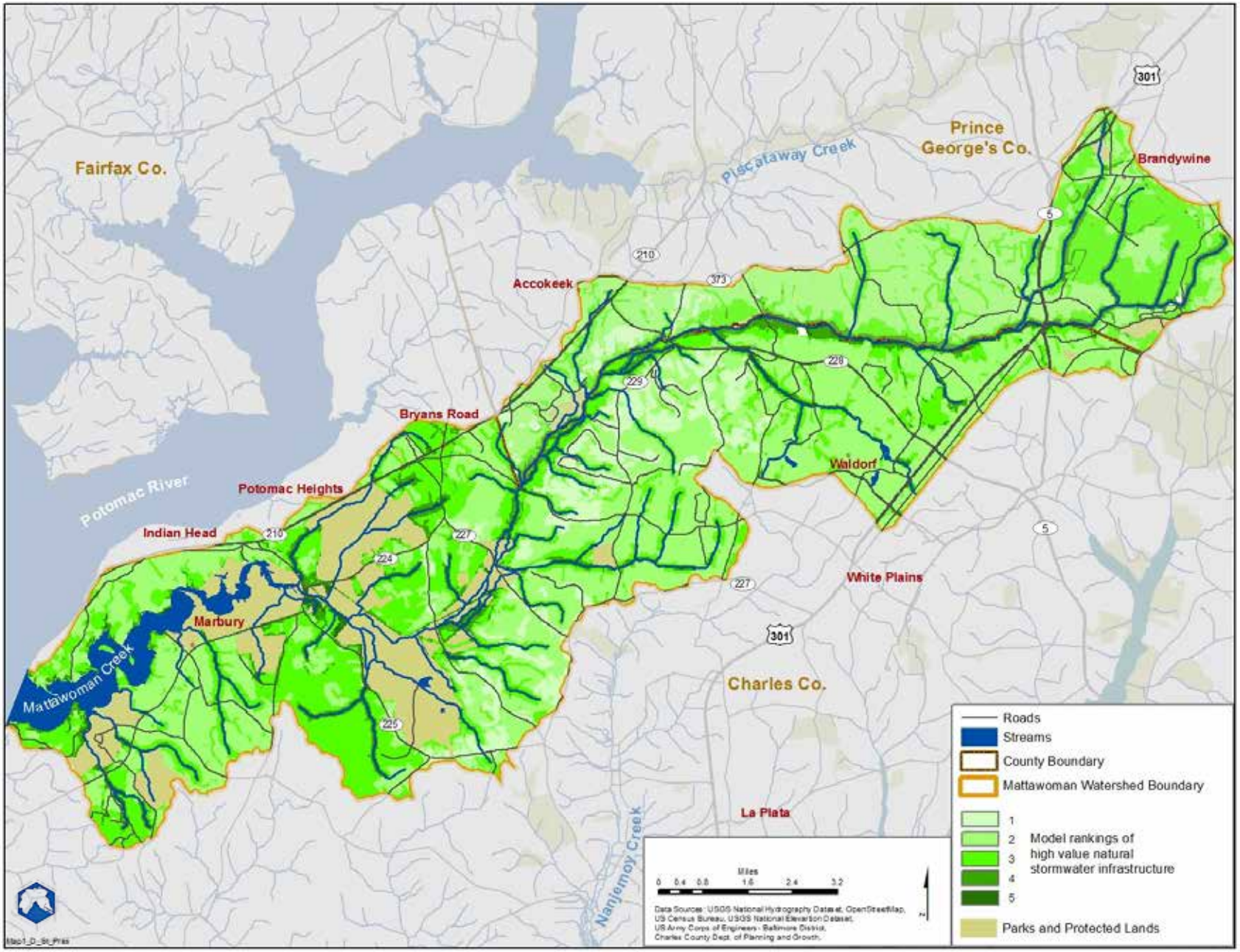

Figure A-7. WRR rankings for natural stormwater infrastructure preservation sites in the Mattawoman watershed. (WRR - June 2011)

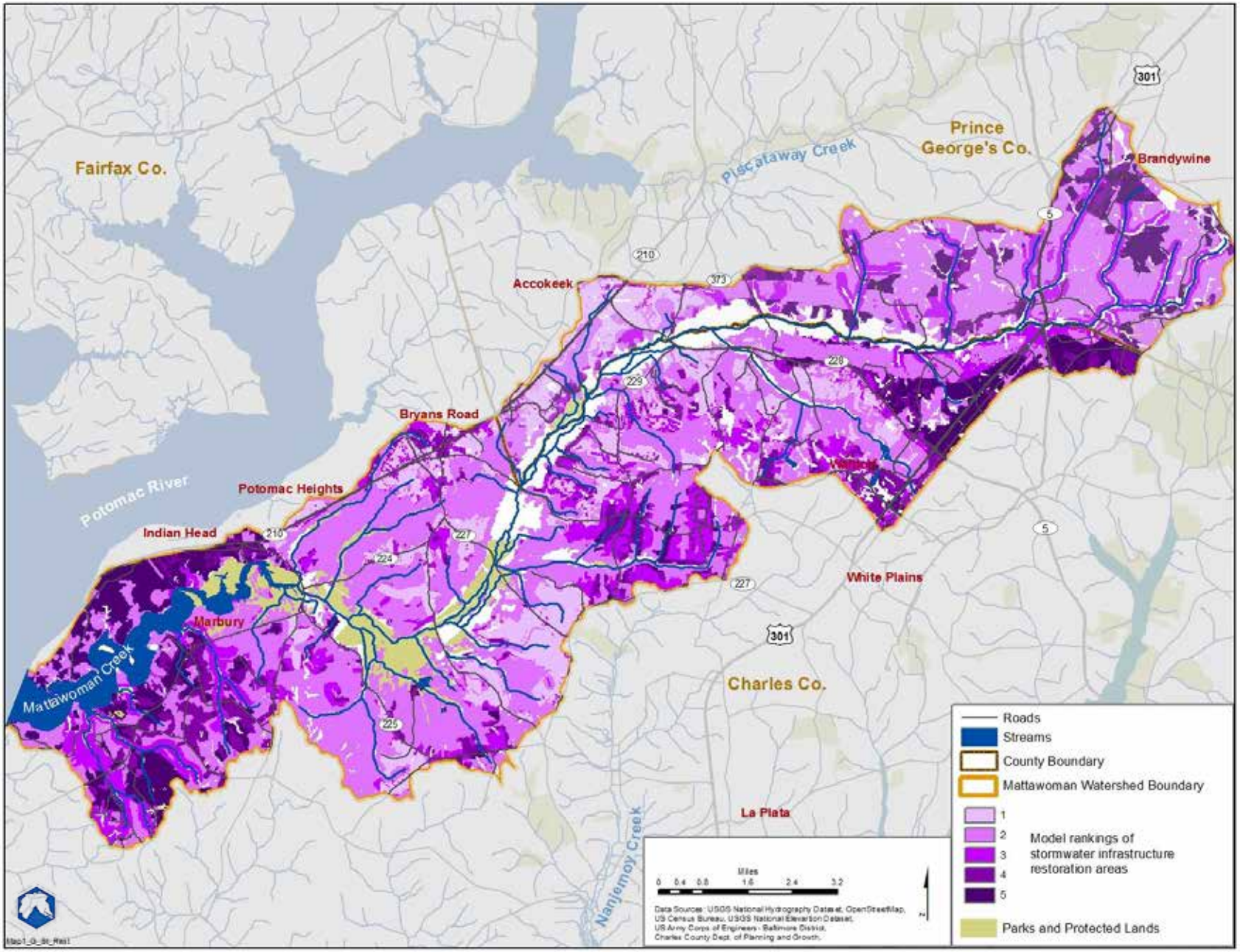

Figure A-8. WRR rankings for compromised stormwater infrastructure restoration sites in the Mattawoman watershed. (WRR - June 2011)

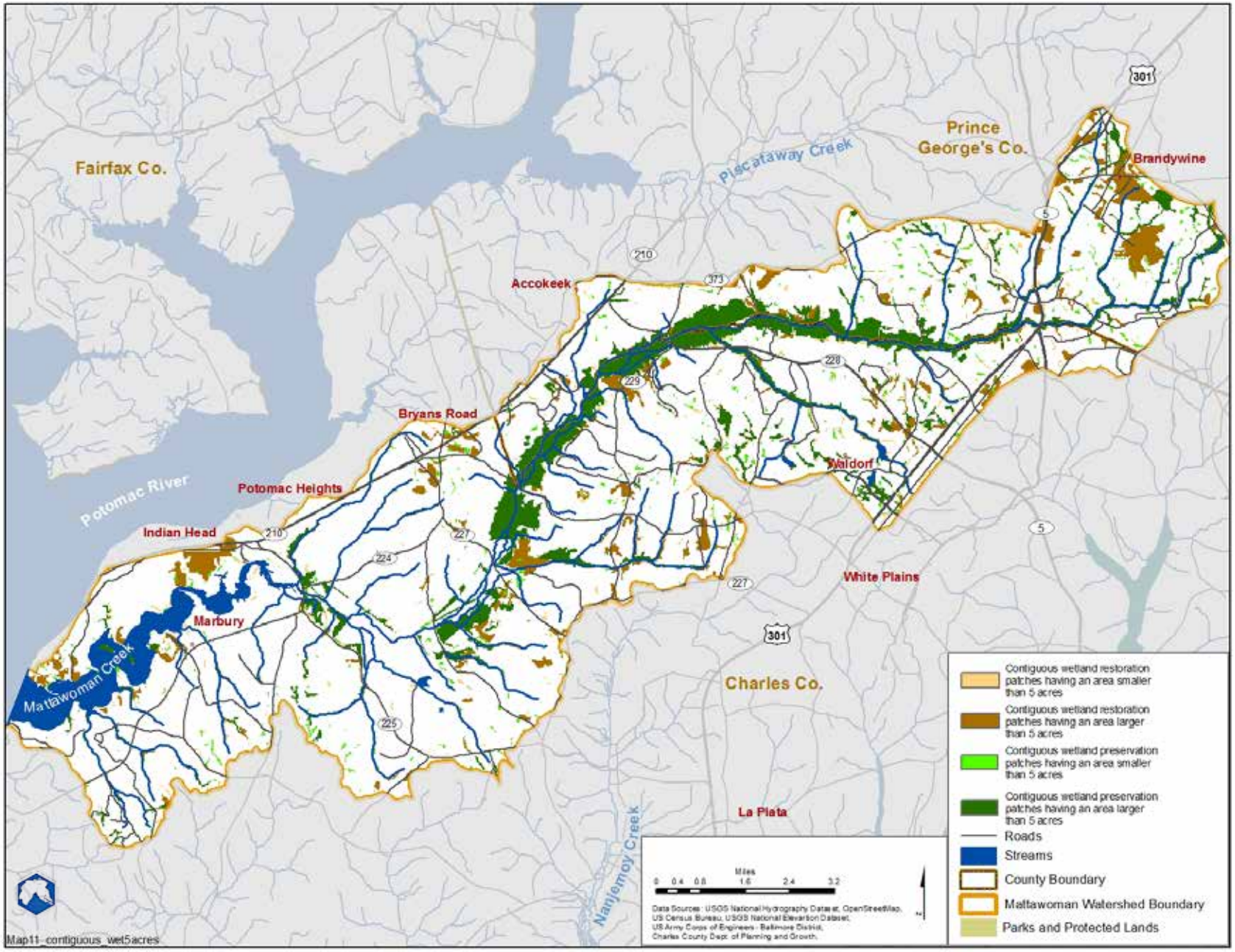

Figure A-9. Wetland preservation and restoration opportunities by size (larger than five acres; smaller than 5 acres). (WRR - June 2011)

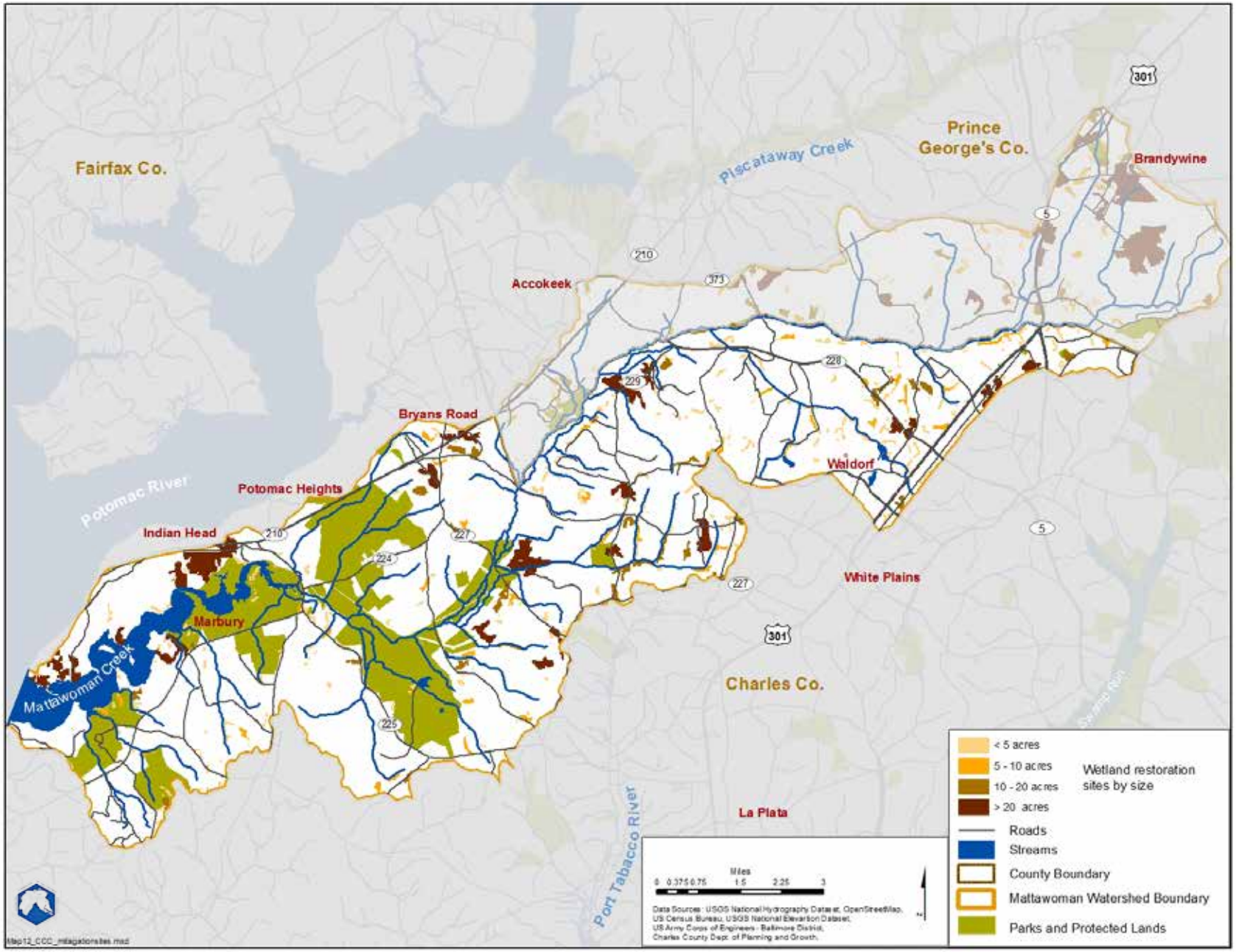

Figure A-10. Wetland restoration opportunities in the Charles County portion of the Mattawoman Creek watershed ordered by area. (WRR - June 2011)

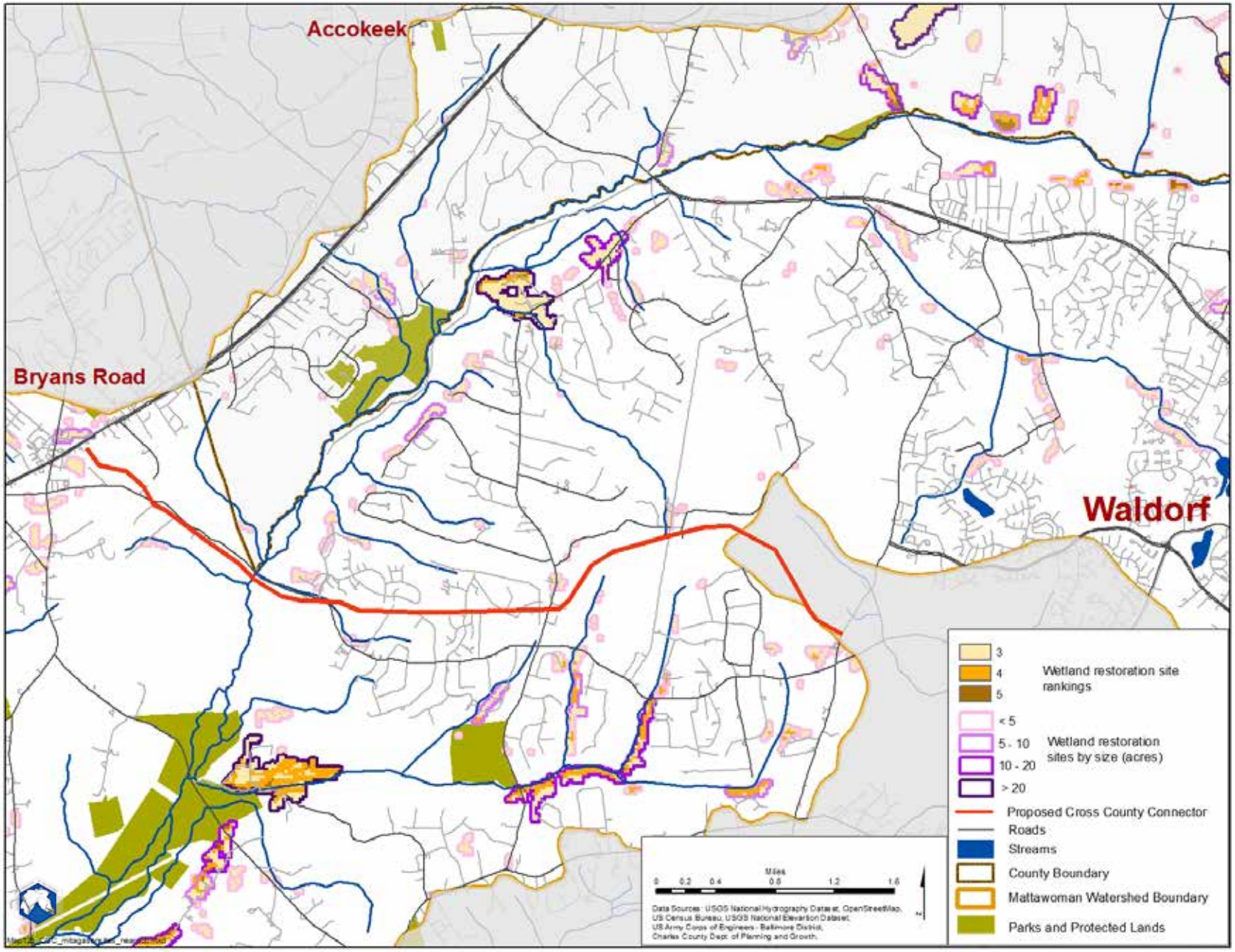

Figure A-11. Wetland restoration opportunities near the proposed Cross County Connector, by rank and area. (WRR - June 2011)

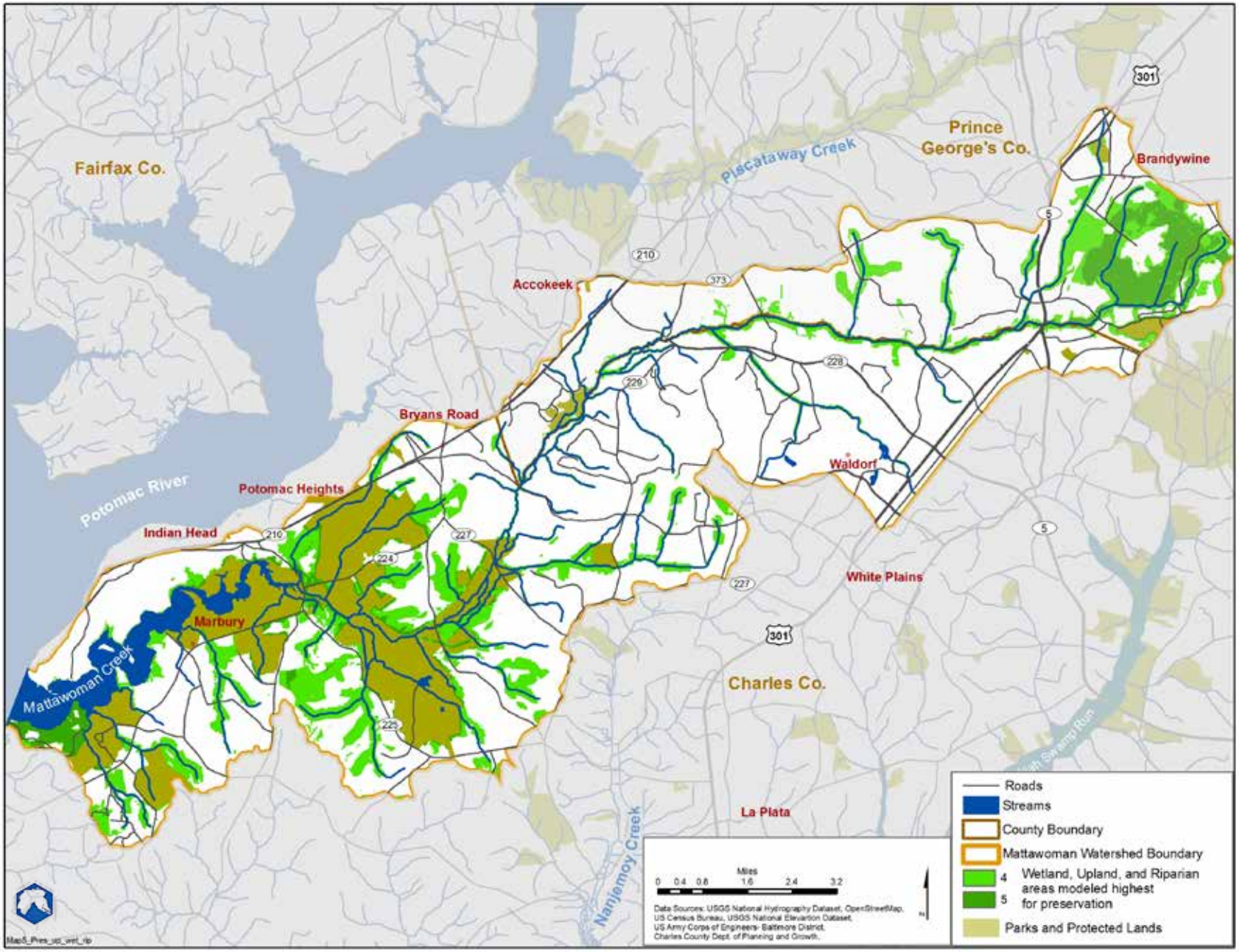

Figure A-12. High value wetland, upland, and riparian preservation opportunities. (WRR - June 2011)

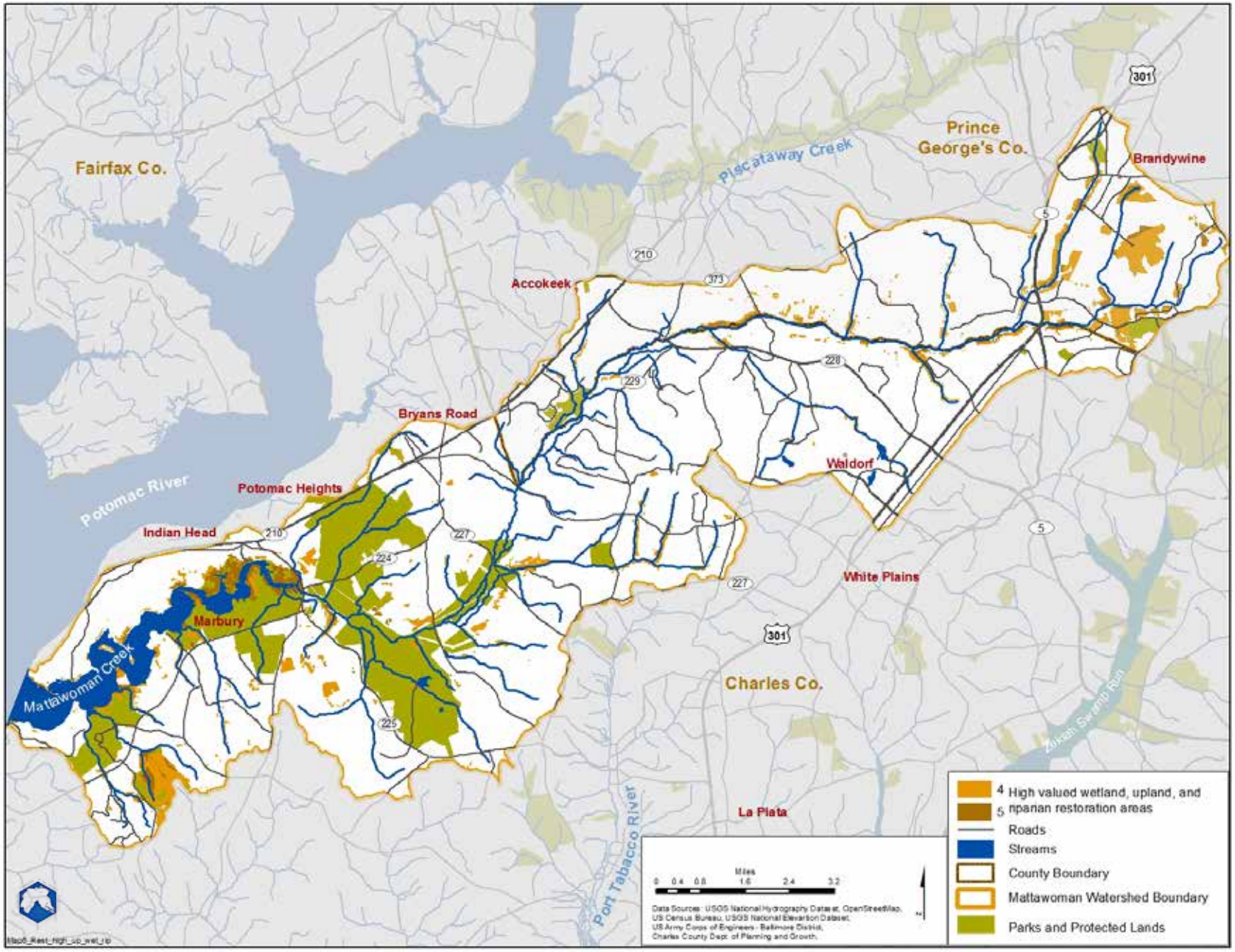

Figure A-13. High value wetland, upland, and riparian restoration opportunities. (WRR - June 2011)

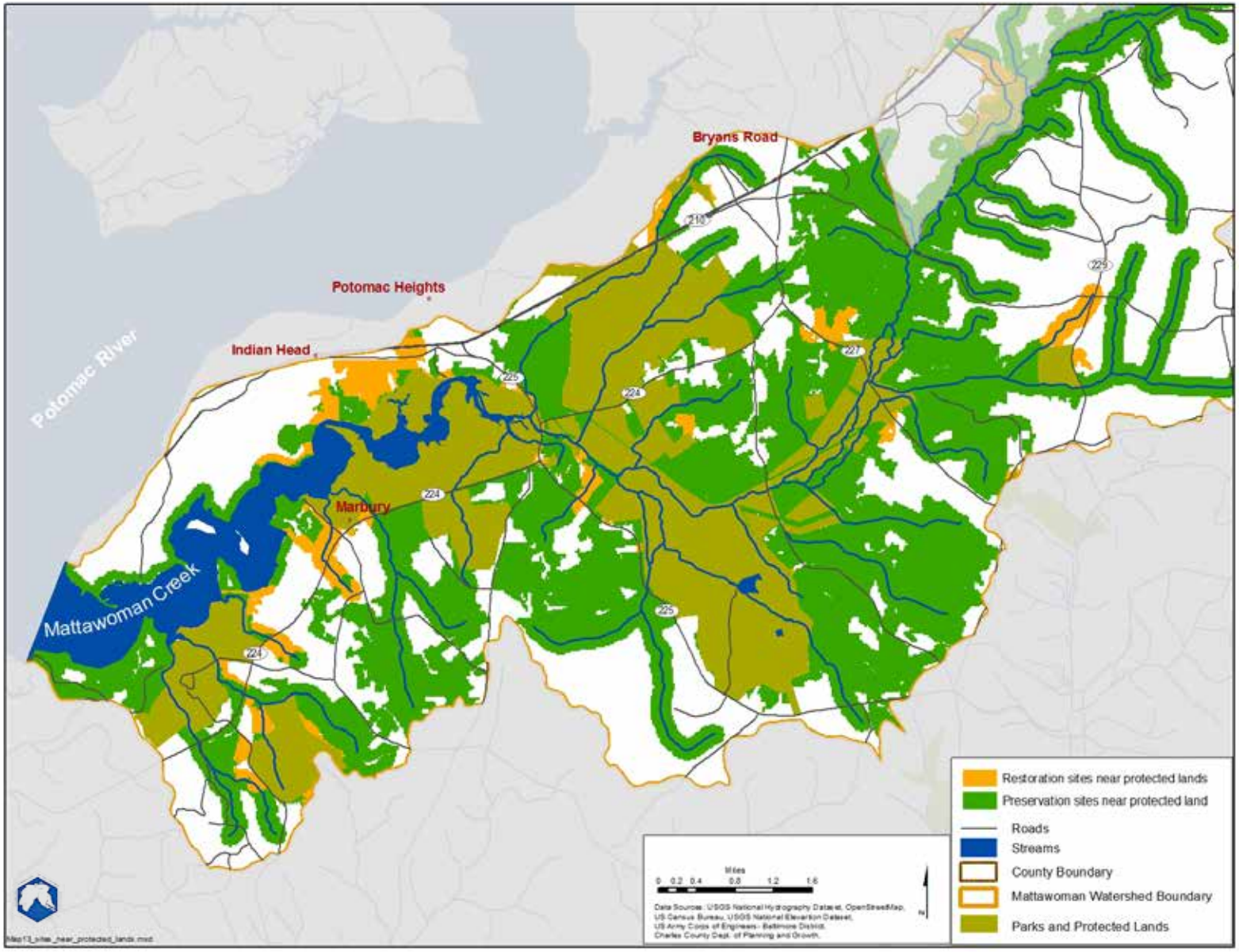

Figure A-14. Wetland, upland, and riparian preservation and restoration opportunities adjacent to existing protected lands in the lower Mattawoman. Opportunities were grouped regardless of rank to identify larger parcels connected to protected lands. (WRR - June 2011)

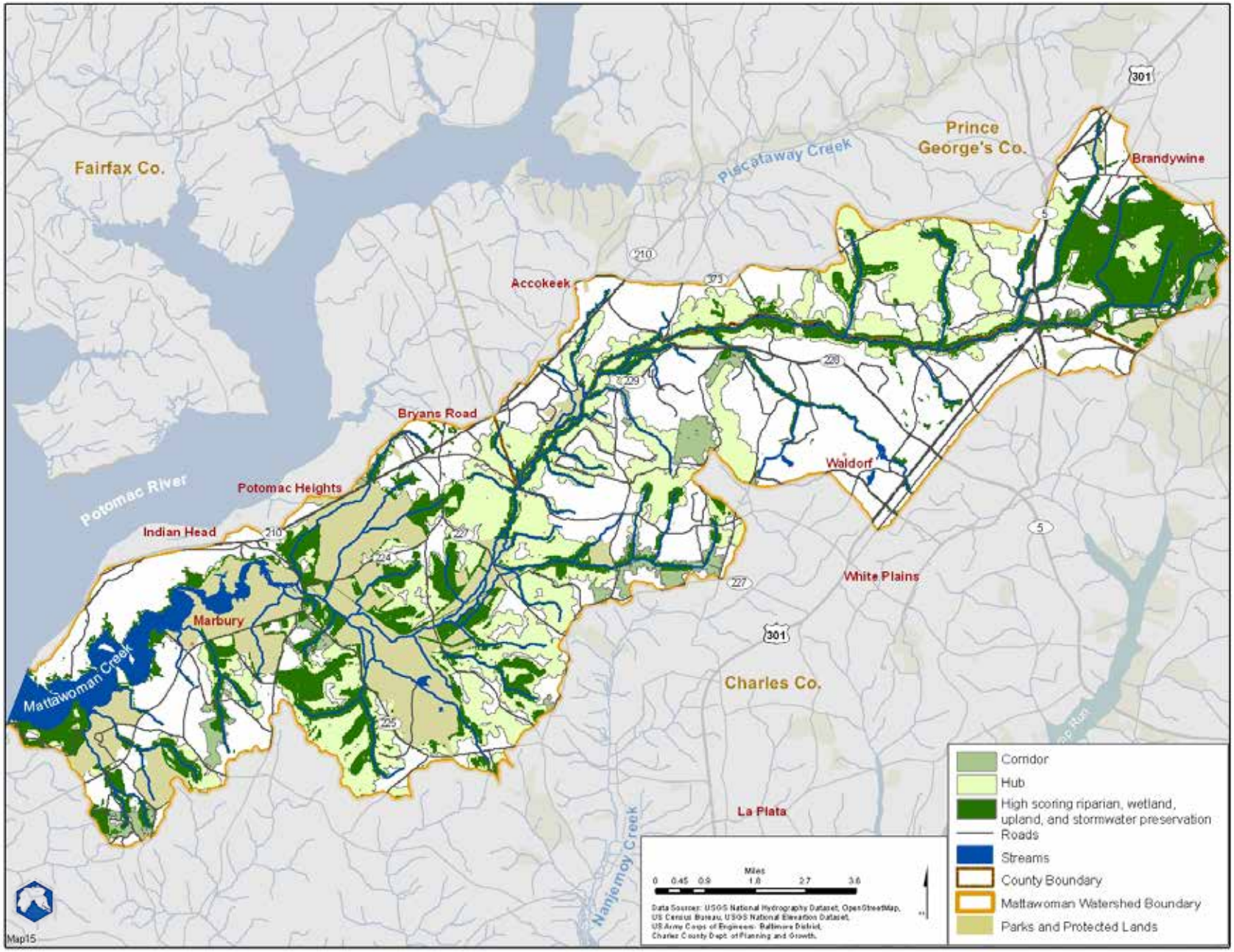

Figure A-15. Green Infrastructure network in the Mattawoman watershed and the high value (rank of 4 or 5) preservation opportunities within that network. (WRR - June 2011)

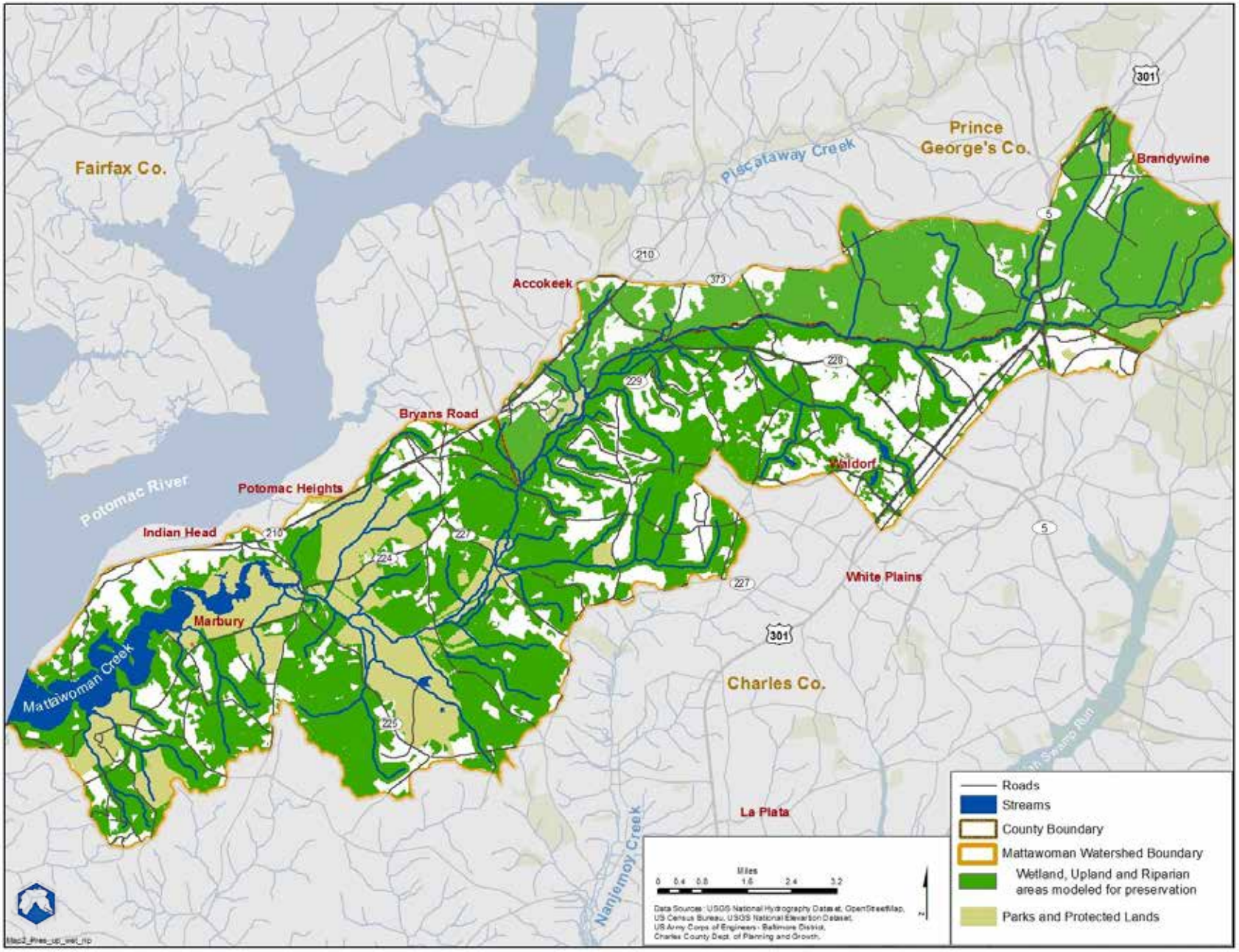

Figure A-16. Wetland, riparian, and/or upland preservation opportunity areas in the Mattawoman watershed that received any rank (one through five). (WRR - June 2011)

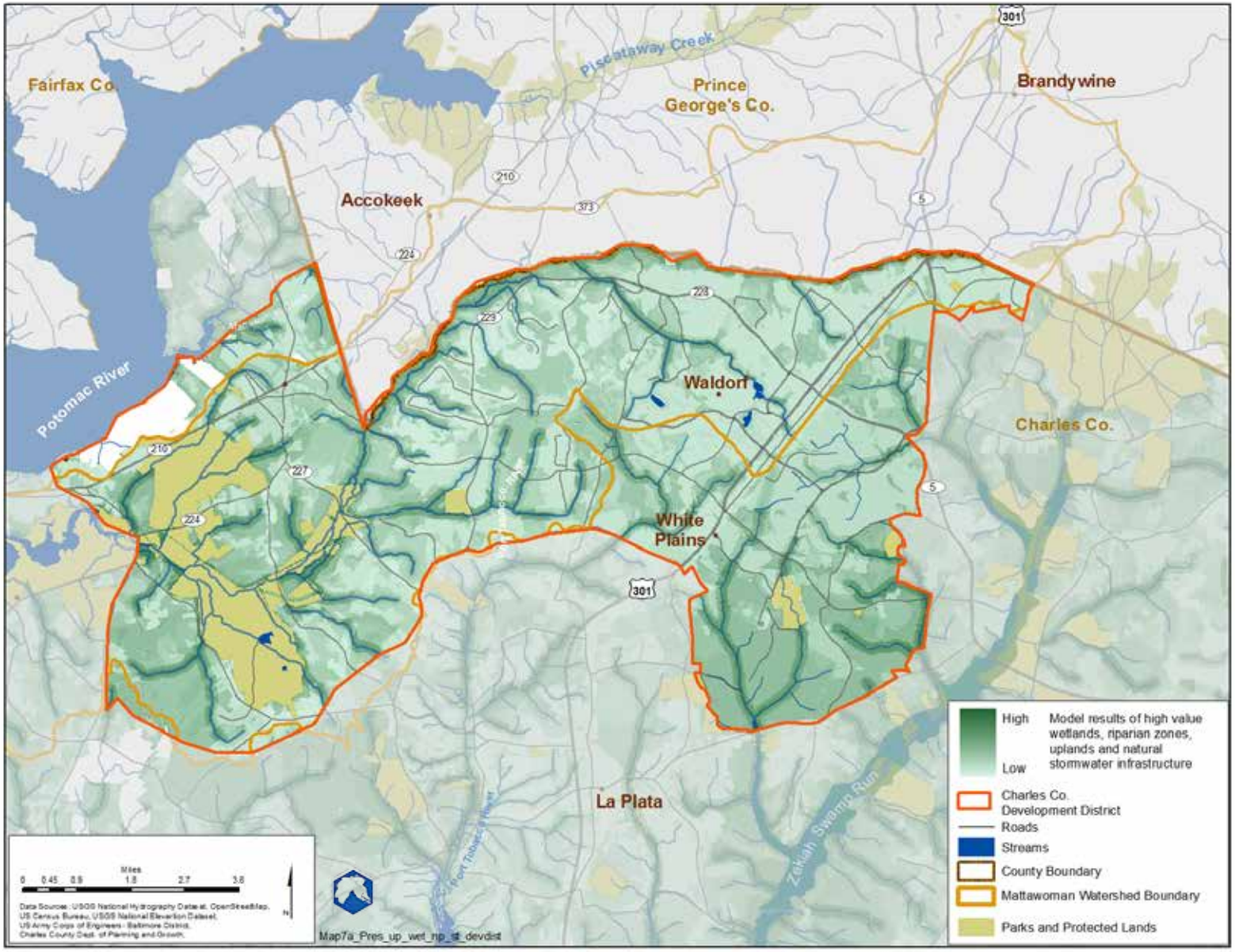

Figure A-17. Preservation opportunities in the Charles County Development District. Scores from the four preservation analyses were summed at each location to get a cumulative preservation value. (WRR - June 2011)

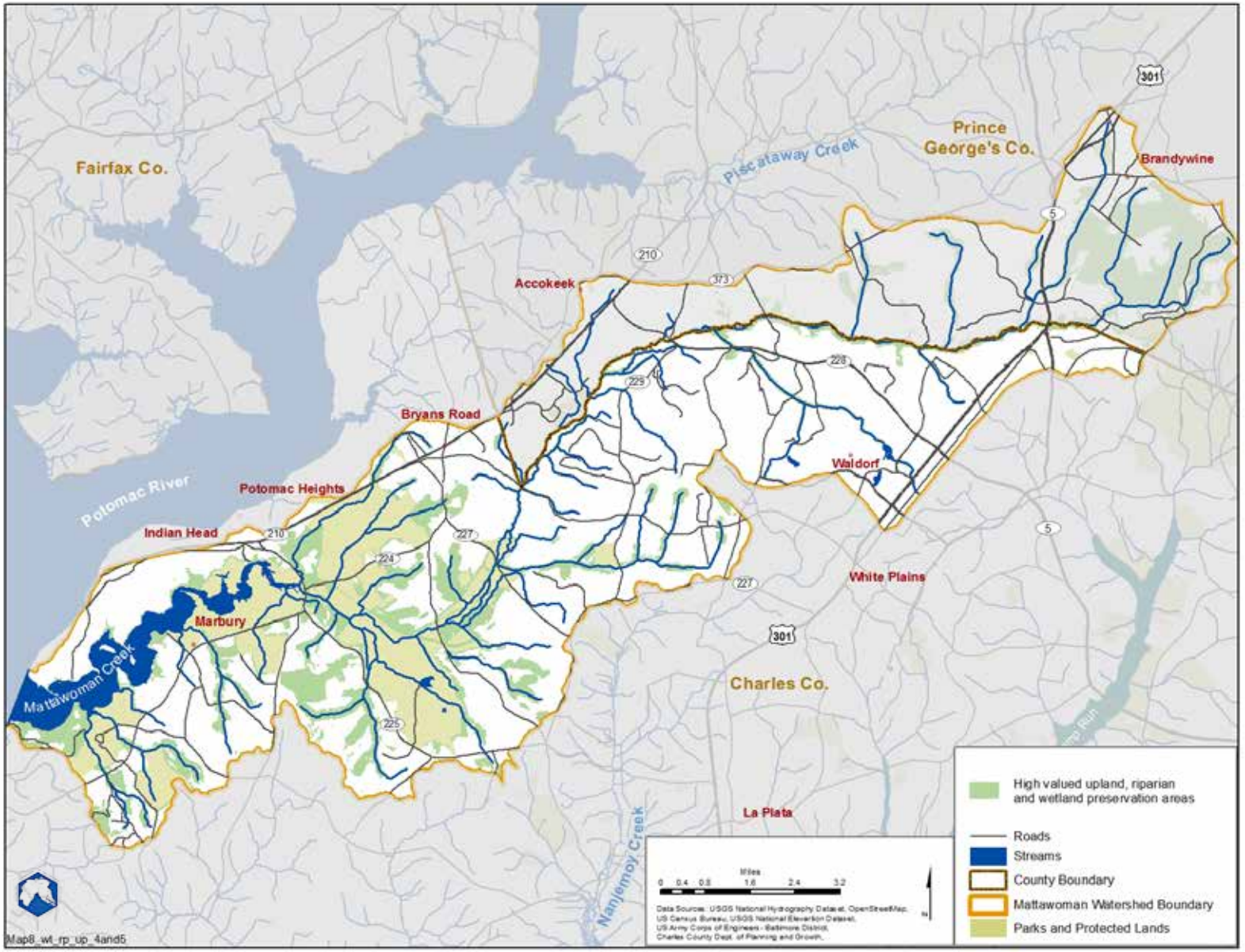

Figure A-18. High priority (rank four or five) wetland, upland, riparian preservation opportunities in the Charles County portion of the Mattawoman watershed. These site could be used for a natural resource-focused TDR program. (WRR - June 2011)

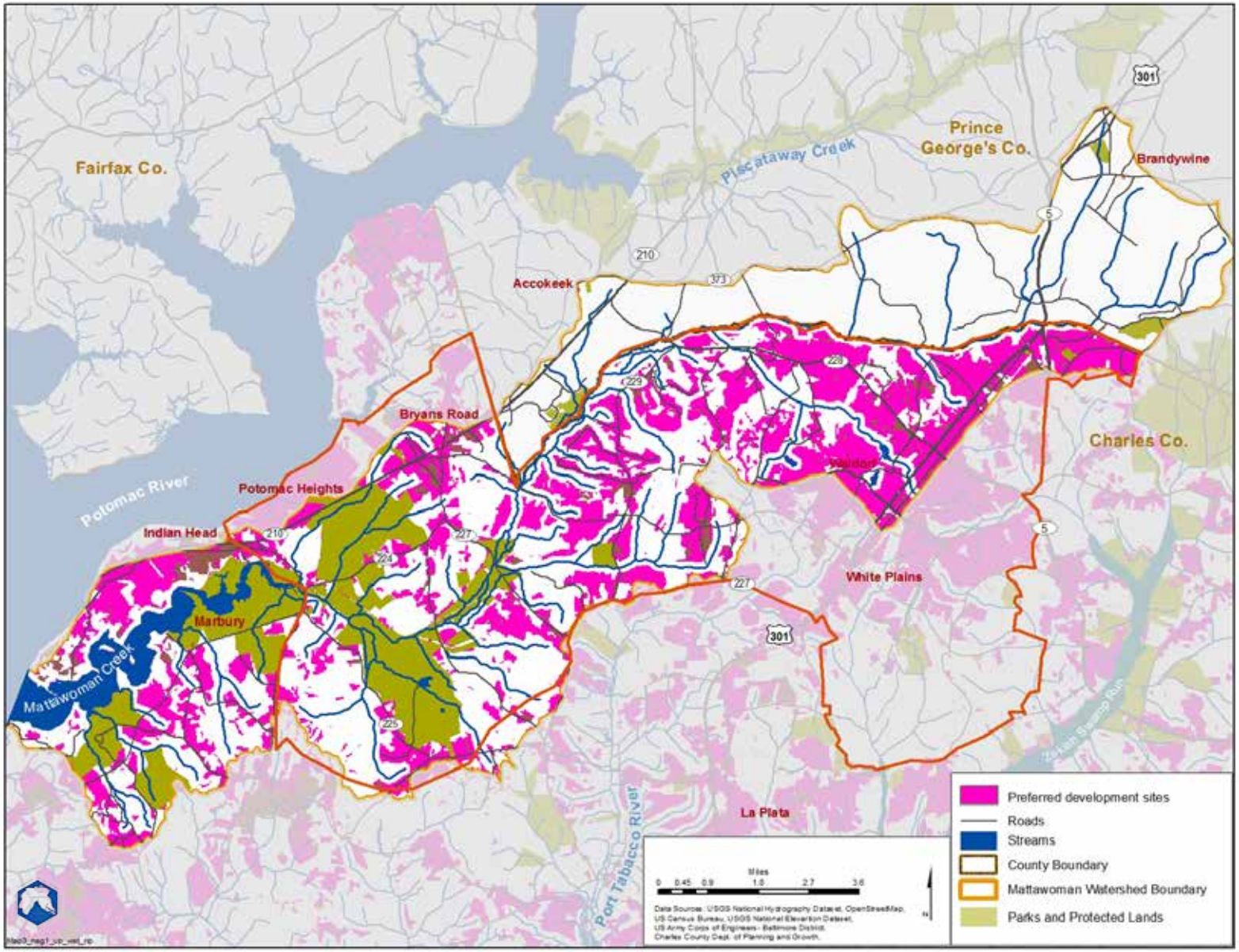

Figure A-19. Sites in Charles County determined to be unsuitable for wetland, riparian, and upland preservation (Sites are unsuitable for all three analyses. Sites unsuitable for one or two of the analyses are not shown). (WRR - June 2011)

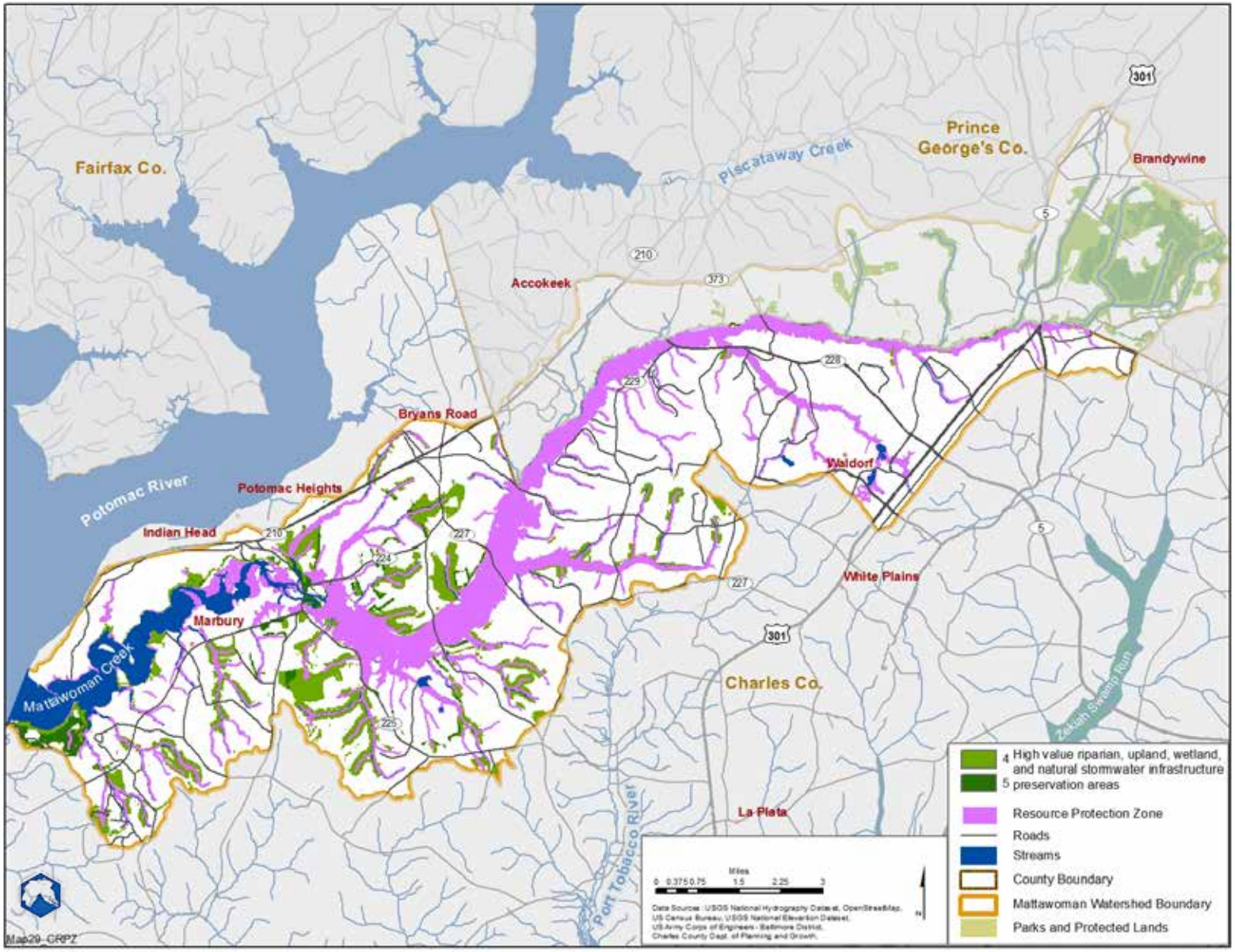

Figure A-20. High value (rank four or five) preservation opportunities in the Mattawoman watershed that could be added to the existing Resource Protection Zone in Charles County. (WRR - June 2011)

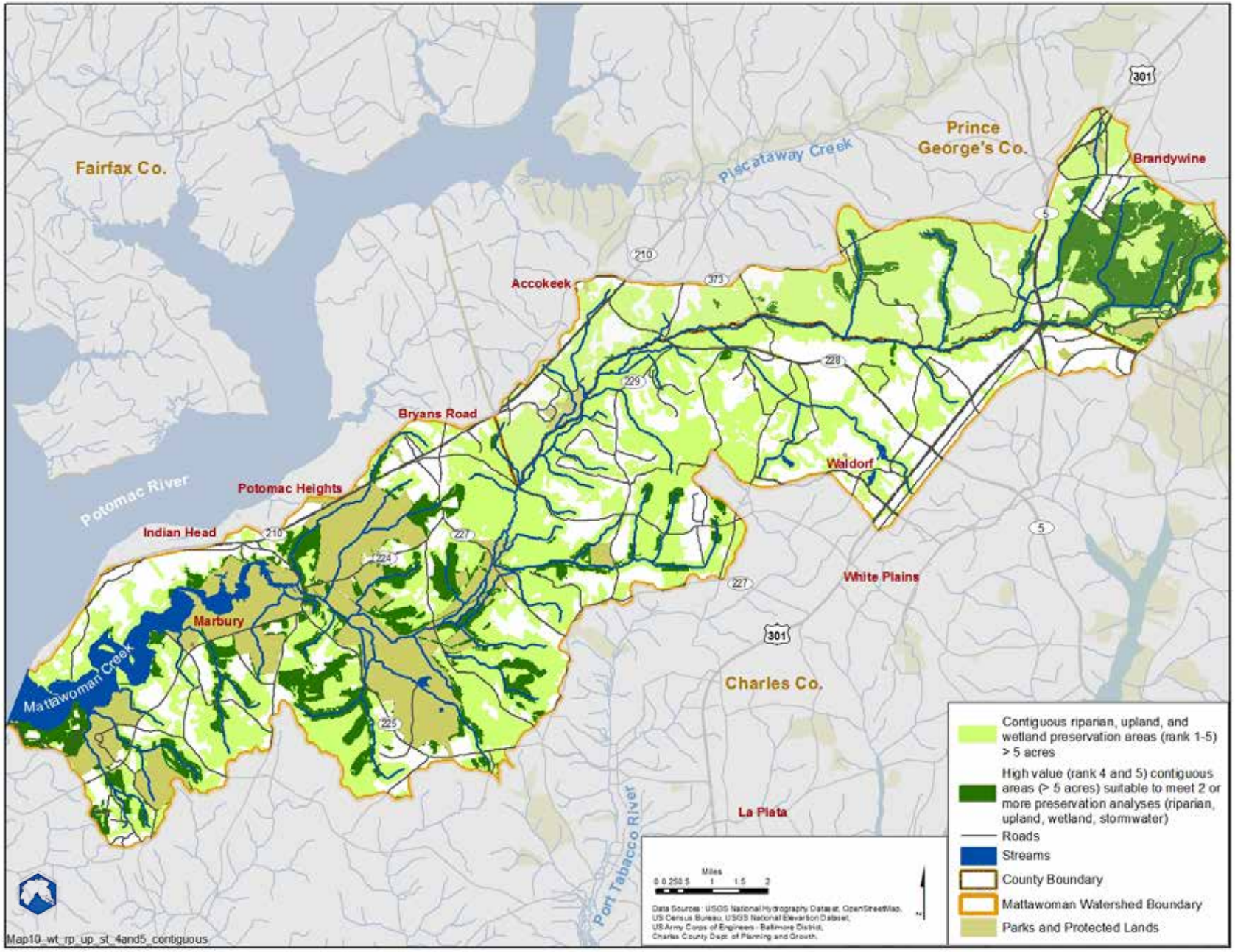

Figure A-21. Contiguous preservation opportunities that could serve as the basis for an open space network in the Mattawoman watershed. (WRR - June 2011)

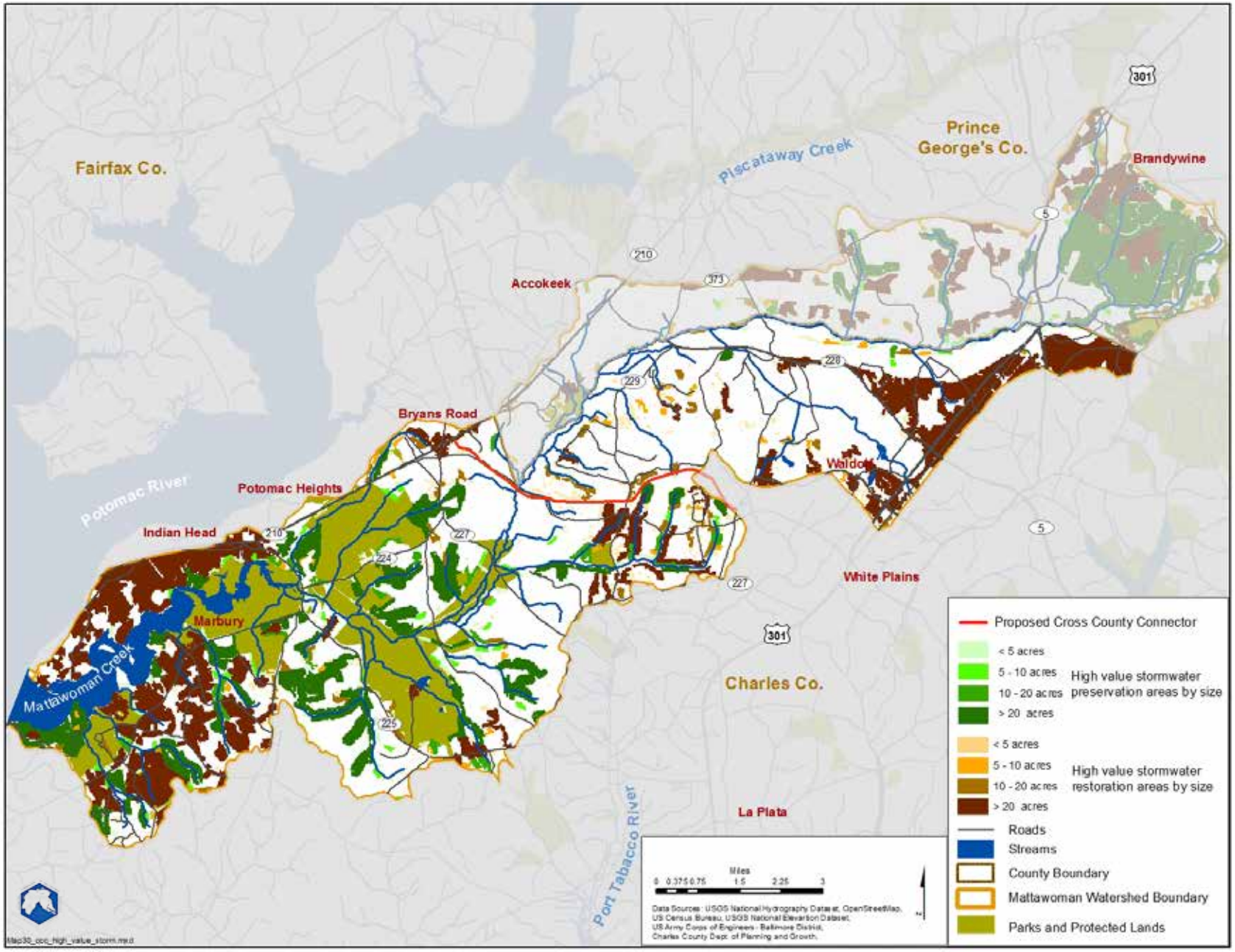

Figure A-22. High value (rank of four or five) stormwater restoration and preservation opportunities shown by area. (WRR - June 2011)

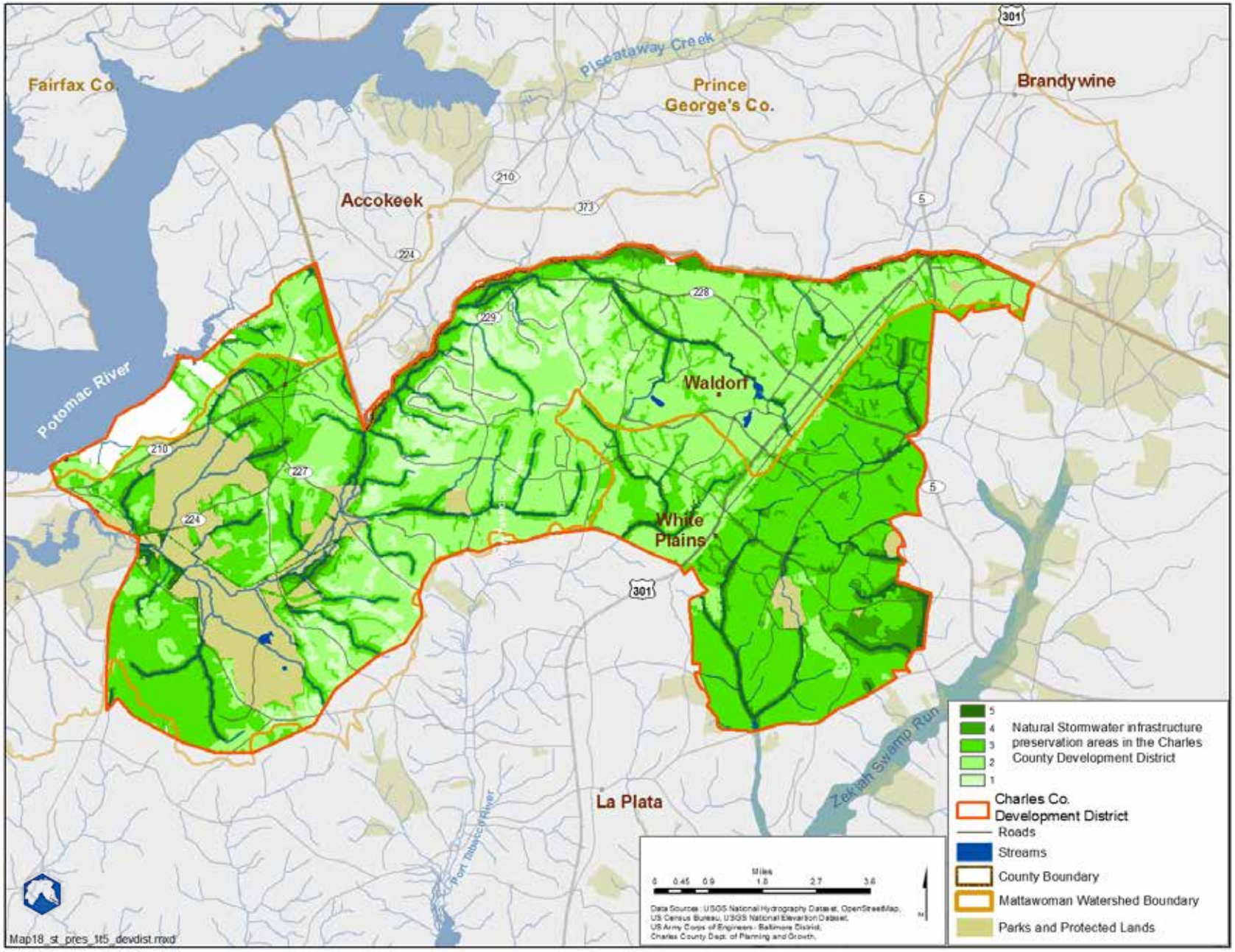

Figure A-23. Natural stormwater infrastructure preservation opportunities in Charles County's MS4 area. (WRR - June 2011)

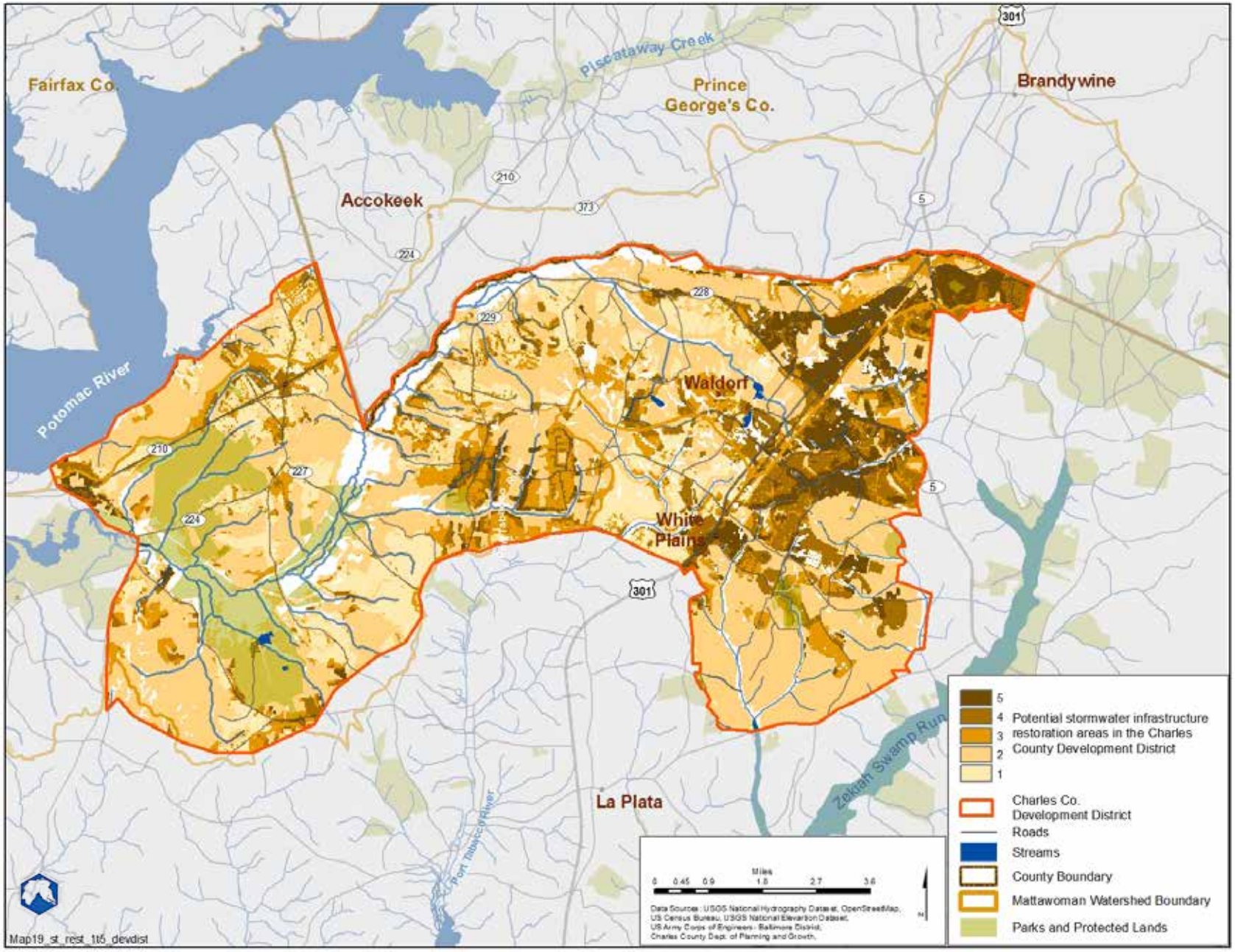

Figure A-24. Opportunities to restore compromised stormwater areas in Charles County's MS4 area. (WRR - June 2011)

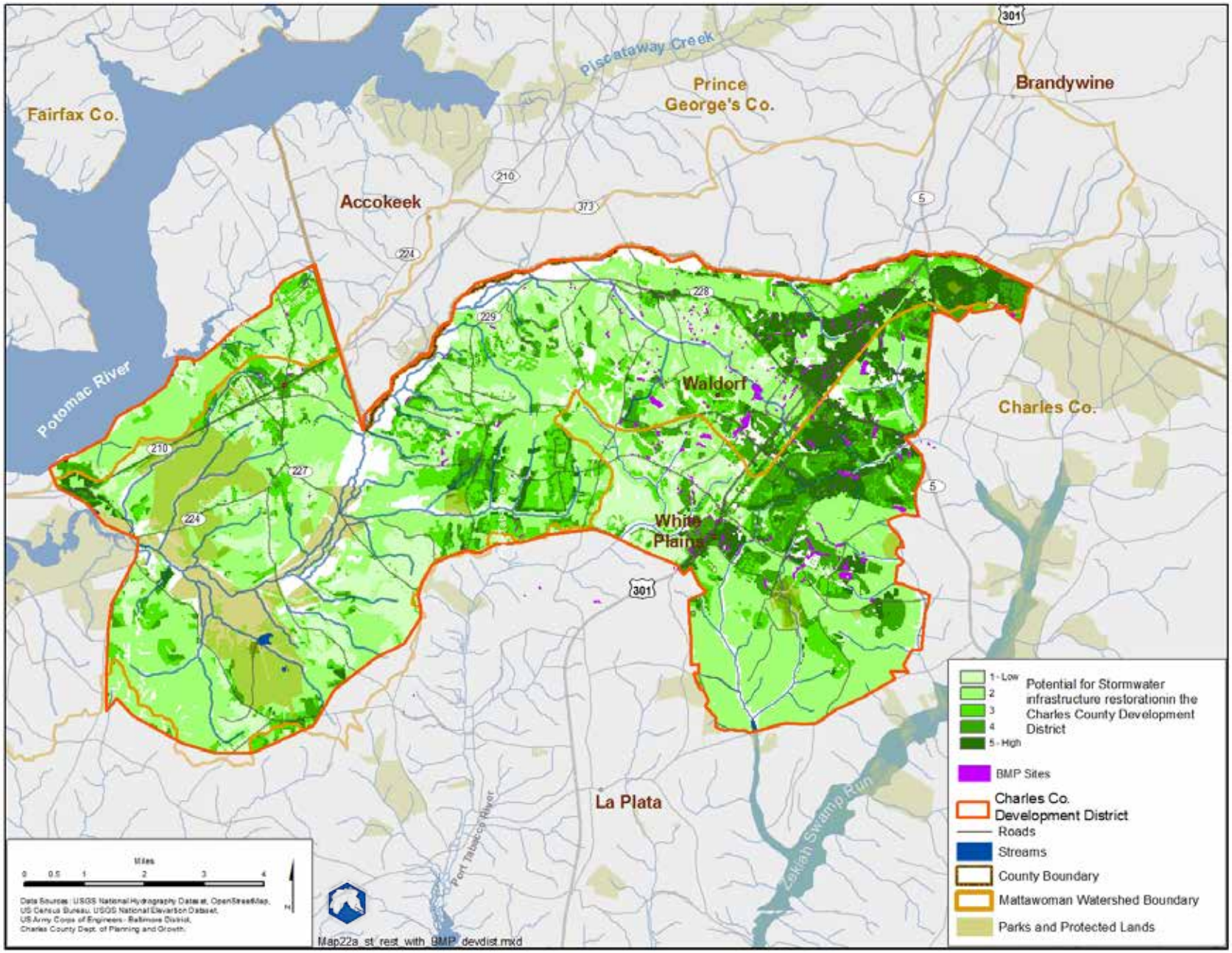

Figure A-25. Existing stormwater BMPs in the MS4 area compared with locations for potential natural stormwater infrastructure preservation. (WRR - June 2011)

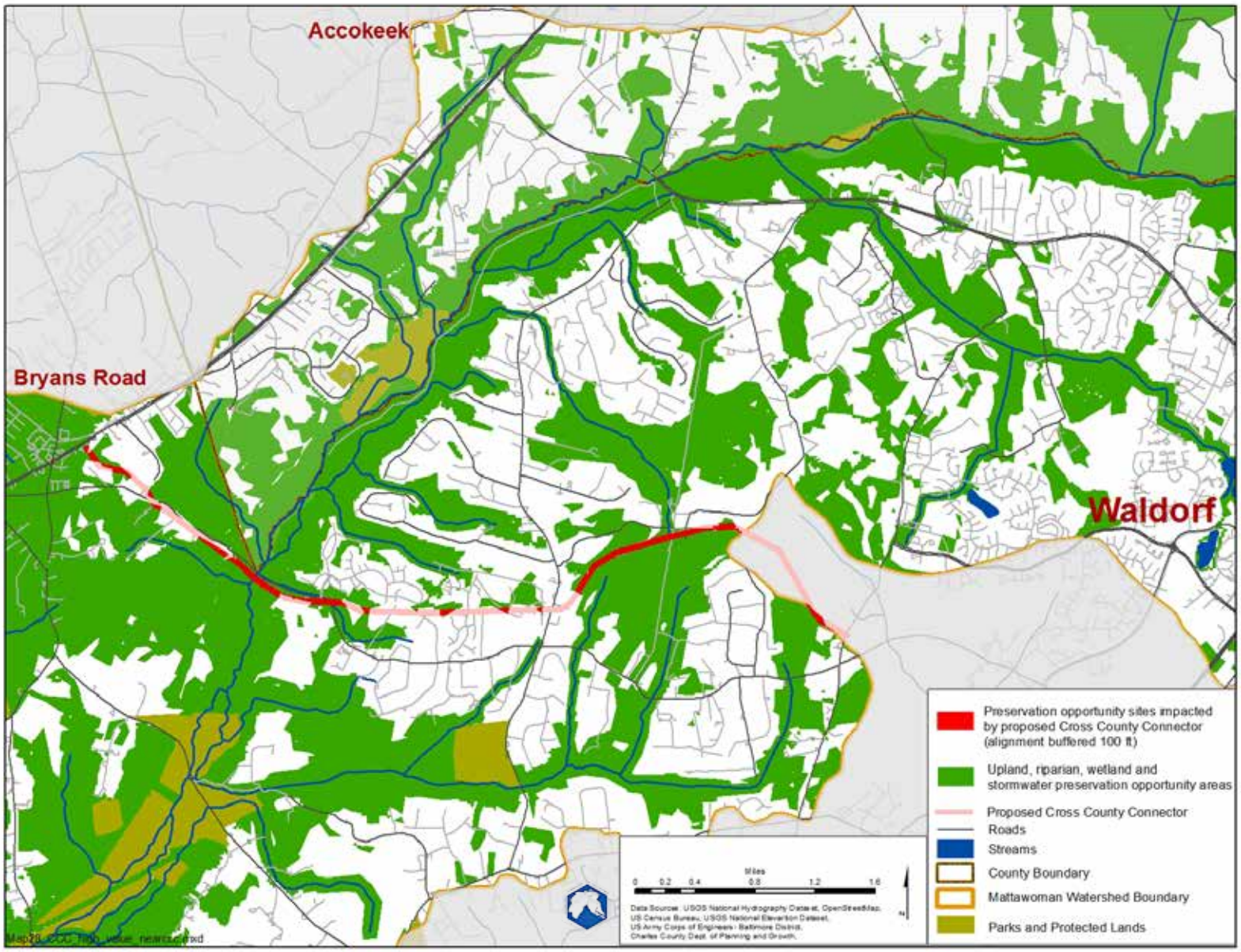

Figure A-26. Preservation areas that would be impacted by the proposed Cross County Connector. The map shows areas from the four preservation models that received a rank of three, four, or five. (WRR - June 2011)

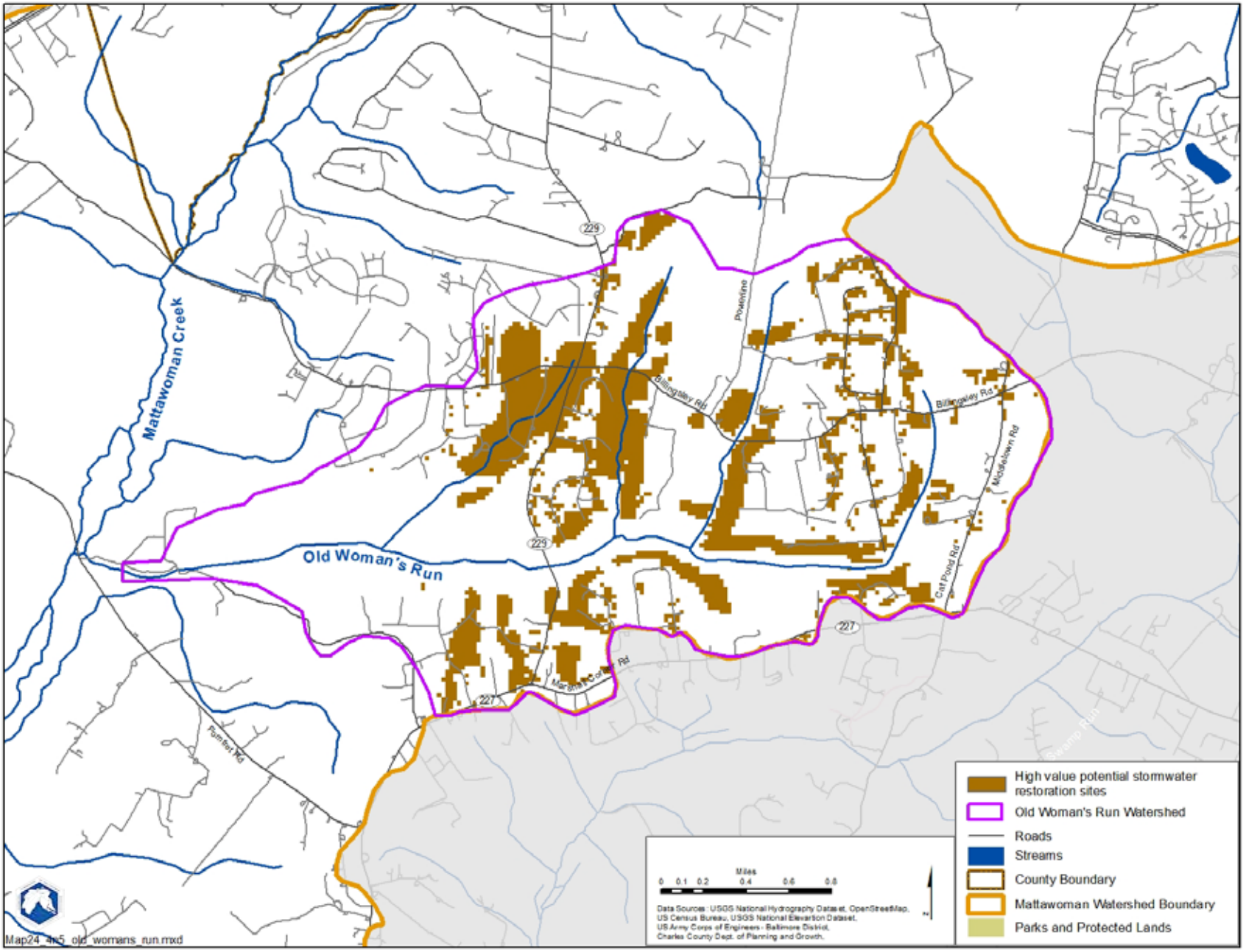

Figure A-27. High priority opportunities to improve stormwater management in the Old Woman's Run catchment. (WRR - June 2011)

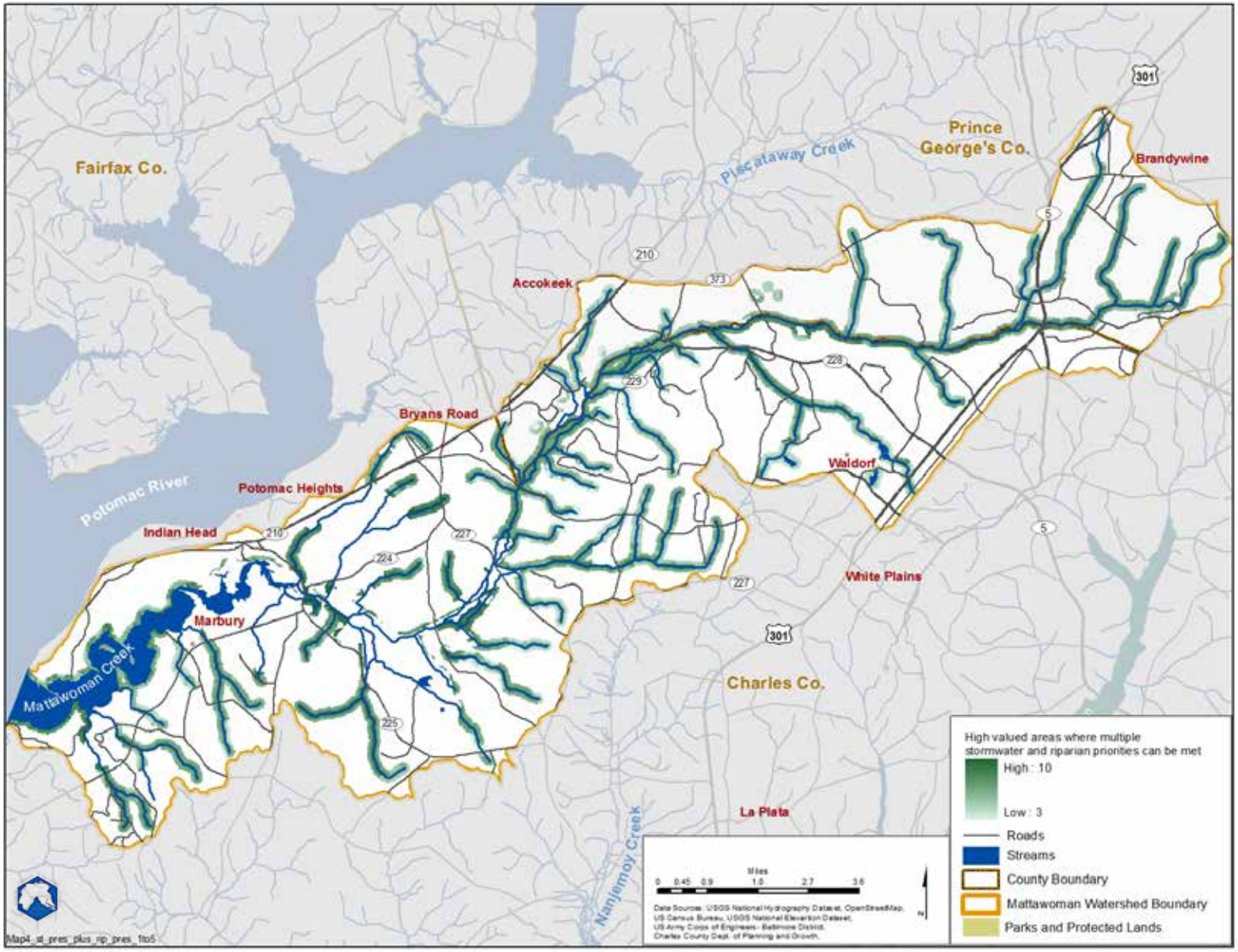

Figure A-28. Natural stormwater infrastructure and riparian preservation opportunities. Results shown are the sum of the ranks for each analysis. Thus, if a location received a five for stormwater preservation and a three for riparian preservation, its new value is eight. (WRR - June 2011)

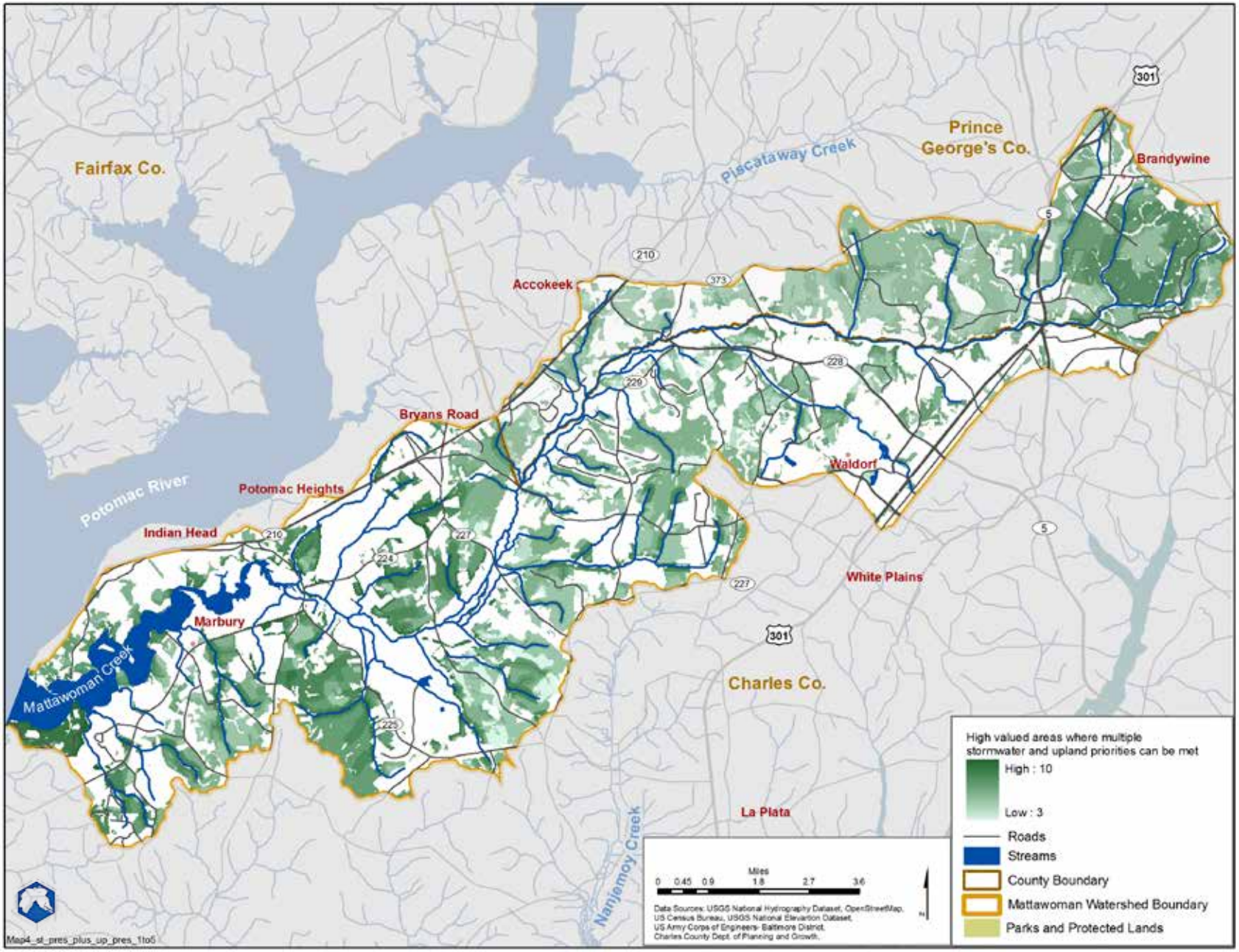

Figure A-29. Natural stormwater infrastructure and upland preservation opportunities (summed results). (WRR - June 2011)

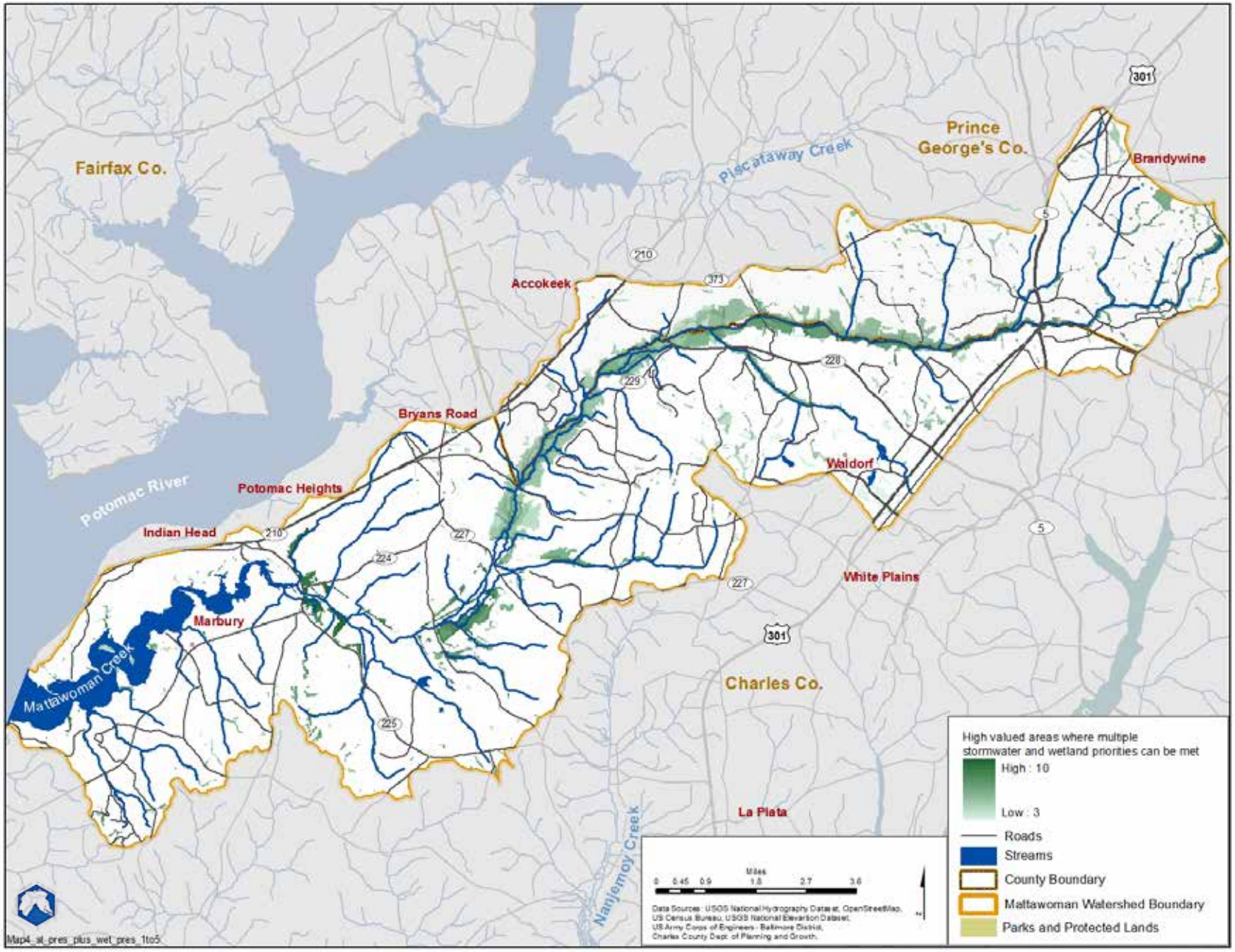

Figure A-30. Natural stormwater infrastructure and wetland preservation opportunities (summed results). (WRR - June 2011)

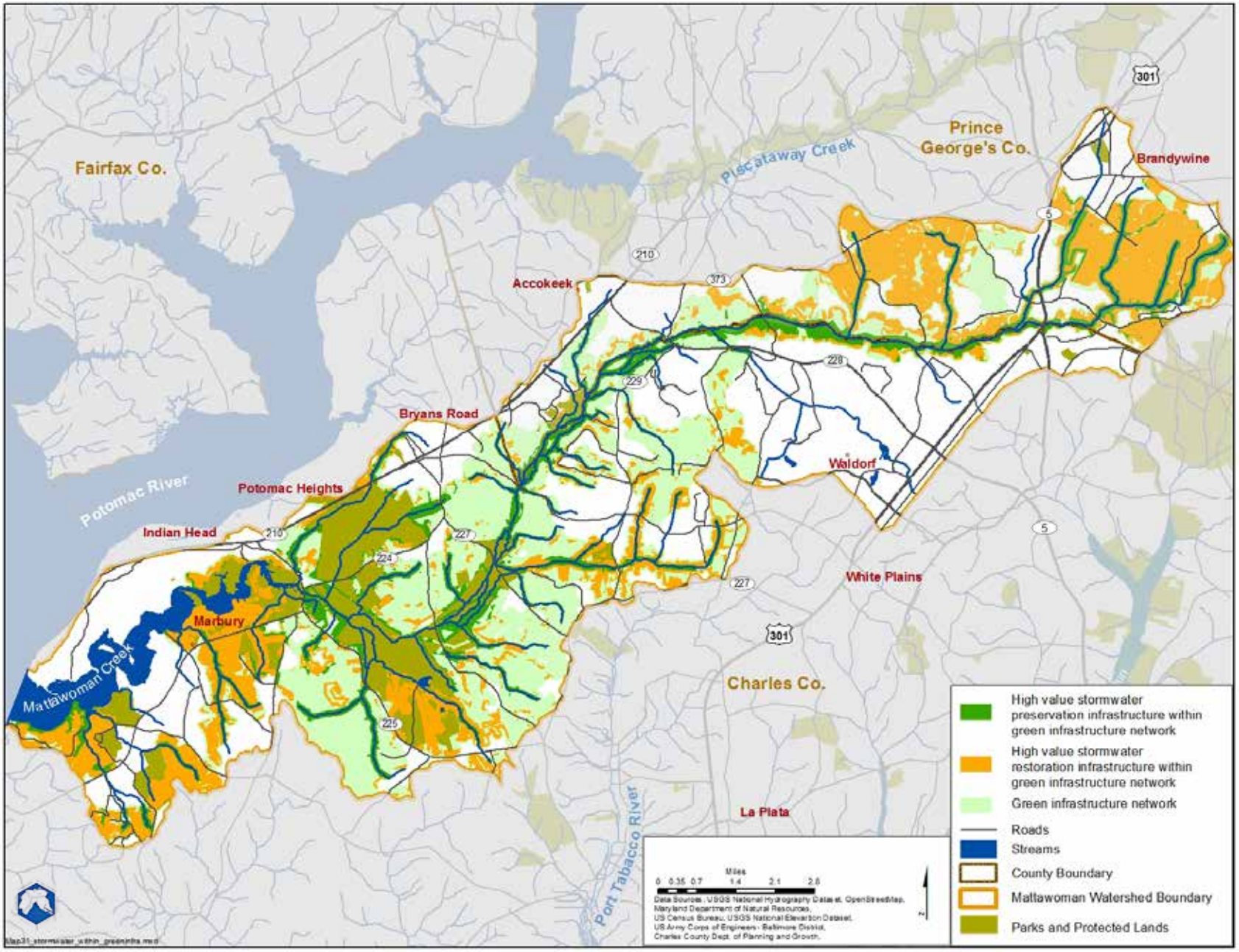

Figure A-31. High value stormwater preservation and restoration opportunities in the green infrastructure network. (WRR - June 2011)

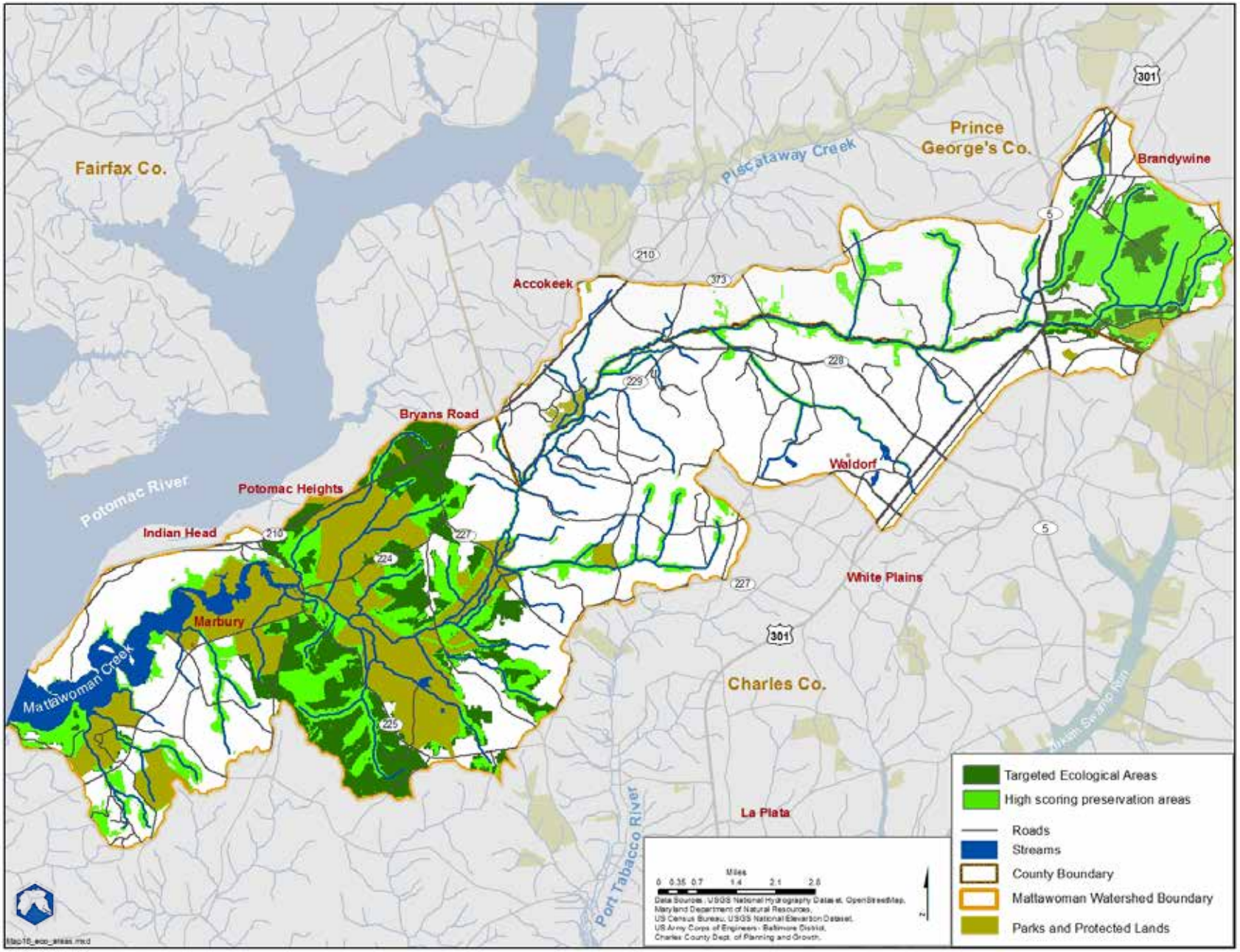

Figure A-32. High priority (rank of four or five) wetland, upland, riparian, and stormwater preservation opportunities in Targeted Ecological Areas. (WRR - June 2011)

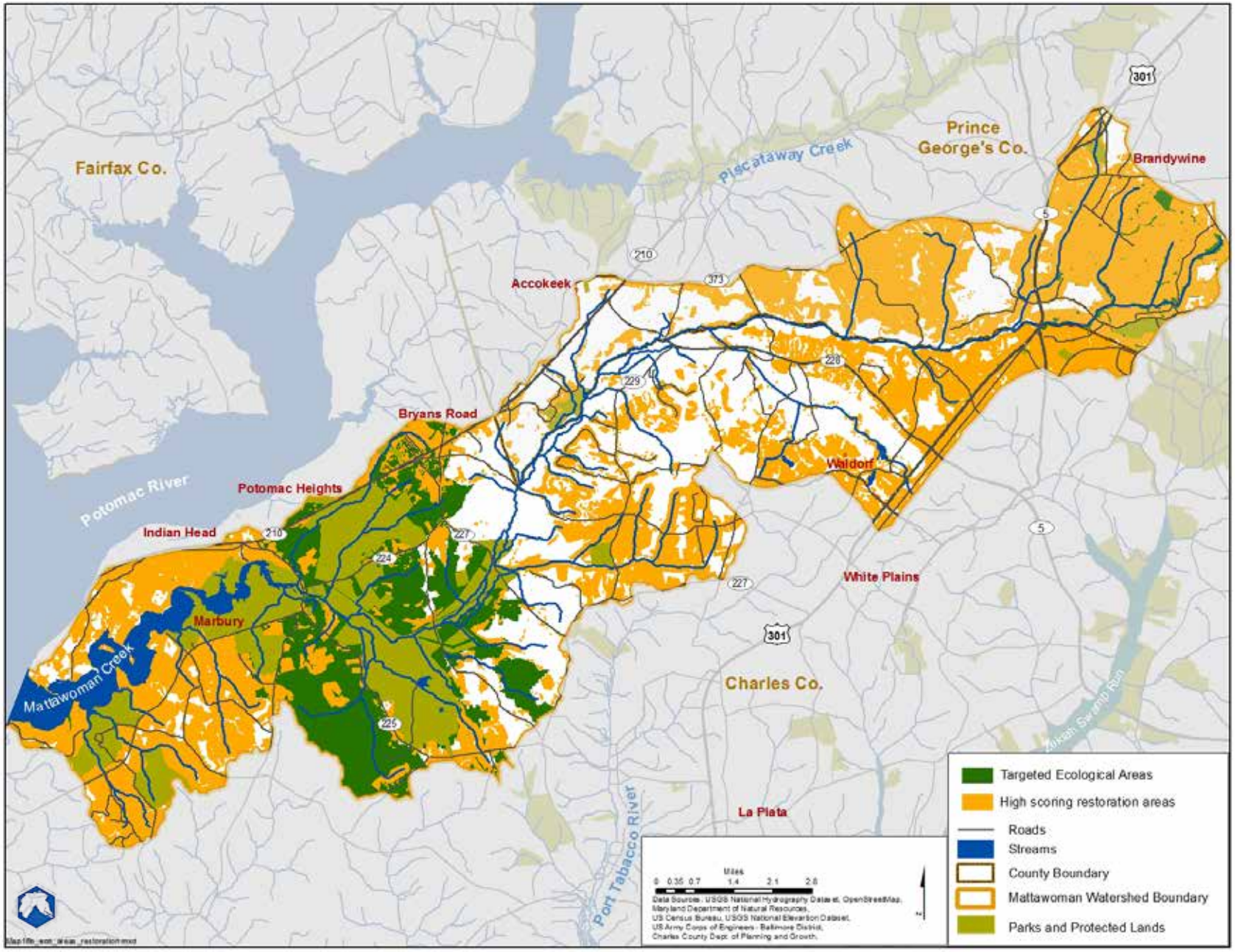

Figure A-33. High priority (rank of four or five) wetland, upland, riparian, and stormwater restoration opportunities in Targeted Ecological Areas. (WRR - June 2011)

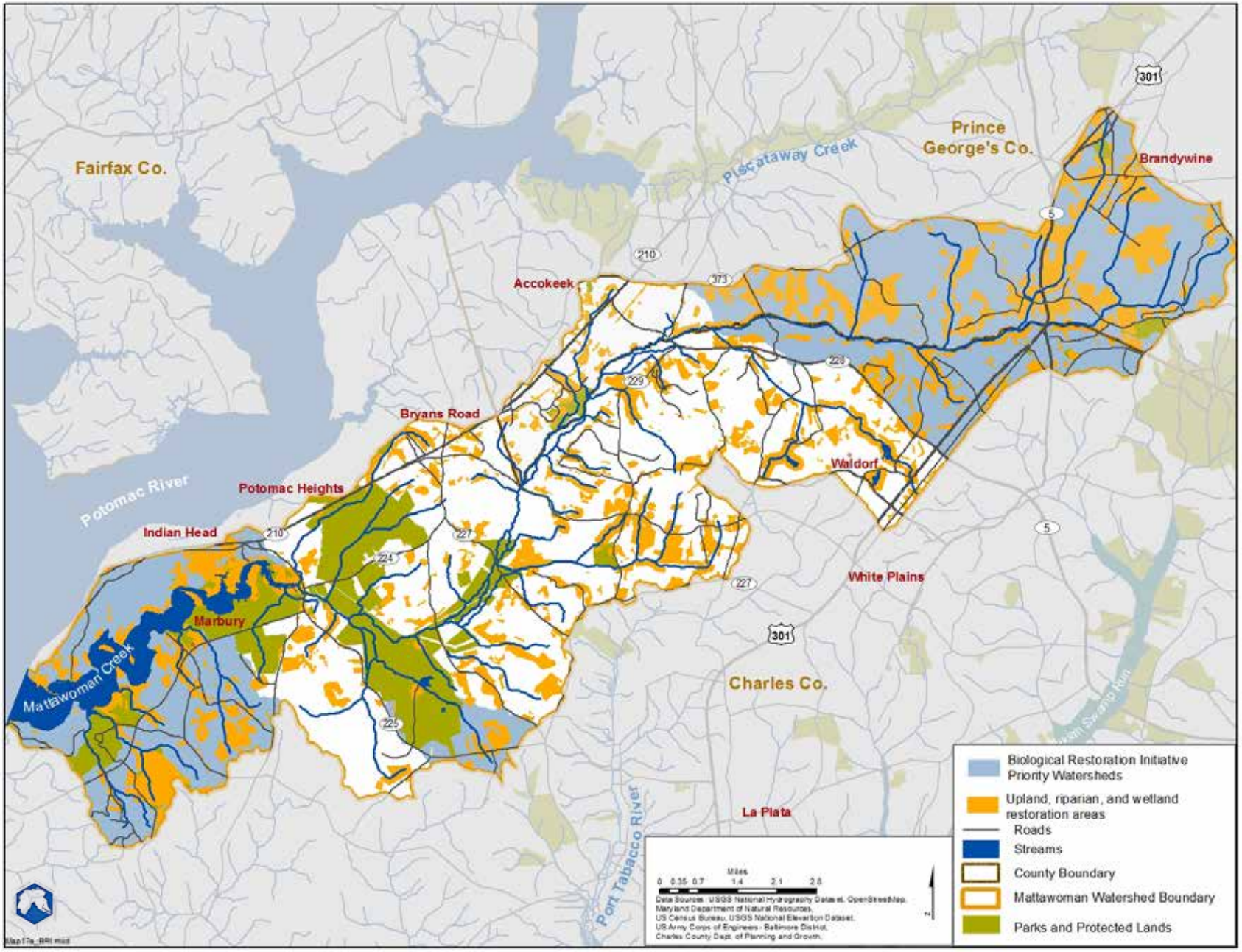

Figure A-34. Overlapping areas of the Biological Restoration Initiative priority watersheds and opportunities for upland, riparian, and wetland restoration. (WRR - June 2011)