Port Tobacco River Watershed Restoration Action Strategy

Prepared For:
Charles County Department of Planning and Growth Management
County Government Building
La Plata, MD 20646

Prepared By:
Center for Watershed Protection
8390 Main Street, 2nd Floor
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JUNE 20, 2007

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June 20, 2007

Acknowledgements

We would like to thank Karen Wiggen, Environmental Planner with the Charles County Department of Planning and Growth Management, for her dedication, assistance, response and contributions. This project would not have occurred without the dedication of the Port Tobacco River Conservancy volunteer officers, particularly Dave Gardiner and Gloria Heisserman.

This project was made possible through a grant from the Maryland Department of the Environment (MDE). We would like to thank MDE staff Robin Pellicano, Danielle Lucid, Scott Macomber, and Niles Primrose. Additionally, previous work in the watershed, which was funded by the Chesapeake Bay Trust and the National Fish and Wildlife Foundation, contributed significantly.

Technical guidance for this project was provided by the Steering Committee. Steering Committee members were:

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Finally, the fieldwork was possible with the assistance of a number of volunteers. Thanks to Port Tobacco River Conservancy volunteers Connie Dunbar, Dave Gardiner, Don Zimmer, and Sherie Zimmer; Johns Hopkins University student Jennifer Bassman; and Town of La Plata intern Jesse Flerlage.

The Center for Watershed Protection project team was led by Sally Hoyt (Project Manager) and Rebecca Winer-Skonovd (Quality Control). Thanks go out to the current and former Center for Watershed Protection staff who contributed to this watershed planning effort: Emily Corwin, Lisa Fraley-McNeal, Harry Hibbits, Mike Novotney and Paul Sturm.

Table of Contents

Appendices

A. Public Input Summary
B. *Subwatershed Delineation, Impervious Cover Analysis, and Management Classification for the Port Tobacco Watershed*
C. Evaluated Sites – Tables and Maps
D. *Watershed Treatment Model for the Port Tobacco Watershed Restoration Action Strategy*
E. Septic System Information
    - PTRC Septic Survey Results and Bacteria Monitoring Results
    - Soils and Septic Map
    - Profile Sheet: *N-9 Septic System Cleanouts* – includes links to municipal programs
    - *Household Guide to Protecting Our Water Quality: The Septic Connection* - brochure by PTRC
F. Land Conservation
    - Protection Sites Identified During Fieldwork – Table
    - Green Infrastructure Assessment (DNR 2005)
G. Restoration Projects
    - Tables – Retrofit/Restoration Projects, SHA Projects
    - Excerpts from *Subwatershed Restoration in the Port Tobacco Watershed* – includes preliminary concept designs for three stormwater retrofits
H. Volunteer Projects
    - Table: Restoration Projects for Volunteers
    - Resources for Volunteer Construction Projects – list of web links
    - *Planting Trees Along Streams and Shorelines*
    - Profile Sheet: *N-20 BUFFERSCAPING* – includes links
I. Education
    - Table: Hotspot Assessment Sites
    - Neighborhood Pollution Prevention Education Internet Resources
    - Watershed Education: Increasing Public Awareness to Improve Water Quality – slideshow handouts
    - *Profile of the Port Tobacco River Watershed* – Educational pamphlet specifically for the watershed
J. Summary of Better Site Design Principles
K. Enforcement Actions
    - Table: Enforcement Actions
    - Table: Repair Sites
    - Photographs of ESC Violations in the Watershed
L. Illicit Discharge Detection and Elimination Resources
M. Field Data sheets (under separate cover)
N. CD of photos (under separate cover)
O. CD with project-specific GIS shapefiles and map files (under separate cover)

Part 1: Introduction

The Port Tobacco River Watershed Restoration Action Strategy (WRAS) is a two year planning and study process that began in 2005 with data collection, water quality monitoring, and visual assessments. The process pulls together efforts by the Port Tobacco River Conservancy (the Conservancy), Charles County Planning and Growth Management (the County), Maryland Department of the Environment (MDE), and the Center for Watershed Protection (Center) to create a strategy for implementing restoration and protection projects.

1.1 Project Background and Objectives

Concern for the Port Tobacco River (the River) has risen in recent decades as citizens and local and federal officials recognized the declining health of the River. Residents, local and state governments, and conservation groups are collaborating to restore the River. This watershed, a natural and historical resource, should have clear, navigable waters, be rich in fish and wildlife, and be safe for the residents and visitors that use it for recreation. The purpose of the WRAS is to select and describe projects and programs to improve impacted water quality and preserve sensitive areas in the Port Tobacco River watershed.

Formed in 2001, the Conservancy is a non-profit organization composed of citizens that have advocated for the health of their watershed while utilizing technical experts and environmental programs in Maryland. The Conservancy began monitoring the tidal section of the River in 2003, spurred by concern over bacteria levels. It regularly samples the waters for both quality indicators, like salinity and temperature, and ecological indicators, such as fish populations. Their monitoring efforts have moved upstream since that time, continuing to document the bacteria sources. The analytical tests of the water samples are funded through the Charles County Department of Health and Maryland Department of Health and Mental Hygiene. This testing has resulted in placement of the Port Tobacco River on the State's 303(d) list of polluted water bodies for impairment due to bacteria. In addition to bacteria concerns, the River is also 303(d) listed for impairment due to nutrients and sediment. In response to that impairment, MDE prepared a Total Maximum Daily Load (TMDL) for nutrients.

Existing Conditions Information

In 2005, teams from MDE, conducted a Stream Corridor Assessment and synoptic water quality testing. MDE released three documents in 2006 summarizing existing conditions in the watershed, these are:

- *Port Tobacco River Watershed Characterization*. Summarizes existing data on water quality, landscape and living resources (Maryland Biological Stream Survey, Stream Waders, etc).
- *Report on Nutrient Synoptic Survey in the Port Tobacco River Watershed.* Presents 2005 water quality testing results for nutrients, and bacteria.
- *Stream Corridor Assessment Survey for the Port Tobacco River Watershed.* Identifies stream impacts throughout the non-tidal portions of the watershed.

The detail contained in those documents is not presented in this strategy. However, these reports are referenced as sources for additional information:

http://www.dnr.state.md.us/watersheds/surf/proj/wras.html

The WRAS also builds on previous collaborative efforts between the Conservancy and the Center. Through other grant funding, these groups conducted a small scale assessment and compiled a strategy for a small tributary in 2005. The Conservancy conducted a survey of septic system owners and conditions, as well as outreach about septic system performance and maintenance. The Center conducted a subwatershed-scale vulnerability analysis that projected future conditions and identified management categories. As the WRAS process began, the partners narrowed the physical assessment scope to three subwatersheds, based on the vulnerability analysis: Hoghole Run, Jennie Run, and La Plata.

Strategy

To develop the WRAS, the Center evaluated the SCA data collected by MDE. The Center utilized this data to identify restoration projects in the stream corridor and uplands. The assessment methodology is described in Section 2 of this document. Non-site specific, programmatic recommendations were developed based on the fieldwork and discussions with the Steering Committee, the Conservancy, and local and state government staff. Local residents were given the opportunity to provide input through two formal meetings.

Outcomes

Once finalized, the Port Tobacco WRAS will be presented to the Charles County Commissioners for their endorsement. This WRAS meets the US EPA a-i criteria for watershed planning and identifies potential restoration projects and protection measures (Table 1-1). These criteria will help projects qualify for EPA funding. This report can be a tool to help the Conservancy and the County obtain funding for implementation of the recommendations outlined in this WRAS.

Table 1-1. How the WRAS meets EPA a-i criteria for Watershed Plans

EPA Criteria	Description	Relevant WRAS sections
a	Identify Sources	Section 2 - Watershed Assessment and findings Sections 3.1, 3.3, 3.5
b	Estimate Load Reductions	Table 4-1 Appendix D Sections 3.2, 3.4, 3.6
c	Describe Management Measures	Sections 3.2, 3.4, 3.6 Section 4 Appendices E-M
d	Estimate Technical / Financial Needs	Table 4-2
e	Education and Public Involvement	Section 1.3 Table 4-3
f	Schedule	Table 4-2
g	Milestones	Table 4-3
h	Criteria to determine if goals are met	Table 4-3
i	Monitoring	Table 4-3

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1.2 Watershed Profile

The Port Tobacco watershed is located in central Charles County, with the headwaters in Saint Charles and Waldorf. The river flows south through Pages Swamp (a large forested wetland), past the College of Southern Maryland, and into an open tidal section before joining the Potomac River and ultimately draining to the Chesapeake Bay. The 47 square mile watershed encompasses the western half of the Town of La Plata as well as development along US 301, including White Plains and Bel Alton. Tributaries to the Port Tobacco River include Jennie Run, Wills Branch, and Hoghole Run. Table 1-2 presents the 2002 conditions in the watershed.

Table 1-2. 2002 Conditions in Port Tobacco River Watershed

Watershed Factor	Current Conditions
Total Area	47 square miles (28,064 acres)
Mapped Perennial Stream Miles	157 miles
2002 Impervious Cover	6% of watershed
Future (buildout) Impervious Cover	14% of watershed
2002 Land Use Forests Agricultural Land Wetlands Developed Land	 15,763 acres (56% of watershed)* 5,671 acres (20% of watershed) 1,733 acres (6% of watershed)* 6,351 acres (23% of watershed)
Total Protected Lands Parks Easements Resource Protection Zone (100 year floodplain, steep slopes, and 50' stream buffer)	5,182 acres (18% of watershed) 1,233 acres (4%) 1,566 acres (6%) 2,384 acres (8%)

*Percentages do not total 100% due to presence of forested wetlands that are included in both the forest and wetland categories.

History

Many historic sites are located in the watershed including the Thomas Stone National Historic Site; St. Ignatius Catholic Church, the longest running Catholic parish in the US; Chapel Point State Park, formerly home to an amusement park serving tourists from Washington, DC; and Port Tobacco, the historic Charles County Seat and deep water port. The Port Tobacco watershed is a classic example of the effects that an agricultural period can have on a watershed. During the late 19th century, deforestation caused high sedimentation rates that filled in the tidal wetlands and the port. Today, the tidal portion of the River is not visible from the Port Tobacco Village that previously docked cargo ships hauling tobacco. Sedimentation and navigable channels continue to be of concern to local residents. More recently, the watershed was affected by a 2002 tornado that not only damaged homes and businesses, but also felled trees in the riparian corridor along its path. Much replanting and rebuilding has taken place since this event.

Increasing Population, Changing Land Use

Just as the clearing of land had an impact on the Port Tobacco River in the 19th century, development will continue to have a profound impact on the River. The communities in

the Port Tobacco watershed are transforming from small towns to booming suburbs of Washington, DC. According to the 2006 Charles County Comprehensive Plan, the population of La Plata has nearly doubled in the past 25 years, and will increase an additional 64% in the next twenty years. Likewise, the number of housing units in La Plata will increase from 5,202 in 2005 to 8,922 in 2025. Increases in the Waldorf area will affect the headwaters of the River as well.

Typically, the amount of sediment increases during construction, building up in stream channels. Following construction, the increased amounts of stormwater runoff due to greater impervious cover scour the stream banks, increasing downstream sedimentation and the transport of nutrients while degrading in-stream habitat. While advances in environmental regulations have reduced the impacts of current construction compared to pre-1960's standards, no technology or program can completely mitigate for these changes. The erosion and sediment controls (e.g. silt fences, sediment basins) installed at construction sites are not one-hundred percent efficient in capturing sediment and the regulations are not always enforced. Likewise, while new developments are required to construct stormwater management measures (e.g. ponds, bioretention, sand filters), these are not completely efficient in removing pollutants or protecting downstream channels. Therefore, additional degradation of water quality and stream habitat can be expected as additional homebuilding continues in the watershed.

1.3 Restoration and Protection Goals

The Port Tobacco River Conservancy has established a vision for the watershed. The steering Committee and citizen stakeholders had the opportunity to give input about the watershed restoration goals during a public meeting on September 18, 2006. Streamside property owners and citizens in the three target subwatersheds were invited through mailings. An article advertising the meeting appeared in the local paper.

Residents reported that they interact with the River and the watershed in many ways, and value its natural, scenic beauty. Some residents value the water resources for the economic benefits through timber harvesting, row crops, and livestock. Because residential wells and septic systems are common, many residents understand the relationship between their water usage and sewage disposal and groundwater resources. Recreation activities engaged in by residents include fishing, crabbing, hunting, boating, and swimming. Residents access the tidal river from waterfront properties, one of two private marinas, or Chapel Point State Park. Comments from residents are summarized in Appendix A.

Residents would like to see to see the following conditions preserved or restored:

- Safe, abundant seafood including crabs, fish, and oysters.
- Preservation of the natural state, both for its ecological and scenic benefits.
- Water quality that allows safe boating and swimming.
- Navigable water for boating (a dredging project to maintain access to boat landings is planned).

For this vision to be accomplished, the following goals should be adopted:

GOAL 1: Reduce bacteria levels below the State limits for contact recreation.

GOAL 2: Prevent summer algal blooms by reducing summer nutrient levels from non-point sources to the low-flow load allocation as specified in the TMDL. This is 5776 lb/month nitrogen and 696 lb/month phosphorus for the period of May 1- October 31 (MDE 1999).

GOAL 3: Reduce sedimentation rates. This goal has not been quantified. When a Sediment TMDL is developed, a numerical goal should be assigned.

GOAL 4: Mitigate future changes to watershed hydrology. This goal will reduce all non-point pollution, as less runoff will reach surface water.

Specific objectives were developed under each of these goals to guide the recommendations. The objectives and recommendations can be found in Part 4 of this document.

Section 2: Watershed Assessment Methods and Findings

2.1 Impervious Cover Analysis and Management Classifications

Understanding existing stream conditions aids decision-making for land use planning, restoration priorities, and conservation to protect or restore resources. By estimating future conditions, based on zoning and impervious cover, communities can assess how current land use plans, if brought to fruition, will affect watersheds and streams. Because impervious cover (IC) correlates with potential stream conditions, IC calculations provide an initial understanding of watershed and subwatershed conditions. Physical condition, habitat for fish and aquatic insects, and water quality all correlate with IC. If a subwatershed has IC over 10%, most stream indicators decline. Severe degradation is expected beyond 25% IC. To describe these conditions, a subwatershed with less than 10% impervious cover is described as sensitive, between 10% and 25% as impacted, and above 25% as non-supporting. These classifications assist in developing management strategies tailored to the watershed.

Impervious Cover Analysis

The Center calculated existing and future impervious cover (IC) for the Port Tobacco watershed and the nine subwatersheds. Impervious cover for existing conditions was based on 2002 land use data from the Maryland Department of Planning. This is detailed data with established IC coefficients for each land use class. Impervious cover at build-out was calculated based on current Charles County and Town of La Plata zoning maps and ordinances. The details of that analysis are in Appendix B. The analysis found the potential for high quality streams in much of watershed at the 2002 development levels. However, the projected build-out conditions will double the IC, as shown in Table 2-1 and Figure 2-1. This will limit the quality of streams severely.

Table 2-1 Summary of Existing and Future Impervious Cover

Subwatershed	Existing (2002) Imperviousness	Existing (2002) Classification	Future Imperviousness	Future Classification
Hoghole Run	4%	Sensitive	9%	Sensitive
Jennie Run	8%	Sensitive	21%	Impacted
La Plata	11%	Impacted	22%	Impacted
Lower Port Tobacco East	2%	Sensitive	10%	Sensitive
Lower Port Tobacco West	2%	Sensitive	3%	Sensitive
Middle Port Tobacco	3%	Sensitive	8%	Sensitive
Pages Swamp	5%	Sensitive	11%	Impacted
Upper Port Tobacco Creek	11%	Impacted	27%	Non-Supporting
Wills Branch	6%	Sensitive	12%	Impacted
OVERALL	6%	Sensitive	14%	Impacted

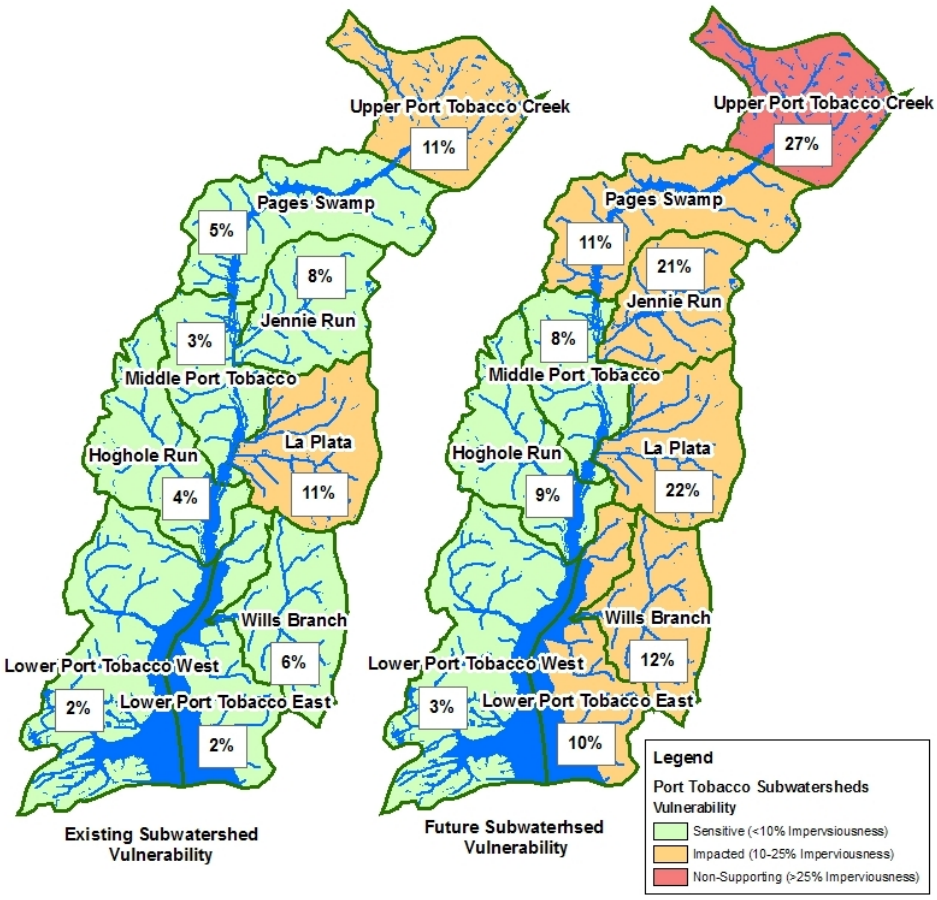

Figure 2-1. Subwatershed Imperious Cover for 2002 (Existing) and Future

Management Classifications

Three management classifications were developed to guide protection and restoration efforts for the Port Tobacco River watershed. The Sensitive, Impacted Water Quality, and Vulnerable to Future Development classifications are based on existing IC, water quality testing results, change in IC from 2002 to build-out, and other factors described in Appendix B. These management classifications were used to select three representative subwatersheds for detailed study in this WRAS.

Sensitive management classification subwatersheds have a vulnerability to existing conditions (based on an impervious cover of 0-10%). In general, sensitive subwatersheds have high quality streams and forests, stable channels, excellent habitat structure, good to excellent water quality, and diverse communities of fish and aquatic insects. The main goal for these subwatersheds is to maintain predevelopment stream biodiversity and channel stability. The focus is on PROTECTION.

The ***Impacted Water Quality*** management classification was developed to identify those subwatersheds where increasing development and deteriorating natural resources have degraded water quality. Factors that may be impacting water quality in these subwatersheds include: negative effects of high septic system density and wastewater

treatment facilities, as well as eroding stream channels. Stream biodiversity has declined and has been rated *fair*; the most sensitive fish and aquatic insects are disappearing from the stream. The management goal for these subwatersheds is to accurately identify pollution sources and repair them via changes in land use, restoration projects, or by enlisting the public's help using educational campaigns. The focus is on RESTORATION.

The ***Vulnerable to Future Development*** management classification was developed to identify those subwatersheds where future development, according to current zoning for the County and Town of La Plata, will significantly increase the total impervious cover. The management goal for these subwatersheds is to minimize the impact of future development by using environmentally friendly site design, implementing effective stormwater management, and preserving key natural resources. The recommendations include PROTECTION and RESTORATION.

Management classifications for the subwatersheds are listed in Table 2-2. The programmatic recommendations in the WRAS apply to other subwatersheds with similar characteristics. While site specific recommendations do not directly translate to other subwatersheds, similar projects may be possible. The WRAS focuses on the following subwatersheds within the Port Tobacco watersheds: Jennie Run, Hoghole Run and La Plata.

Table 2-2. Subwatershed Management Classifications

Sensitive	Impacted Water Quality	Vulnerable to Future Development
Hoghole Run Lower Port Tobacco East Lower Port Tobacco West Pages Swamp Wills Branch	Middle Port Tobacco **La Plata**	**La Plata** **Jennie Run** Upper Port Tobacco Creek

2.2 Stream Corridor Project Identification

Results from MDE's SCA were reviewed to identify project locations that contained erosion, impacted buffers or other impacts that can be addressed through restoration projects. Locations were selected based on the severity and type recorded in the SCA. An examination of SCA photos also informed the decision regarding site visits.

Field visits were conducted at the selected SCA sites and additional headwater stream sites not visited during the SCA. Stream sites were evaluated using the Unified Stream Assessment (USA), a comprehensive stream walk protocol developed for small urban watersheds (Kitchell and Schueler, 2004). Some collected data are similar to the SCA, but additional information was collected to plan a restoration project, such as construction access and available space for projects. The USA was used to identify the following types of potential restoration projects in the Port Tobacco watershed, with their USA assessment type abbreviated in parentheses:

- Impacted buffers with reforestation potential. (IB)

- Severe stream bank erosion sites that would benefit from upstream retrofits or stream repair measures. (ER)
- Outfalls with suspected illicit discharges to be tested for water quality. (OT)
- Construction sites needing erosion and sediment control enforcement. (MI)
- Trash clean-up sites. (TR)
- Permanent fish barriers in locations where anadromous fish are impacted. (SC)
- Sites of unique value for preservation. (MI)

Additionally, the Stream Repair Investigation (Schueler and Brown 2004) was used to document conditions at potential stream repair sites.

Center staff walked approximately 2 miles of stream in the three targeted subwatersheds, visiting 5 erosion sites, 10 impacted buffer sites, 18 outfalls, 8 stream crossings, 5 trash sites, and 16 miscellaneous sites. All of the sites visited and streams walked are listed in Appendix C with a map and tabular summary. Not all sites were found to have feasible projects.

2.3 Upland Project Identification

The Unified Subwatershed and Site Reconnaissance (USSR; Wright *et al*., 2004) is a component of urban subwatershed restoration that focuses on upland areas where neighborhoods and businesses are located. The USSR is a rapid field survey designed to assess these upland areas for behaviors that can potentially influence water quality and to identify promising restoration project opportunities. In the Port Tobacco watershed the Hotspot Site Investigation and Neighborhood Source Assessment were used. This method identifies potential locations for reforestation, stormwater retrofits, and enforcement actions. The findings also inform recommendations for educational campaigns or programmatic changes.

As part of this WRAS, the Center conducted a Hotspot Site Investigation (HSI), which is a component of the USSR that ranks the potential severity of each commercial, industrial, municipal or transport-related hotspot found within a subwatershed. The HSI looks specifically at vehicle operations, outdoor materials storage, waste management, building conditions, turf and landscaping, and stormwater infrastructure. Potential hotspots in Port Tobacco watershed were located based on previous knowledge of the watershed and area of development.

Stormwater retrofits are structural stormwater practices such as ponds, wetlands, bioretention, swales, and infiltration constructed in areas currently not managed by stormwater practices. This includes areas built prior to stormwater management requirements, as well as older stormwater ponds designed to treat quantity but not quality.

During the upland assessment in the three targeted subwatersheds, 25 hotspot site investigations were conducted; 33 potential stormwater retrofits were evaluated; and three neighborhoods were assessed. Restoration practices were not recommended at all of these sites. However, information from the assessments was used to influence the WRAS recommendations. Refer to Appendix C for a map and tabular summary of the sites.

2.4 Forest and Wetland Assessment

Forest and Wetland Assessments record existing conditions of representative sites, providing information that can inform preservation and management programs. The evaluation included both ecological conditions and human impacts.

The forest evaluation looked at contiguous forests, which are forests that are not broken up by roads, clearing, or development. These areas are valuable because of the amount of interior forest habitat. Digital orthophotos were used to identify potential contiguous forest tracts. Field evaluations included observation of forest diversity, maturity, understory conditions, and invasive species. Human impacts, such as roadways and selective cutting, were noted.

Wetland sites were pre-identified using Maryland Department of Natural Resource (DNR) mapping. Two field wetland assessment components were completed: water quality and wildlife. Parameters included hydrology, hydroperiod, size, position in landscape, disturbance, and substrate. Vegetative cover, diversity, and edge conditions were also noted.

Five forest sites were visited. Four wetland areas were visited, and two were assessed in detail. Refer to Appendix C for a map and tabular summary of the sites.

2.5 Watershed Treatment Model

The WTM calculates the pollutant loads generated in a watershed then applies existing or proposed treatment options to quantify the pollutant removal benefits of the treatment options. The spreadsheet-based model includes structural and non-structural practices (Caraco 2002). The model was used to estimate pollutant loads for total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), and bacteria for the three target subwatersheds and the entire watershed. The following scenarios were evaluated:

1. Existing Land Use including Existing Treatment Practices
2. Existing Land Use including Existing Treatment Practices AND Proposed Restoration Practices

The model has two basic components: Pollutant Sources and Treatment Options. The *Pollutant Sources* component of the WTM estimates the load from primary land uses (i.e. residential, commercial, agriculture) and secondary sources (i.e. active construction, managed turf, channel erosion, illicit connections) in a watershed without treatment measures in place. The *Treatment Options* component of the model estimates the potential reduction in this uncontrolled load if various treatment measures (both structural and nonstructural) are used.

Pollutant source calculations are based on the Simple Method (Schueler, 1987), where impervious cover is used to estimate primary loads from various urban land uses. Specific concentration assumptions used for urban/suburban loading estimates in the WTM model are based on values for different land uses summarized in the National Stormwater Quality Database, a summary of national stormwater data from over 200 communities nationwide (Pitt *et. al*., 2003). Estimated runoff volumes are multiplied by pollutant concentration data to compute stormwater loads. All loads are computed based on an annual time step.

Treatment options include the existing management practices and future management practices components of the WTM. The pollutant removal efficiencies associated with various structural and nonstructural urban stormwater management practices are based on existing research and studies in the National Pollutant Removal Performance Database for Stormwater Treatment Practices (Winer, 2000) and research compiled in the WTM (Caraco, 2002). Existing practice information is based on data provided by the County and the Center field observations. These inputs are summarized in Appendix D. Proposed treatment practices are based on site specific and programmatic recommendations developed in the WRAS. The modeled practices include:

- Structural stormwater practices (ponds, bioretention, etc)
- Buffer plantings
- Stream repair
- Education about lawn care, pet waste, and septic systems
- Septic system repair and upgrade
- Sanitary sewer overflow prevention
- Increased erosion and sediment control enforcement

Caveats

There are many simplifying assumptions made by the WTM, and the model results are not calibrated to measured pollutant loads or other modeling efforts. However, it should be noted that the existing TN and TP loads are within 5% of the 1996 load estimates presented in the TMDL (MDE 1999). Therefore, the results of the model simulations should be compared on a relative basis rather than used as absolute values.

The application of existing and future treatment practices is based on limited GIS data, best professional judgment, and default values associated with the WTM. A series of modeling assumptions were made on loading rates, existing and current practice application, and stormwater program implementation that may or may not be valid. These assumptions are stated in Appendix D, for future model refinement.

Results

Two key results from the Watershed Treatment Model are the relative pollutant loads from various sources and the pollutant load reductions from proposed practices. For sources, the focus is on the anthropogenic pollutant loads. A background level of nutrients, sediment and bacteria is a natural phenomenon. The load of TN, TP, TSS, and bacteria attributed to forest and open water does not represent a problem to be solved.

The anthropogenic sources of these loads have increased their presence in the River to levels that are out of balance.

The most significant anthropogenic sources of pollutants for the entire Port Tobacco watershed are runoff from urban land, rural land, and septic systems (Table 2-3). Active construction sites and increased stream bank erosion contribute significantly to the sediment load. Wastewater treatment plants contribute to the nutrient loads. Sanitary sewer overflows play a role in the bacteria load.

Table 2-3 Sources of Pollutants

Pollution Source	Port Tobacco Watershed			
	TN	TP	TSS	Bacteria
Urban Land	12%	23%	14%	20%
Active Construction	-	3%	13%	-
SSOs	-	1%	-	6%
Illicit Connections	-	-	-	4%
Channel Erosion	1%	6%	25%	-
Marinas	-	-	-	1%
Road Sanding	-	-	7%	-
Point Sources	9%	7%	-	-
Rural Land	10%	28%	9%	4%
Forest	11%	20%	26%	3%
Septic	47%	5%	1%	62%
Open Water	9%	7%	5%	-

These results for the three target subwatershed can be found in Section 3 and with the detailed WTM description in Appendix D.

Section 3: Subwatershed Conditions and Management Strategies

3.1 Hoghole Run Subwatershed Conditions

Hoghole Run joins the Port Tobacco River just south of Port Tobacco Road (MD 6). The subwatershed, defined by an eight digit hydrologic unit code (HUC), includes small tributaries that drain directly to the tidal portion of the River. Hoghole Run subwatershed is entirely in the County, not Town of La Plata, jurisdiction. Sixty percent forested and over seven percent wetlands, the subwatershed hosts timber harvesting, and cropland. Development contributing to the impervious cover in this subwatershed (Table 3-1) includes Port Tobacco Riviera neighborhood, limited development along MD 6, and the Port Tobacco Marina.

No public sewer service exists in the subwatershed and housing pre-dates current percolation test standards. Soil data show that areas near the tidal section have low infiltration rates and a high water table. Based on anecdotal evidence, a large number of septic systems in the subwatershed fail and require mound systems.

Table 3-1. Conditions in Hoghole Run Subwatershed

Watershed Factor	Current Conditions
Total Area	4.89 square miles (3,131 acres)
Mapped Perennial Stream Miles	11.6 miles
2002 Impervious Cover	4% of sub-watershed
Future (buildout) Impervious Cover	9% of sub-watershed
Percent of Stream length with Erosion (Pellicano 2005)	15%
Percent of Stream length with Impacted Riparian Buffer (<50' buffer) (Pellicano 2005)	22%

Stream and Riparian Conditions

Along the tidal section of the subwatershed, the shoreline is dominated by residential development. Bulkheads dominate the shoreline, with lawns mowed to the top of the wall. Sediment from Hoghole Run and the mainstem of Port Tobacco Creek accumulates in channels providing water access to these properties. Residents are concerned about maintaining these navigable channels.

From a geomorphic perspective, Hoghole Run and its tributaries are generally in good condition. Most assessed sections had stable banks and connection to the floodplain. Historically, sediment was deposited on the floodplain and in certain locations, the stream is now downcutting through accumulated sediment. Accurate description of the stream processes would require more detailed fieldwork and measurement than included in the WRAS assessments.

A significant percentage (22%) of Hoghole Run's riparian buffer is less than 50 feet wide. The vegetated utility corridor parallel to the stream is the primary cause of the inadequate buffer width due to the lack of forest cover. Forestry operations also impact

the riparian corridor. Forestry-related stream crossings without erosion and sediment controls were noted.

Protected Land
The Thomas Stone National Historic Site, a mix of forest and meadows, preserves 350 acres of the subwatershed. One conservation easement of preserves approximately 70 acres as managed forest. Agricultural easements and parcels in the transferable development rights program have provided short-term preservation.

Future Development
Hoghole Run is entirely outside of the County's development district and is zoned RC. Areas not protected through easements or the riparian protection zone could be developed at a density of 0.33 dwelling units per acre. Even this low density would increase the imperiousness from 4% to 9%. Using better site design techniques (Appendix L) in these low density developments can mitigate hydrologic and water quality changes.

Water Quality
Notable results from the March 2005 synoptic testing (MDE 2006) include the findings that 97% of phosphate samples were above the baseline levels in the "moderate" category. Only 3% of samples rated "high" for *E. coli* presence. These one-time tests can be compared with the ongoing PTRC water samples. Three PTRC monitoring sites in the subwatershed have high bacteria readings. Fifteen percent of the samples from these sites were "excessively" high (>1000 MPN for *Enterococci*). Both *E. coli* and *Enterococci* are indicators of a potential public health risk, not an actual cause of disease.

Pollutant Sources
The major anthropogenic pollutant sources are related to septic systems and runoff from residential areas.

Table 3-2 Sources of Pollutants in Hoghole Run

Pollution Source	Hoghole Run			
	TN	TP	TSS	Bacteria
Urban Land	12%	20%	8%	13%
Active Construction	-	1%	3%	-
Illicit Connections	-	-	-	2%
Channel Erosion	2%	12%	40%	-
Marinas	-	-	-	30%
Road Sanding	-	-	6%	-
Rural Land	12%	27%	7%	3%
Forest	21%	33%	34%	4%
Septic	51%	5%	-	48%
Open Water	3%	2%	1%	-

3.2 Hoghole Run Management Strategies

Priority Protection Strategies
Hoghole Run subwatershed contains the second largest contiguous forest in the watershed, so forest preservation is the major protection strategy. This may be

achieved through acquisition of lands by the County or through conservation easements. For the low-density development that does occur, the County should encourage Better Site Design techniques (see Appendix L) to mitigate hydrologic and water quality changes.

Land Conservation

First, the County should adopt the goal of preserving 50% of the Port Tobacco watershed. The *Charles County 2005 Land Preservation, Parks, and Recreation Plan* calls for 50% protection of the County, but does not apply this ratio to each watershed (Charles County 2005b). Priority areas for preservation are identified in the *Green Infrastructure Assessment* (DNR 2005). Though the report ranks the identified areas based on ecological value (Green Infrastructure Hub Rank), all identified areas in Hoghole Run should be targeted for preservation. This includes wetlands of special state concern and areas identified during WRAS fieldwork.

The County does not currently manage undeveloped, natural lands. Therefore, placing private property in easements may be preferred to acquisition.

The Conservancy for Charles County, the local land trust, works with landowners and the Maryland Environmental Trust to place parcels into perpetual conservation easements. Landowners benefit from state and federal tax credits for the easements. The volunteer-operated Conservancy has contacts with the local landowners and has ongoing discussion with undisclosed property owners in the watershed. The County can support this WRAS-aligned work by entering a memorandum of understanding with the Conservancy for Charles County. The County could share maps and property data, eliminating a cost for the non-profit Conservancy.

Surveying and preparation of an easement plat constitute disincentives to easements, as the fee is $3,000-$10,000, depending on parcel size. The County could support preservation in the watershed by using forest conservation fee-in-lieu funds to assist landowners with these costs.

Better Site Design (BSD)

The County should encourage Better Site Design techniques for the low-density development that does occur. These techniques generate less runoff volume, a factor in pollutant loading. BSD is feasible at the 0.33 dwelling unit per acre density of the subwatershed. Use of the BSD-related credits in the *2000 Maryland Stormwater Design Manual* will likely eliminate the need for structural stormwater management.

The principles related to conservation areas, lot dimensions, and roadway configuration must be encouraged and applied at the preliminary plan stage. Subdivision plan reviewers, planning boards, and local design consultants need training to recognize better site design principles in preliminary plans.

The County began addressing Better Site Design as an outcome of the Mattawoman watershed plan. This process will benefit Hoghole Run and similar subwatersheds. A

BSD residential development could preserve contiguous forest areas and cluster the home sites, minimizing roadway lengths. Efforts to revise ordinances are based on the "Review of Charles County's Stormwater Management, Parking, and Forest Conservation Codes" (Winer-Skonovd 2006). Additionally, the subdivision codes, design guidelines, and process should be reviewed to ensure that the techniques can be applied early in the planning process. County roadway design standards should also be checked for potential conflicts with BSD-principles. For future County construction in Hoghole Run, such as, the Community Services Division building, the BSD principles should be utilized and showcased as a model for future projects.

Priority Restoration Strategies

As a subwatershed with the Sensitive management classification, the focus of efforts should be on protection strategies. However, a few notable restoration projects have been identified in the Hoghole Run subwatershed.

Septic Systems

Septic systems present the biggest opportunity for restoration in the subwatershed. In 2006, PTRC surveyed homeowners in the Port Tobacco Riviera about septic system knowledge and maintenance practices (see Appendix E). Half of those surveyed indicated that they would upgrade to a nitrogen removal system under a cost share plan. The survey also revealed that 60% of homeowners last pumped their tanks five years ago or never. The County PGM and Health Departments are collaborating with PTRC to address failing septic systems and upgrade systems to treat nitrogen. The County has applied for Bay Restoration Funds to begin upgrading these systems.

A combination of education and enforcement programs could be used to increase the frequency of pump-outs and other maintenance activities. Septic system owner information can be presented at the time of sale for existing homes and at the time of well water testing for new homes. Some communities require septic tank pump-outs every three years, with documentation sent to the local authority. The Port Tobacco WRAS steering committee decided this type of program would have a poor cost/benefit ratio. However, it could be pursued in the future if additional restoration efforts are needed.

Hoghole Run Fish Ladder under MD 6 (SC-8)

The fish ladder was blocked with debris on the upstream end when visited (Figure 3-1). The pool depth below the ladder may not be sufficient to allow fish to jump. PTRC members have located yellow perch egg masses downstream of the bridge. DNR staff with specialized knowledge on fish passage and yellow perch should visit the site to determine if modifications can be made to the pool at the bottom and the debris collection area at the upstream end. See the locator maps in Appendix C and additional Restoration Project information in Appendix G.

Figure 3-1. Fish Ladder at MD 6. Left – Upstream end. Right – Pool at bottom.

Volunteer Projects

These projects treat only a small area, but are located in public areas where educational signage can be used. Volunteers learn skills during construction that enables them to use the techniques on their own property. Possible volunteer projects include rain gardens at the Port Tobacco Post Office (R- 25) and McDonough High School (R- 27). Educational efforts in the tidal section could include living shoreline stabilization projects. The project locations and descriptions are in Appendix H.

Pollutant Load Benefits

Pollutants load reductions are based on the WTM. Septic system upgrades could reduce the nitrogen load by 9% if half of the septic systems in the subwatershed were upgraded. Septic System Education leads to greater maintenance and lower failure rates, decreasing the bacteria load by 9% in the model. Bacteria load reduced to 28% as a result of legally mandated yearly inspection of septic systems. Volunteer projects and a few low-ranked on-site retrofits together account for the small load reduction from structural stormwater management practices. Table 3-3 presents the WTM results for the percent load reductions from structural stormwater management practices.

Table 3-3. % Load Reductions from Future Practices in Hoghole Subwatershed

Future Management Practices	TN	TP	TSS	Bacteria
Lawn Care Education	2%	1%	-	-
Pet Waste Education	<1%	<1%	-	-
Erosion and Sediment Control	<1%	<1%	2%	-
Structural Stormwater Management Practices	<1%	<1%	<1%	-
Riparian Buffers	<1%	-	<1%	-
Septic System Education	<1%	1%	<1%	9%
Septic System Inspection/Repair	<1%	3%	<1%	29%
Septic System Upgrade	10%	<1%	-	5%
Total Reduction	10%	5%	2%	43%

The WRAS project did not include modeling of restoration and protection practices in a future land use scenario. Comparison of that scenario to the existing conditions scenario

would quantify the pollutant load benefits of protection strategies. Future conditions can be assessed with the Watershed Treatment Model.

3.3 Jennie Run Subwatershed Conditions

Jennie Run is a tributary of Port Tobacco Creek that joins the mainstem Creek near Hawthorne Road. The study of the subwatershed included an adjacent unnamed tributary. The primarily forested watershed also encompasses:

- cropland
- an industrial park
- commercial areas along US 301, such as Wal-Mart
- part of the College of Southern Maryland
- the Hawthorne Country Club golf course
- a small portion of the Quarry on Washington Ave
- the former Town landfill; State Police headquarters
- Low-density residential areas including Mount Carmel Woods and Warrlinda.

Mount Carmel has a small County-operated waste water treatment plant that is the only point source in the subwatershed. The Warrlinda subdivision and other residences outside the Town of La Plata use on-site septic systems. A portion of the rapidly developing subwatershed is within the Town of La Plata.

Table 3-4. Conditions in Jennie Run Sub-Watershed

Watershed Factor	Current Conditions
Total Area	3.97 square miles (2,541acres)
Mapped Perennial Stream Miles	10.0 mi **
2002 Impervious Cover	8%
Future (buildout) Impervious Cover	21%
Percent of Stream length with Erosion (Pellicano 2005)	6%
Percent of Stream length with Impacted Riparian Buffer (Pellicano 2005)	12%

** Stream length is not accurate, as some perennial stream reaches are not depicted in the GIS data layer that was used for MDE/DNR fieldwork and these calculations. Note that these tributaries do appear on the USGS 7.5' quad.

Stream and Riparian Conditions

In addition to reviewing information for the Stream Corridor Assessment, the Center assessed a small potion of the streams not assessed by MDE/DNR. The mainstem of Jennie Run was generally in stable condition and possessed a buffer greater than 50 feet in width. Erosion in headwater streams was noted downstream of US 301 and other locations with human impacts.

Two notable stream segments in the subwatershed are located near Hawthorne County Club and near the quarry. The unnamed tributary through Hawthorne Country Club lacks a buffer for most of its distance. The stream banks are eroding at a fast rate, filling in the club's irrigation pond. Downstream of the golf course, the tributary flows into the drainage ditch alongside Mitchell Road. The small tributary downstream of the quarry

and Washington Avenue hosts an old dam that created cypress tree habitat. These trees were not seen elsewhere in the watershed.

Protected Land
Only 22 acres of land are protected in the quickly developing Jennie Run subwatershed. These 22 acres are included in the forest conservation easement on the College of Southern Maryland campus.

Future Development
Once built out, the Jennie Run subwatershed may experience the scoured stream channels and poor water quality of the La Plata subwatershed. Impervious cover will increase from 8% in 2002 to and estimated 21% at build-out (Appendix C). The recently completed extension of Rosewick Road paves the way for the next development, and developers are investigating other local properties.

Water Quality
Notable results from the March 2005 synoptic testing (MDE 2006) include 15% of contributing area above baseline levels for *E. Coli*; 70% above baseline levels for Phosphate, with ~25% rated high; 40% above baseline rates for Nitrate, with 9% excessively high. These one-time tests can be compared with the ongoing PTRC water samples. In 32 readings at three sites, 35% were rated "excessively high" (>1000 MPN for *Enterococci*). Both *E. coli* and *Enterococci* are indicators of a potential public health risk, not an actual cause of disease.

Pollutant Sources
The major anthropogenic pollutant sources are runoff from urbanized area, septic systems, and cropland.

Table 3-5 Sources of Pollutants in Jennie Run subwatershed

Pollution Source	TN	TP	TSS	Bacteria
Urban Land	24%	37%	19%	35%
Active Construction	-	2%	6%	-
SSOs	-	-	-	3%
Illicit Connections	-	1%	-	3%
Channel Erosion	2%	15%	46%	-
Road Sanding	-	-	6%	-
Point Sources	4%	7%	-	-
Rural Land	8%	18%	5%	3%
Forest	12%	17%	17%	3%
Septic	48%	4%	-	53%

3.4 Jennie Run Management Strategies

Priority Protection Strategies

Jennie Run is in transition between a less developed and more developed state, so practices associated with rural and urban areas apply. The following priority protection strategies described in Section 3.2 and 3.6 also apply to this subwatershed: ***Land Conservation, Better Site Design*** and ***Erosion and Sediment Controls.***

Priority Restoration Strategies

Septic system upgrades, education, and enforcement are the primary restoration techniques for Jennie Run. Education for residents about lawn care could also decrease the nutrient loads. While stormwater retrofits and stream repair projects had a minimal benefit on the subwatershed scale, their impact would be felt locally. Three priority retrofits are described below.

Septic Systems

The septic system strategy described in Section 3.2 should also be applied to the Jennie Run subwatershed. However, far fewer systems in the Jennie Run subwatershed were built prior to 1990 on poorly infiltrating soils or a high water table. These properties include the Warrlinda subdivision and a few located between Parkway Subdivision Rd and Industrial Drive.

Public Education

Well-planned, targeted public education campaigns can influence residential behaviors and reduce pollutant loads. Public education is also a required component of the National Pollutant Discharge Elimination System (NPDES) permits issued to municipalities for municipal separate storm sewer systems (MS4's). While multiple sources of information are available in Charles County, a targeted campaign using media with wide distribution has not been used.

The Town of La Plata will add residential tips to the monthly *La Plata Town Notes,* which is distributed to all Town residents. Similar newsletters in print or electronic format for the County, Homeowners Associations, or local environmental organization can be used to deliver a short tip connecting individual behavior to water quality. Use of newspaper ads, public service spots on radio, billboards, or similar means can spread a simple message to a wide audience. For example, conducting a spring campaign to remind homeowners to wait until Fall to fertilize. Tips on effective educational campaigns are located in Appendix I. Brochures and public service ad templates are available free of charge from the MD Cooperative Extension, EPA, and numerous local governments. Links to this information is included in Appendix I.

Industrial Drive Dry Pond Retrofit (OT-8)

The dry pond located at the Industrial Park should be investigated as a potential retrofit site. The field staff could not access this pond to make recommendations. In general, dry ponds are good candidates for adding water quality treatment. The industrial park contains potential hotspot operations, another factor prioritizing this site for water quality improvements.

RCH-24 Mitchell Road Stream Diversion and Constructed Wetland

The unnamed tributary that traverses Hawthorne County Club is routed through the irrigation pond golf course then is discharged to the right-of-way in the proximity of the culvert in Figure 3-2. The corrugated metal culvert at this location is partially submerged and does not appear to convey water. Field staff searched for the other end of the culvert but were unable to locate it. Instead of passing through this culvert, the stream (RCH-24) heads south along the east side of Mitchell Road. Make-shift stabilization measures such as those in Figure 3-2 prevent the stream from undermining the roadway. Before reaching the intersection with Hawthorne Road, this stream re-enters the golf course before joining another tributary and entering the culvert under the intersection of Mitchell Road and Hawthorne Road.

The property across Mitchell Road from the golf course and stream has been purchased by a private owner as a wetland mitigation bank. Using topographic maps it can be discerned that prior to earth moving activities for agriculture and road-building the tributary would have crossed the area that is now the "Port Tobacco Wetland Creation Area."

A restoration project at this location would repair or replace the disfunctional culvert. This will require excavation on the west side of the road in the "Port Tobacco Wetland Creation Area." A stormwater wetland can be designed and built at this location to treat the water quality volume of the stream flow. This will require coordination with the private owner and MDE. If all parties are agreeable, an engineering design could be prepared.

Figure 3-2. Stream Reach 24 along Mitchell Rd. (Left) dysfunctional culvert; (Center) Flow parallel to Mitchell Road; (Right) Commercial wetland mitigation site across Mitchell Road.

RCH-23 Hawthorne Golf Course Stream Stabilization

The Hawthorne Golf Course stream has been downcutting and widening. The assistant course superintendent reports that the rate of erosion has increased in recent years. The golf course has an on-line pond used for irrigation that fills with sediment. The club has two objectives: to prevent bank erosion that undermines the cart paths and to keep

sediment out of the pond. Various stream stabilization and pond maintenance techniques are proposed. The selected techniques will depend upon the budget and further feasibility analysis.

- Continue current practice of not mowing the stream banks.
- Plant a 5 to10 foot wide buffer of no-mow grasses along stream segments that cross fairways.
- For areas where the stream is on the north (forested) side of the cart path, use soft bank stabilization techniques such as live stakes, fascines, and brush mattresses. Clethra- sweet pepper bush used in these techniques will quickly establish.
- Remove the culverts in area north of cart path to daylight the stream.
- Install a sediment forebay at the entrance to the pond. This can be constructed with a hard bottom to allow equipment access.
- Relocate the stream channel north of its current location, to the depression that was likely its previous location. This will take the pond off line. Flows could be diverted to the pond for irrigation purposes, while reducing the volume of sediment that terminates in the pond.

Figure 3-3. Stream through Hawthorne Country Club golf course.

Pollutant Load Benefits

The Watershed Treatment Model estimated that the biggest pollutant load reductions in the Jennie Run subwatershed could be achieved with septic system upgrade, inspection, and repair programs. Lawn care education also impacts the nutrient loads.

Table 3-6. % Load Reductions from Future Practices in Jennie Run Subwatershed

Future Management Practices	TN	TP	TSS	Bacteria
Lawn Care Education	3%	1%	-	-
Pet Waste Education	<1%	<1%	-	<1%
Erosion and Sediment Control	<1%	1%	3%	-
Structural Stormwater Management Practices	<1%	<1%	<1%	<1%
Septic System Education	<1%	<1%	<1%	10%
Septic System Inspection/Repair	<1%	3%	<1%	32%
Septic System Upgrade	9%	<1%	-	6%
Total Reduction	**10%**	**5%**	**4%**	**48%**

The WRAS project did not include modeling of restoration and protection practices in a future land use scenario. Comparison of that scenario to the existing conditions scenario would quantify the pollutant load benefits of protection strategies. Future conditions can be assessed with the Watershed Treatment Model.

3.5 La Plata Subwatershed Conditions

The La Plata Subwatershed includes several small unnamed tributaries with headwaters in the Town of La Plata, where the railroad tracks are the drainage divide. The La Plata subwatershed includes the County Courthouse and office building as well as La Plata Town Hall. The headwater streams cross US 301 and the commercial and industrial land uses along that corridor. The Town of La Plata wastewater treatment plant discharges to one of the small tributaries. Residential developments built in the last 30 years are a major land use and include Quailwood, Morgan's Ridge, and Hillendale. The downstream end of the tributaries is located in a more rural area outside the Town limits that includes some agricultural land uses. Horse stables and pasture land are present in this area.

Table 3-7. Conditions in La Plata Subwatershed

Watershed Factor	Current Conditions
Total Area	4.90 square miles (3,134 acres)
Mapped Perennial Stream Miles	11.7 mi
2002 Impervious Cover	11%
Future (buildout) Impervious Cover	22%
Percent of Stream length with Erosion (Pellicano 2005)	35%
Percent of Stream length with Impacted Riparian Buffer (Pellicano 2005)	20%

Stream and Riparian Conditions

The headwater streams show signs of past development without stormwater controls. However, the signs of channel erosion decrease further downstream. Since many of the small headwater streams cross US 301, the stream channels immediately downstream have been scoured. The concrete chutes and pipe outfalls from the highway drainage system now dangle in the air over the downcut stream invert. Also, the Town was developed long before stormwater management controls were required. During fieldwork conducted in June and July of 2006, several construction sites were observed with no erosion and sediment controls (ESC), non-maintained ESC, or improper ESC techniques. (See Appendix K.)

Protected Land

The La Plata subwatershed contains only 10 acres of forest conservation easements, mostly in stream buffer/floodplain areas. At least one agricultural easement exists in the subwatershed; however, these are not permanent preservation tools.

Future Development
The Town of La Plata is growing at a fast pace. The subwatershed impervious cover is slated to double from 11% to 22% (Appendix C). This includes two major residential developments that will eliminate the remaining contiguous forests in the subwatershed. Since these developments - Steeplechase and Stagecoach – are already in the design process, it is likely too late to incorporate more better site design techniques. However, attention should be paid to the erosion and sediment control and the stormwater treatment practice design and construction.

Water Quality
Notable results from the March 2005 synoptic testing (MDE 2006) include no samples above the baseline levels for E. coli; ~20% moderately above baseline levels for Nitrate;~65 above baseline for Phosphate, with 7% rated excessively high. These one-time tests can be compared with the ongoing PTRC water samples. In 30 readings at four sites, 23% were rated" excessively high" (>1000 MPN for *Enterococci*). Both *E. coli* and *Enterococci* are indicators of a potential public health risk, not an actual cause of disease.

Pollutant Sources
The major anthropogenic nutrient sources are urban runoff, septic systems, and the wastewater treatment plant. Major TSS contributors are urban land, active construction site, and channel erosion. The largest bacteria contributors are septic systems, sanitary sewer overflows, and urban runoff.

Table 3-8 Sources of Pollutants in La Plata Subwatershed

Pollution Source	TN	TP	TSS	Bacteria
Urban Land	13%	33%	21%	18%
Active Construction	-	5%	20%	-
SSOs	1%	2%	-	18%
Illicit Connections	-	1%	-	3%
Channel Erosion	1%	7%	31%	-
Road Sanding	-	-	8%	-
Point Sources	21%	16%	-	-
Rural Land	5%	19%	7%	2%
Forest	4%	10%	13%	1%
Septic	54%	8%	1%	58%

3.6 La Plata Subwatershed Management Strategies

Priority Restoration Strategies
Efforts in the La Plata Subwatershed should deal with the past problems associated with development while preventing future problems through education and enforcement. This includes dealing with erosion and sediment controls on construction sites, eliminating sanitary sewer overflows and septic failures, and excluding livestock from the stream

corridor. Additionally, site specific stormwater retrofits are recommended based on their large drainage area or demonstration value.

Septic Systems and ***Public Education*** were addressed in Sections 3.2 and 3.4.

Erosion and Sediment Controls
Given the large amount of development coming to this subwatershed, enforcement of ESC regulations on construction sites will be critical to maintaining stream quality. The Maryland Department of the Environmental has responsibility for the inspection and enforcement of the ESC regulations. Since these inspectors have a wide geographic and topical range to cover, the attention of Town building inspectors, the Soil Conservation District (SCD) staff, and citizens may be needed to keep these large sites in compliance.

Sanitary Sewer Overflows
The Town has established a Water and Sewer Advisory Committee and contracted with URS to determine the causes and solution of sanitary sewer overflows (SSOs) and to plan for future capacity demands. URS found that while infiltration and inflow contributed to the chronic SSOs, inadequate capacity was the prime cause. The sewer lines were surcharged from the 8" diameter pipe in the WWTP to the chronic SSO site, MH13. The short term solution to this chronic overflow is to supplement the capacity of the 8" pipe by pumping around this segment. The long-term plan is to incorporate capacity upgrades into coming development. Developers have an incentive to contribute to this effort, as the plant will be under capacity if all planned units were built without upgrades. Developers will participate in the cost share for upgrades or risk denial of building permits due to insufficient wastewater capacity.

Livestock Exclusion
The Charles County SCD and MD Cooperative Extension to identify the individuals engaged in farming activities in the watershed and the current status of their BMPs. The SCD provides assistance with federal and state cost share programs. Programs such as MACS or CREP could be used to exclude livestock from the stream corridor. The SCD and Cooperative Extension have the technical resources to pursue these projects.

New Stormwater Pond Retrofit (R-32)
The feasibility of a Wet Extended Detention Pond at a double outfall that drains 70 acres of La Plata town center should be investigated. This project would be expensive and complex in terms of property ownership, technical design, and permitting. Benefits include providing water quality and channel protection treatment for up to 50 acres of untreated impervious cover. A feasibility study should be completed before proceeding to a design contract.

The double outfall with grouted rip rap is located at the southwest corner of the US 301/MD 6 intersection, south of Maples Senior Living. The stream channel below the outfall shows signs of bank and bed scour plus downcutting. Three hundred feet downstream from the double outfall there is a junction with another scoured channel (OT-5, see Figure 3-5).

Figure 3-4. Double outfall (L). Scoured downstream channel (R).

Highway 301 Median Retrofits (R-1, R-14)

Two outfalls from the US 301 drainage system had significant downstream erosion. Upstream of these stream channels, the potential to retrofit the highway medians exists. Pending a check of the sewer line locations (some utilize the 301 median), dry swales designed per the *2000 Maryland Stormwater Design Manual* should be installed. This retrofit may be applicable at multiple locations along 301 where drainage system outfalls are eroding headwater streams.

Highway 301 Outfall Stabilization and Stream Repair (R-2, OT-5)

Downstream of the retrofits described above, stream repair and stabilization is proposed. This may include dropping the outfalls to the stream invert. See Appendix G for additional detail on R-2.

Figure 3-5. Channel adjacent to Hunt Ford. View of concrete chute at top (L). Depth of channel compared to person (R).

County Courthouse Main Parking Lot Bioretention (R-8)
This 2.6 acre parking lot would be an excellent site for demonstrating green parking lot design. Additional details on this project are in Appendix G.

Dry Pond Conversion to Bioretention (R-15 and R-23)
These existing stormwater dry ponds are located at Diggs Circle II Townhomes on Nanjemoy Rd (R-15, drainage area 1.5 acres) and on Carroll Street adjacent to Town Hall (R-23, drainage area 0.6 acres). Both locations could provide water quality benefits by adding biofiltration soil media and replanting the site with a mix of grass, shrubs, and trees.

Figure 3-6. Diggs Circle Dry Pond (L). Carroll Street Dry Pond (R).

Stormwater Planter Demonstration Project at Catalpa Drive Offices (R-17)
This office building that currently houses the Soil Conservation District contains several potential retrofit sites. Pictured in Figure 3-7 is the stormwater planter site. Note the roof drain discharges to the X on the asphalt. Remove the pavement from the X, excavate down 2.5 feet, and construct the planter per design standards in the Portland, Oregon Stormwater Design Manual. The underground portion can be lined but the top edge should be design to weep.

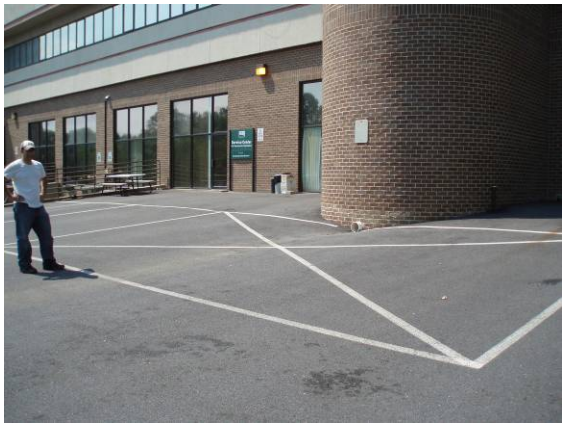

Figure 3-7 Possible Demonstration Site at SCD offices

Permeable Paving Demonstration Project at Patuxent Court (R-16)

The asphalt parking areas for these townhomes is in poor condition (Figure 3-8). Since the road is crowned in the middle and drains toward the parking spaces, the area between the space and the roadway could be used for runoff storage. When the lot and road is resurfaced, this strip can be constructed from a permeable paving system with a gravel reservoir subbase. Additionally, a landscaped island could be added to the excessively large cul-de-sac. See the Field sheet in Appendix M for additional detail.

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Figure 3-7. Patuxent Court. Asphalt parking spaces in disrepair (L). Configuration of road, parking, and cul-de-sac (R).

Pollutant Load Reductions

The pollutant load reductions are highest from septic system upgrade, repair and education. More frequent erosion and sediment control inspection and SSO repair also contribute significantly to potential reduction. The structural stormwater retrofits contribute a small but not insignificant reduction in all modeled pollutants.

	La Plata Subwatershed			
Future Management Practices	**TN**	**TP**	**TSS**	**Bacteria**
Lawn Care Education	1.5%	0.5%	-	-
Pet Waste Education	<1%	0.5%	-	<1%
Erosion and Sediment Control	<1%	2.5%	11%	-
Structural Stormwater Management Practices	0.5%	3%	3%	2%
Septic System Education	<1%	1.5%	<1%	11%
SSO Repair/ Abatement	0.5%	2%	<1%	15%
Septic System Inspection/Repair	<1%	5%	1%	35%
Septic System Upgrade	10%	1%	<1%	7%
Total Reduction	**12%**	**15%**	**15%**	**70%**

Section 4: Recommended Management Strategies

The recommended management strategies were developed based on the established goals, the fieldwork, data review, and discussion with members of the Steering Committee. Section 3 discussed strategies related to each goal. The recommended management strategies are organized by objectives, which work towards multiple goals. The steps to achieve each objective are listed.

OBJECTIVE A: Eliminate Septic System Failures.

- Require new on-site systems to include Nitrogen removal capability.
- Upgrade systems in pre-1990 communities known to have high water tables or poorly infiltrating soils using the following techniques:
  - Nitrogen upgrades to individual units
  - Small, shared wastewater treatment systems
  - Connection to a public Waste Water Treatment Plant (WWTP)
- Educate homeowners about septic system maintenance to reduce failures. Educational materials can be provided at the point of sale (for existing homes) or at time of well water testing (for new homes).
- Implement inspection and enforcement requirement for N-removal systems and traditional systems. This may take form of a 3-year tank servicing program with submittal requirement.
- Hire temporary staff as needed to administer the septic upgrade program.

Additional information about the Septic System Survey and related educational materials can be found in Appendix E.

OBJECTIVE B: Eliminate Sanitary Sewer Overflows.

- Town to continue rehabilitation of existing sewer conveyance system per recommendations of Town of La Plata Water and Sewer Advisory Committee. This includes eliminating the overflow at the Centennial Street at US 301 manhole (MH13).

OBJECTIVE C: Protect a Greater Percentage of the Watershed.

- Require that Forest Conservation mitigation projects associated with development occur in the same watershed as the development. This is encouraged in the County by varying mitigation rates, but not at the Town level. County requires 2:1 mitigation if site is in the watershed and 4:1 mitigation outside the watershed.
- Use forest conservation fee-in-lieu funds to assist landowners in placing their properties in permanent easement, by paying for the required surveying and easement plat. This fee is approximately $3,000-$10,000, depending on parcel size.
- Set goal of preserving 50% of the Port Tobacco watershed. The County's Comprehensive Plan calls for 50% protection of the County, but does not apply this ratio to each watershed. (Charles County 2006b) County to develop strategy and funding plan to protect 8,850 acres by regulatory methods, easement donation, or acquisition.
- Work with Conservancy for Charles County and Maryland Environmental Trust to place properties in conservation easements. A MOU between Charles County Dept. of PGM and the Conservancy for Charles County could aid this process.

- Target the areas within the Port Tobacco watershed identified in the Green Infrastructure Assessment (DNR 2005). This short report is an appendix to the *Port Tobacco River Watershed Characterization.* It is recommended that all of these areas in the watershed be targeted, because the Green Infrastructure Hub Rank doesn't consider vulnerability to future development.

Information on areas for preservation is located in Appendix F.

OBJECTIVE D: Reduce the Volume of Runoff Generated at New Developments through Better Site Design (BSD) and Well-designed and Constructed Stormwater Management.

Codes

- Supplement the review of County's Forest Conservation and Stormwater Management Ordinance with a review of the Subdivision Codes.
- Adopt code changes recommended in the review of County codes.
- Review La Plata subdivision and stormwater management codes for the ability to implement site design credits in the 2000 Maryland Stormwater Design Manual.

Plan Review

- Revise design submittal checklists to include BSD.
- Train stormwater management reviewers, subdivision plan reviewers, planning boards, and local design consultants to recognize BSD principles in preliminary plans.
- Hire a junior environmental planner or engineer to assist with plan review and construction site inspection for the Town of La Plata.

Construction Inspection

- Inspector training on construction techniques important to BSD and stormwater management, especially such practices as bioretention.

Municipal Projects

- Execute MOU for all County and Town projects to utilize BSD and innovative stormwater management. New construction should showcase techniques and seek to treat runoff from off-site as a retrofit. County and Town redevelopment projects should include stormwater retrofits that treat drainage area beyond the minimum required.

Resources for BSD are located in Appendix J.

OBJECTIVE E: Reduce Stream Bank Erosion caused by Existing Development without Stormwater Management Practices by Constructing Retrofits.

- Apply for grants and construct priority stormwater management retrofits.
- Obtain State Highway Administration cooperation for retrofits along MD 301.
- Maintain the list of second priority stormwater management retrofits to be implemented with stormwater fee-in-lieu and grant funding.
- Maintain the list of volunteer projects that can be implemented by community groups.

Detailed information on potential retrofit and stream corridor projects:

Sections 3.2, 3.4, and 3.6 for narratives.
Appendix C for project locator maps.
Appendix G for Retrofit and other projects to be implemented by the County or SHA.
Appendix H for volunteer projects.

Appendix M (hard copy only) for original field data sheets.
Appendix N (CD) for photos of project sites.
Appendix O (CD) for GIS data related to these sites.

OBJECTIVE F: Enforce Erosion and Sediment Control Regulations.

- Local staff and volunteers to serve as watchdogs for the enforcement of erosion and sediment control.

For information regarding erosion and sediment control violations noted during fieldwork see Appendix K.

OBJECTIVE G: Eliminate Illicit Discharges to Reduce Nutrient and Bacteria Loads and Protect the Biological Functions of Streams.

- Test discharges from suspect outfalls identified during fieldwork.
- Train County and Town staff who conduct daily fieldwork about pollution prevention practices and recognizing illicit discharges.

IDDE resources are listed in Appendix L.

OBJECTIVE H: Educate the Watershed Residents about Water Quality and Impacts of Individual Actions.

- Outreach to new residents about their watershed.
- Collaborate on education campaign for Town of La Plata and Charles County residents. Address lawn care, pet waste, and car washing. Utilize MD Cooperative Extension experience and materials that can be used in whole or excerpted in newsletters. Include residential education excerpts in the *La Plata Town Notes.*
- Construct natural shoreline demonstration projects and offer training to residents on the topic.
- Provide information about maintenance of stormwater management facilities to Home Owners' Associations.
- Train citizens about BSD and local development regulations. .

Resources for education materials, tips for conducting an educational campaign, and the "Profile of the Port Tobacco Watershed" are located in Appendix I.

OBJECTIVE I: Exclude livestock from streams.

- Collaborate with the Charles County SCD and MD Cooperative Extension to identify the individuals engaged in farming activities in the watershed and to determine the current status of their BMPs.
- Use cost share and incentive programs (e.g. MACS or CREP) to exclude livestock from the stream corridor.

Each objective was evaluated based on the associated pollutant load reduction, using the Watershed Treatment Model. Details on the model can be found in Appendix D. Table 4-1 depicts the load reductions for Total Nitrogen (TN), Total Phosphorus (TP), Total Suspended Solids (TSS), and Fecal Coliform Bacteria (FC). The pollutants affected by the objective are listed.

Table 4-2 details the timeframe, cost, technical assistance, possible funding source, and responsible party. The timeframe for implementation varies by objective and individual steps.

Short term projects should be implemented in Year 1, medium term in Years 2-4, and long term in Year 5 and beyond. Several short term recommendations were noted as PRIORITY in the Time Frame (f) column. This PRIORITY designation indicates the importance of immediate action in terms of the highest % reduction in total load of nitrogen, phosphorus and fecal coliform, and the perception that immediate action will positively affect future patterns of development in the watershed.

Qualitative costs are shown in Estimated Cost/Unit (d) column of Table 4-2 to inform decision makers on relative cost/need for each recommendation: low cost indicates staff time only; mid cost indicates staff time plus costs for training, outreach/education, and/or consultant services; and high cost indicates capital improvement project. The estimated costs can be refined as the recommendations are further developed.

The final table in this section details numeric targets (EPA Criteria h) as well as monitoring or tracking methods for their success (EPA Criteria i), as shown in Table 4-3. In addition to the measures of implementation success described in the table, nutrient monitoring in the tributaries and mainstem could be pursued. Numerical values in the targets are related to implementation levels modeled in the Watershed Treatment Model. Interim milestones (EPA Criteria g) are also included. The recommendations require different levels of programmatic changes and public involvement beyond the WRAS process (EPA Criteria e) that are also listed.

Table 4-1: Recommendations and Impact on Goals and Pollutant Loads (EPA Criteria a, b, c)						
Obj. #	**Objective (EPA Criteria c)**	**Goals Met**	**Sub-watersheds**	**Associated Pollutant Load, if known (a)**	**Estimated Reduction in Pollutant load (b)**	**% Reduction in Total Load**
A	Eliminate Septic System Failures.	1, 2	All	Septic Load for All TN = 129,181 lb/yr TP = 801 lb/yr FC = 3,637,798 billion/yr	<u>Nitrogen Upgrades:</u> TN 24522 lb/yr (with Nitrogen upgrades; alternatives not modeled) <u>Homeowner Education:</u> TN: 181 lb/yr TP: 151 lb/yr FC: 683,906 billion/yr <u>Increased Inspection/Repair:</u> TN: 577 lb/yr TP: 481 lb/yr FC: 2,182,679 billion/yr	TN: 9% TN: 0.1% TP: 1% FC: 12% TN: 0.2% TP: 3% FC: 37%
B	Eliminate Sanitary Sewer Overflows.	1, 2	La Plata	SSO Load for La Plata TN = 347 lb/yr TP = 58 lb/yr FC = 262,383 billion/yr	TN: 295 lb/yr TP: 49 lb/yr FC: 223,025 billion/yr	TN: 0.5% TP: 2 % FC: 15%
C	Protect a Greater Percentage of the Watershed.	2, 3, 4	All	Urban land contributions as of 2002 12% TN 23% TP 14% TSS	Population predicted to increase >60%. This is a PROTECTION not a RESTORATION strategy.	Mitigate future increases in urban land contributions.
D	Reduce the Volume of Runoff Generated at New Developments through BSD and Well-Designed and Constructed Stormwater Management Facilities.	1, 2, 3, 4	All	Urban land contributions as of 2002 12% TN 23% TP 14% TSS	Population predicted to increase >60%. This is a PROTECTION not a RESTORATION strategy.	Mitigate future increases.

Table 4-1: Recommendations and Impact on Goals and Pollutant Loads (EPA Criteria a, b, c)						
Obj. #	**Objective (EPA Criteria c)**	**Goals Met**	**Sub-watersheds**	**Associated Pollutant Load, if known (a)**	**Estimated Reduction in Pollutant load (b)**	**% Reduction in Total Load**
E	Reduce Stream Bank Erosion caused by Existing Development without Stormwater Management Practices by Constructing Retrofits.	2, 3	La Plata, Jennie Run, Hoghole Run	Channel Erosion Load (All; La Plata) TP = 935 lb/yr; 173 lb/yr TSS = 1.5 million lb/yr; 281,623 lb/yr	From Future Structural Stormwater Practices, including existing (All; La Plata): TP: 99 lb/yr; 73 lb/yr TSS: 32,514 lb/yr; 27,173 lb/yr	All: TP:0.6 % TSS: 0.5% La Plata: TP: 3% TSS: 3%
F	Enforce Erosion and Sediment Control Regulations.	2, 3	All, La Plata	Active Construction Load (All; La Plata): TP = 470 lb/yr; 114 lb/yr TSS = 762,652 lb/yr; 185,523 lb/yr	Improved Enforcement (All; La Plata): TP: 248 lb/yr; 60 lb/yr TSS: 402,141 lb/yr; 97,825 lb/yr	All: TP: 2% TSS: 7% La Plata: TP: 3% TSS: 11%
G	Eliminate Illicit Discharges to Reduce Nutrient and Bacteria Loads and to Protect the Biological Functions of Streams.	1, 2	All	Illicit Connections: TN = 317 lb/yr TP = 68 lb/yr FC = 217,230 billion/yr	Not Modeled.	NA
H	Educate the Watershed Citizens about Water Quality and Impacts of Individual Actions.	1, 2, 3, 4	All	Urban land contributes (for All as of 2002: 12% TN 23% TP 14% TSS	*Lawn Care Ed* TN: 4,555 lb/yr TP: 91 lb/yr *Pet Waste Ed* TN: 520 lb/yr TP: 68 lb/yr FC: 4,523 billion/yr	TN: 2% TP: 0.7 % TN: 0.2% TP: 0.4% FC: 0.1%
I	Exclude livestock from streams.	1,2	All	Not Modeled	Not Modeled.	NA

Table 4-2: Recommendations and Implementation Strategies (EPA Criteria c, d, f)						
Rec. #	**Recommendation (EPA Criteria c)**	**Time Frame (EPA Criteria f)**	**Estimated Cost/unit (EPA Criteria d)**	**Technical Assistance needed (EPA Criteria d)**	**Funding Source**	**Responsible Party**
A	**Eliminate Septic System Failures.**					
A-1	Require new on-site systems to include Nitrogen removal capability.	Short-term **PRIORITY**	Staff Time (Low Cost)	Development guidelines with acceptable devices	Cost covered by developer	County Health County PGM County Commissioners
A-2	Upgrade systems in older communities by one of the following: ▪ Nitrogen upgrades to individual units ▪ Small, shared wastewater treatment systems ▪ Connection to a public Waste Water Treatment Plant Includes an estimated 1,162 homes with septics located on poor soils or high water table.	Short-term & ongoing **PRIORITY**	Capital Improve-ments (High Cost)	To be completed by County/PTRC/ Consultant	Bay Restoration Funds/County CIP	County PGM County Health County Utilities PTRC
A-3	Educate homeowners about septic system maintenance to reduce failures.	Short-term & ongoing	Staff Time (Low Cost)	Standard public ed materials	Grant funding	County PGM County Health PTRC
A-4	Increase the current inspection and repair requirements.	Long-term	Staff Time (Low Cost)	Language for code change	County budget	County Health
B	**Eliminate Sanitary Sewer Overflows.**					
B-1	Town to continue rehabilitation of existing sewer conveyance system per recommendations of Town of La Plata Water and Sewer Advisory Committee. This includes eliminating the overflow at the Centennial Street at US 301 manhole (MH13).	Short-term and Long-term **PRIORITY**	Capital Projects (High Cost)	Town hired URS to conduct study of sanitary sewer system.	Town CIP budget and cost-share by developers/ Grants	Town of La Plata
C	**Protect a Greater Percentage of the Watershed.**					
C-1	Require that Forest Conservation mitigation projects associated with development occur in the same watershed as the development.	Short-term	Staff Time (Low Cost)	List of available properties must be developed	Cost bourn by developer	Town of La Plata
C-2	Use forest conservation offset fees to assist landowners in placing their properties in permanent easement, by paying for the required surveying and easement plat.	Short-term & ongoing	$3000-$4000 per survey (Low Cost)	Code change may be needed	Forest conservation or SWM offset fees	County PGM

Table 4-2: Recommendations and Implementation Strategies (EPA Criteria c, d, f)						
Rec. #	**Recommendation (EPA Criteria c)**	**Time Frame (EPA Criteria f)**	**Estimated Cost/unit (EPA Criteria d)**	**Technical Assistance needed (EPA Criteria d)**	**Funding Source**	**Responsible Party**
C-3	Set goal of preserving 50% of the Port Tobacco watershed. The County's Comprehensive Plan call for 50% protection, but does not relate to watersheds. (Charles County, 2006b) County to develop strategy and funding plan to protect 8,850 acres by regulatory methods, easement donation, and acquisition.	Short-term **PRIORITY**	Staff Time (Low Cost) Acquisition (High Cost)	Consultant	Program Open Space; County Parks budget	County PGM
C-4	Work with Conservancy for Charles County and Maryland Environmental Trust to place properties in conservation easements.	Short-term & ongoing	Staff Time (Low Cost)	Conservancy & MET to provide	See C-2 & C-3	County PGM
C-5	Target the areas within the Port Tobacco watershed identified in the Green Infrastructure Assessment (DNR 2005). This short report is an appendix to the *Port Tobacco River Watershed Characterization.* It is recommended that all of these areas in the watershed be targeted, because the Green Infrastructure Hub Rank doesn't consider vulnerability to future development.	Short-term & ongoing	Staff Time (Low Cost)	Obtain mapping info from DNR/MDE	See C-2 & C-3	County PGM
D	**Reduce the Volume of Runoff Generated at New Developments through Better Site Design (BSD) and Well-designed and Constructed Stormwater Management.**					
D-1	Supplement the review of County's Forest Conservation and Stormwater Management Ordinance with a review of the Subdivision Codes.	Short-term	Staff Time plus $5000-$10,000 (Mid Cost)	Conduct internally or hire experienced consultant	Apply for grant funding	County PGM
D-2	Adopt code changes recommended in the review of County codes.	Short-term	Staff Time (Low Cost)			County PGM; County Commissioners
D-3	Review La Plata subdivision codes for the ability to implement site design credits in the 2000 Maryland Stormwater Design Manual.	Short-term	Staff Time plus $5000-$10,000 (Mid Cost)	Conduct internally or hire experienced consultant	Apply for grant funding	Town of La Plata

Table 4-2: Recommendations and Implementation Strategies (EPA Criteria c, d, f)						
Rec. #	**Recommendation (EPA Criteria c)**	**Time Frame (EPA Criteria f)**	**Estimated Cost/unit (EPA Criteria d)**	**Technical Assistance needed (EPA Criteria d)**	**Funding Source**	**Responsible Party**
D-4	Hire a junior environmental planner or engineer to assist with plan review and construction site inspection for the Town of La Plata.	Short-term & ongoing	Salary (Mid Cost)		Development fees	Town of La Plata
D-5	Revise design submittal checklists to include better site design.	Short-term; After D-1 & D-3	Staff Time (Low Cost)	See Appendix for templates	Budget	County PGM; Town of La Plata
D-6	Inspector training on construction techniques important to better site design (BSD) and stormwater management, especially such practices as bioretention.	Short-term	Staff Time plus $0-$15,000 (Mid Cost)	MDE or consultant assist with training	Apply for grant funding	County PGM; Town of La Plata
D-7	Execute MOU for all County and Town projects to utilize BSD and innovative stormwater management. New construction should showcase techniques and seek to treat runoff from off-site as a retrofit. County and Town redevelopment projects should include stormwater retrofits that treat drainage area beyond the minimum required.	Short-term **PRIORITY**	Staff Time (Low Cost)	Pre-qualify design consultants for BSD experience	Part of project funding	County PGM; Town of La Plata
E	**Reduce Stream Bank Erosion caused by Existing Development without Stormwater Management Practices by Constructing Retrofits.**					
E-1	Apply for grants and construct priority stormwater management retrofits.	Short-term	Capital Projects (High Cost)	Concept designs developed by consultant	MDE grants; Include in County and Town budgets	County PGM; Town of La Plata
E-2	Obtain State Highway Administration cooperation for retrofits along MD 301.	Short-term	Capital Projects (High Cost)	Design consultants to be hired by MDSHA	MD SHA	County PGM; MD SHA
E-3	Maintain the list of second priority stormwater management retrofits to be implemented with stormwater offset fees and grant funding.	Mid-term & ongoing	Staff Time (Low Cost)		Include in County and Town budgets	County PGM; Town of La Plata
E-4	Maintain the list of volunteer projects that can be implemented by community groups.	Short-term & ongoing	Staff Time (Low Cost)		Projects to be funded by community groups	County PGM; PTRC

Table 4-2: Recommendations and Implementation Strategies (EPA Criteria c, d, f)						
Rec. #	**Recommendation (EPA Criteria c)**	**Time Frame (EPA Criteria f)**	**Estimated Cost/unit (EPA Criteria d)**	**Technical Assistance needed (EPA Criteria d)**	**Funding Source**	**Responsible Party**
F	**Enforce Erosion and Sediment Control Regulations.**					
F-1	Local staff and volunteers to serve as watchdogs for the enforcement of erosion and sediment control.	Short-term & ongoing	Staff Time (Low Cost)	MDE Enforcement	MDE	Town of La Plata; SCD; PTRC
G	**Eliminate Illicit (non-permitted) Discharges to Reduce Nutrient and Bacteria Loads and to Protect the Biological Functions of Streams.**					
G-1	Test discharges from suspect outfalls identified during fieldwork.	Short-term	$300 per Outfall (Mid Cost)	Lab Analysis	Volunteer time; municipal budget	County Health PTRC
G-2	Train County and Town field staff on pollution prevention practices and recognizing illicit discharges.	Mid-term	Staff Time plus $0-$15,000 (Mid Cost)	MDE or consultant assist with training	Apply for grant funding	County PGM; Town of La Plata
H	**Educate the Watershed Citizens about Water Quality and Impacts of Individual Actions.**					
H-1	Outreach to new residents about their watershed.	Short-term & ongoing	$15,000 (Mid Cost)	Templates for printed materials	Grant funding	PTRC
H-2	Collaborate on education campaign for La Plata and Charles County residents. Address lawn care, pet waste, and car washing.	Mid-term	$1000-$40,000; See Appendix (Mid Cost)	Templates for printed materials; See Appendix	County & Town under NDPES programs	County & Town Collaboration
H-3	Construct natural shoreline demonstration projects and offer training to residents on the topic.	Mid-term	$50,000-$100,000 (High Cost)	Trainer	Chesapeake Bay Trust (CBT) or other grant funding	PTRC approach CBT

Table 4-2: Recommendations and Implementation Strategies (EPA Criteria c, d, f)						
Rec. #	**Recommendation (EPA Criteria c)**	**Time Frame (EPA Criteria f)**	**Estimated Cost/unit (EPA Criteria d)**	**Technical Assistance needed (EPA Criteria d)**	**Funding Source**	**Responsible Party**
H-4	Provide information about maintenance of stormwater management facilities to Home Owners' Associations.	Long-term	$1000-$15,000 (Mid Cost)	MDE or consultant for training; templates for printed materials; See Appendix	County & Town under NDPES programs	County & Town Collaboration
H-5	Train citizens about BSD and local development regulations.	Long-term	$0-$5000 (Mid Cost)	Speaker/technical expert	Grant Funding	PTRC County PGM
I	**Exclude livestock from streams.**					
I-1	Collaborate with the Charles County SCD and MD Cooperative Extension to identify individuals engaged in farming activities in the watershed and to determine the current status of their BMPs.	Short-term **PRIORITY**	Staff Time (Low Cost)			SCD MD Cooperative Extension
I-2	Use cost share and incentive programs (e.g. MACS or CREP) to exclude livestock from the stream corridor.	Short-term & ongoing **PRIORITY**	(Low Cost)	SCD to provide, MDA publications	Federal and State Cost Share Programs	SCD

Table 4-3: Monitoring for Recommended Strategies (EPA Criteria g, h, i)						
Rec. #	**Recommendation (EPA Criteria c) (Bold indicates PRIORITY for implementation.)**	**Target (EPA Criteria h)**	**Monitoring Component (EPA Criteria i)**	**Interim Milestones (EPA Criteria g)**	**Public Involvement (EPA Criteria e)**	**Program-matic Change**
A	Eliminate Septic System Failures.	GOALS 1, 2	Continue monitoring bacteria at established stations.	Reduction in bacteria levels.		
A-1	**Require new on-site systems to include Nitrogen removal capability.**	100% of new systems remove N.	Adoption of N-removal requirements in development code.	1) Prepare draft zoning text amendment for Critical Area N-removal requirement and take through public adoption process. 2) Prepare draft zoning text amendment for watershed N-removal requirement and take through public adoption process.	Stakeholder process.	Change development codes.
A-2	**Upgrade systems in older communities by one of the following:** ▪ **Nitrogen upgrades to individual units** ▪ **Small, shared wastewater treatment systems** ▪ **Connection to a public Waste Water Treatment Plant** **Includes an estimated 1,162 homes with septics located on poor soils or high water table.**	Offer upgrades to 100% of septic system owners in areas with high water table or soils with poor infiltration capacity.	Track # of septic systems upgraded and connected to a shared septic or public waste water treatment plant.	1) Select and prioritize areas for detailed assessment; 2) Complete assessments including identification of individual site failures; 3) Prioritize neighborhoods for action; 4) Identify appropriate methods for correction of failures and responsible entities for taking action; 5) Obtain additional funding as necessary; 6) Conduct corrective action; 7) Review success of the effort; 8) Monitor success/failure over time.	Outreach to homeowners with info about maintenance and available assistance.	NA
A-3	Educate homeowners about septic system maintenance to reduce failures.	Educate 100% of septic system owners.	Track # of septic system owners contacted.	Contact all homeowners in areas with high water table or soils with poor infiltration capacity.	Outreach to homeowners with info about maintenance and available assistance.	NA

Table 4-3: Monitoring for Recommended Strategies (EPA Criteria g, h, i)						
Rec. #	**Recommendation (EPA Criteria c) (Bold indicates PRIORITY for implementation.)**	**Target (EPA Criteria h)**	**Monitoring Component (EPA Criteria i)**	**Interim Milestones (EPA Criteria g)**	**Public Involvement (EPA Criteria e)**	**Program-matic Change**
A-4	Increase the current inspection and repair requirements.	Yearly septic inspections for 100% of systems.	Track # of yearly inspections.	Adoption of programmatic change giving the Health Department Authority.	Stakeholder process.	Require mandatory inspections.
B	Eliminate Sanitary Sewer Overflows.	GOALS 1, 2				
B-1	**Town to continue rehabilitation of existing sewer conveyance system per recommendations of Town of La Plata Water and Sewer Advisory Committee. This includes eliminating the overflow at the Centennial Street at US 301 manhole (MH13).**	Town sewer conveyance system upgraded to eliminate overflows due to size restrictions.	Track frequency of overflows and Town response time to overflow events.	1) Prioritize list of needed improvements; 2) Set time frames and responsible parties; 3) Determine funding sources; 4) Obtain funding; 5) Conduct corrective actions	La Plata website and newsletter includes # to call for reporting overflow. Public informed of rehabilitation status.	Reporting and response to overflows.
C	Protect a Greater Percentage of the Watershed.	GOALS 3, 4				
C-1	Require that Forest Conservation mitigation projects associated with development occur in the same watershed as the development.	Forest conservation mitigation in same watershed.	Adoption of Forest Conservation code change.	1) Draft programmatic change; 2) Public adoption process.	Stakeholder process.	Forest Conservation code change.
C-2	Use forest conservation offset fees to assist landowners in placing their properties in permanent easement, by paying for the required surveying and easement plat.	Increased number of Forest Conservation Banks in the watershed.	Track # of forest property owners contacted, and track # of forest conservation banks.	1) Draft policy; 2) Review and approval of policy by State FC coordinator; 3) Approve policy change at Department level; 4) Identify eligible property owners; 5) Contact property owners.	Work with individual landowners.	Use of offset fees to establish small forest conservation banks.
C-3	**Set goal of preserving 50% of the Port Tobacco watershed. The County's Comprehensive Plan call for 50% protection, but does not relate to watersheds. (Charles County, 2006b) County to develop strategy and funding plan to protect 8,850 acres by regulatory methods, easement donation, and acquisition.**	50% of watershed protected	Track acreage protected in the watershed.	1) Assess properties for protection with criteria assistance from CCC and MET; 2) Prioritize properties to meet acreage goal; 3) Match protection programs with priority properties; 4) Develop funding mechanisms as necessary; 5) Request approval for strategy and funding; 6) Contact eligible	Work with individual landowners.	County goal of 50% preservation applied to Port Tobacco River Watershed.

Table 4-3: Monitoring for Recommended Strategies (EPA Criteria g, h, i)						
Rec. #	**Recommendation (EPA Criteria c) (Bold indicates PRIORITY for implementation.)**	**Target (EPA Criteria h)**	**Monitoring Component (EPA Criteria i)**	**Interim Milestones (EPA Criteria g)**	**Public Involvement (EPA Criteria e)**	**Program-matic Change**
				property owners with program information to determine interest in participation.		
C-4	Work with Conservancy for Charles County (CCC) and Maryland Environmental Trust (MET) to place properties in conservation easements.	Assistance provided to CCC and MET.	Assistance provided to CCC and MET.	1) Determine CCC and MET needs; 2) Provide assistance to CCC and MET as needed.	NA	NA
C-5	Target the areas within the Port Tobacco watershed identified in the Green Infrastructure Assessment (DNR 2005). This short report is an appendix to the *Port Tobacco River Watershed Characterization.* It is recommended that all of these areas in the watershed be targeted, because the Green Infrastructure Hub Rank doesn't consider vulnerability to future development.	Increased protection of Green Infrastructure in the watershed.	Track # of acres of Green Infrastructure protected in the watershed.	1) Identify property owners of Green Infrastructure; 2) Match potential preservation programs with these properties; 3) Contact property owners to determine interest in participation.	Work with individual property owners.	NA
D	Reduce the Volume of Runoff Generated at New Developments through Better Site Design (BSD) and Well-Designed and Constructed Stormwater Management.	GOAL 4				
D-1	Supplement the review of County's Forest Conservation and Stormwater Management Ordinance with a review of the Subdivision Codes.	Subdivision Code review.	Subdivision Code review completed.	1) Hire consultant to provide Subdivision Code review.	NA	NA
D-2	Adopt code changes recommended in the review of County codes.	100% of developments outside growth boundary to include BSD.	Adoption of design guideline changes.	1) Prepare draft zoning text amendment and take through public adoption process.	Stakeholder process.	Code and design guideline changes.
D-3	Review La Plata subdivision codes for the ability to implement site design credits in the 2000 Maryland Stormwater Design Manual.	Subdivision Code review.	Subdivision Code review completed.	1) Hire consultant to provide Subdivision Code review	NA	NA
D-4	Hire a junior environmental planner or engineer to assist with plan review and construction site inspection for the Town of La Plata.	Staff hired.	Staff hired.	1) Propose increased budget; 2) Advertise position; 3) Hire staff.		Increased Town staff.

Table 4-3: Monitoring for Recommended Strategies (EPA Criteria g, h, i)						
Rec. #	**Recommendation (EPA Criteria c) (Bold indicates PRIORITY for implementation.)**	**Target (EPA Criteria h)**	**Monitoring Component (EPA Criteria i)**	**Interim Milestones (EPA Criteria g)**	**Public Involvement (EPA Criteria e)**	**Program-matic Change**
D-5	Revise design submittal checklists to include better site design.	Improved checklists.	Checklists completed.	1) Compile all applicable checklists; 2) Revise checklists; 3) Approve revised checklists; 4) Distribute new chekclists to development community.	NA	NA
D-6	Inspector training on construction techniques important to better site design (BSD) and stormwater management, especially such practices as bioretention.	Inspectors with BSD expertise.	Training Completed.	1) Hire training consultant; 2) Schedule training seminar	NA	NA
D-7	**Execute MOU for all County and Town projects to utilize BSD and innovative stormwater management. New construction should showcase techniques and seek to treat runoff from off-site as a retrofit. County and Town redevelopment projects should include stormwater retrofits that treat drainage area beyond the minimum required.**	100% of all County and Town projects to include BSD	Track # of BSD practices implemented, and # acreage treated with stormwater management.	1) Draft MOU; 2) Initiate approval process at County and Town; 3) Pre-qualify design consultants for BSD experience; 4) Review County and Town projects for BSD implementation and stormwater treatment of additional drainage area.	Teaching about Better Site Design at design charettes for public facilities.	Inter-departmental cooperation to retrofit storm water facilities and utilize BSD.
E	Reduce Stream Bank Erosion caused by Existing Development without Stormwater Management Practices by Constructing Retrofits.	GOAL 3				
E-1	Apply for grants and construct priority stormwater management retrofits.	Increase the drainage area controlled by stormwater management.	Track # of projects completed; drainage area; type of practice.	1) Develop cost estimates for retrofits; 2) Prioritize retrofits; 3) Match priority projects with potential grants available; 4) Apply for grants; 5) Construct retrofits.	NA	NA
E-2	Obtain State Highway Administration cooperation for retrofits along MD 301.	Increase the drainage area controlled by stormwater management.	Track # of projects completed; drainage area; type of practice.	1) Convey list of retrofit projects to SHA; 2) Follow-up to determine which projects SHA will implement; 3) Recommend SHA implement retrofits.	NA	NA

Table 4-3: Monitoring for Recommended Strategies (EPA Criteria g, h, i)						
Rec. #	**Recommendation (EPA Criteria c) (Bold indicates PRIORITY for implementation.)**	**Target (EPA Criteria h)**	**Monitoring Component (EPA Criteria i)**	**Interim Milestones (EPA Criteria g)**	**Public Involvement (EPA Criteria e)**	**Program-matic Change**
E-3	Maintain the list of second priority stormwater management retrofits to be implemented with stormwater offset fees and grant funding.	Increase the drainage area controlled by stormwater management.	Track # of projects completed; drainage area; type of practice.	1) Develop cost estimates for retrofits; 2) Prioritize retrofits; 3) Match priority projects with potential grants available; 4) Apply for grants; 5) Construct.	NA	NA
E-4	Maintain the list of volunteer projects that can be implemented by community groups.	Increase the drainage area controlled by stormwater management.	Track # of volunteer projects completed; drainage area; type of practice.	1) Compile list of applicable projects; 2) Update list as new projects are identified and old projects are completed.	NA	NA
F	Enforce Erosion and Sediment Control Regulations.	GOAL 3				
F-1	Local staff and volunteers to serve as watchdogs for the enforcement of erosion and sediment control.	All construction sites have properly maintained ESC devices.	Track frequency of site visits by inspectors. Track # of violations and response time.	Sites visited by inspectors at minimum frequency. Violations addressed per existing regs.	Public to be educated on ESC and to serve as watchdogs.	MDE to schedule more frequent site visits to La Plata construction sites. County to improve program as needed.
G	Eliminate Illicit (non-permitted) Discharges to Reduce Nutrient and Bacteria Loads and to Protect the Biological Functions of Streams.	GOAL 1, 2				
G-1	Test discharges from suspect outfalls identified during fieldwork.	Increased illicit discharges identified.	Track # of illicit discharges identified and # businesses that install pollution prevention.	1) Hire consultant to test discharges on a regular basis.	NA	NA

Table 4-3: Monitoring for Recommended Strategies (EPA Criteria g, h, i)						
Rec. #	**Recommendation (EPA Criteria c) (Bold indicates PRIORITY for implementation.)**	**Target (EPA Criteria h)**	**Monitoring Component (EPA Criteria i)**	**Interim Milestones (EPA Criteria g)**	**Public Involvement (EPA Criteria e)**	**Program-matic Change**
G-2	Train County and Town field staff on pollution prevention practices and recognizing illicit discharges.	Increased illicit discharges identified by staff.	Track # of illicit discharges identified by staff.	1) Hire training consultant; 2) Schedule training seminar.	Public education regarding how to report illicit discharges.	Staff training. Establish a hotline. Establish small business outreach.
H	Educate the Watershed Citizens about Water Quality and Impacts of Individual Actions.	GOALS 1, 2, 3, 4				
H-1	Outreach to new residents about their watershed.	30 % of Residents reached.	Behavior survey before and after education effort.	1) County budgets money for the program; 2) Outreach provided.	Public is target audience.	County NPDES education component is pro-active.
H-2	Collaborate on education campaign for La Plata and Charles County residents. Address lawn care, pet waste, and car washing.	30 % of Residents reached.	Behavior survey before and after education effort.	1) County budgets money for the program; 2) Outreach provided.	Public is target audience.	County NPDES education component is pro-active.
H-3	Construct natural shoreline demonstration projects and offer training to residents on the topic.	30 % of shoreline Residents reached.	Track # of shoreline residents contacted.	1) Work with SCD and PTRC to identify property for project; 2) Apply for grant; 3) Hire builder and education consultant; 4) Implement project and training.	Public is target audience.	NA
H-4	Provide information about maintenance of stormwater management facilities to Home Owners' Associations.	30 % of Residents reached.	Behavior survey before and after education effort.	1) County budgets money for the program; 2) Outreach provided.	Public is target audience.	County NPDES education component is pro-active.
H-5	Train citizens about BSD and local development regulations.	30 % of Residents reached.	Behavior survey before and after education effort.	1) County budgets money for the program; 2) Outreach provided.	Public is target audience.	County NPDES education component is pro-active.

Table 4-3: Monitoring for Recommended Strategies (EPA Criteria g, h, i)						
Rec. #	**Recommendation (EPA Criteria c) (Bold indicates PRIORITY for implementation.)**	**Target (EPA Criteria h)**	**Monitoring Component (EPA Criteria i)**	**Interim Milestones (EPA Criteria g)**	**Public Involvement (EPA Criteria e)**	**Program-matic Change**
I	Exclude livestock from streams.	GOALS 1, 3				
I-1	**Collaborate with the Charles County SCD and MD Cooperative Extension to identify individuals engaged in farming activities in the watershed and to determine the current status of their BMPs.**	List of individuals engaged in farming activities in the watershed.	List of contacts for farming activities completed.	1) SCD identifies locations of livestock; 2) Watershed surveyed for any additional locations of livestock; 3) Status of BMPs determined for each location.	NA	NA
I-2	**Use cost share and incentive programs (e.g. MACS or CREP) to exclude livestock from the stream corridor.**	All livestock is excluded from streams.	Track # of properties that exclude livestock from streams.	1) SCD to work with property owners; 2) Fencing and buffer areas implemented.	Work with individual property owners.	NA

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GIS Data Note

The GIS layers used in maps and analyses for this report were provided by:

Charles County Department of Planning and Growth Management
Maryland Department of the Environment
Maryland Department of Natural Resources
Maryland Department of Planning.
US Environmental Protection Agency BASINS
US Environmental Protection Agency Chesapeake Bay Program

Additional data layers were created by the Center for Watershed Protection.