

**REVISED DRAFT**

# Prince George's County, Maryland— Phase II Watershed Implementation Plan

For inclusion in the  
Maryland Final Phase II Watershed  
Implementation Plan

Section III: Local Area Phase II WIP Process—Developing  
Reduction Strategies to Meet Nutrient and Sediment  
Allocations at the County-Geographic Scale

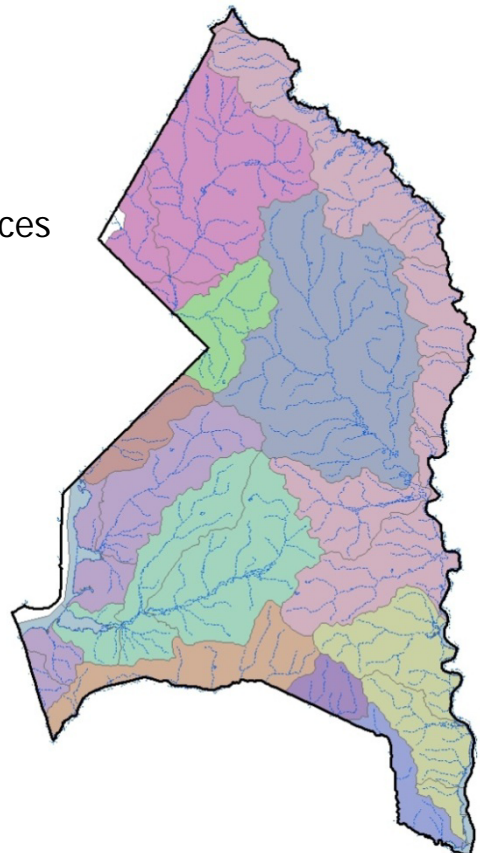


Prince George's County, Maryland  
Department of Environmental Resources

In cooperation with:

- Department of Public Works and Transportation
- Soil Conservation District
- Health Department
- National-Capital Park and Planning Commission
- Washington Suburban Sanitary Commission
- City of Bowie

July 2, 2012 FINAL



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## 1. Narrative of County Efforts

Prince George's County (the County) initiated development of its local strategies to fulfill Phase II WIP (Watershed Implementation Plan) requirements in June 2011 by forming a WIP team with participants from several county agencies. Table 1 lists the membership of the County's Phase II WIP team by agency. The entire WIP team is committed to implementing the WIP to improve the waters of the Chesapeake Bay and the waters of the County (Figure 1).

Table 1. Prince George's County WIP development team members

Agencies	Participants
City of Bowie	Joe Meinert*, Tiffany Wright
Maryland Department of Natural Resources	Ken Yetman* (designated state liaison)
Maryland National-Capital Park and Planning Commission, Department of Planning	Kate Fritz*, Kipling Reynolds
Maryland National-Capital Park and Planning Commission, Department of Parks and Recreation	Laura Connelly*
Prince George's County Soil Conservation District	Dave Bourdon*, Steve Darcey, Lance Gardner
Prince George's County Health Department	Alan Heck, Evelyn Hoban*, Paul Meyer*, Manfred Reichwein
Prince George's County Department of Environmental Resources	Mow-Soung Cheng*, Jeff DeHan, Jerry Maldonado, Sam Moki, Deborah Weller, <b>Sam Wynkoop**</b>
Prince George's County Department of Public Works and Transportation	Dawit Abraham, Gwen Clerkley, Frank Galosi, Haitham Hijazi, Karen Moreland, Mary Rea, Michale Reahl, Tajendra Singh, Derek Winogradoff*
Washington Suburban Sanitary Commission	Craig Fricke, J. L. Hearn*, Kim Knox

Note: \*\* Indicates the County WIP Team Leader; \* Indicates agency WIP lead

Throughout the WIP development process, the team met eight times (06/22/11, 07/13/11, 08/15/11, 08/31/11, 09/28/11, 10/13/11, 11/07/11, and 04/19/12). The State-assigned WIP liaison was present at all meetings. The team was aided through contractor support provided by Tetra Tech, Inc. The County's Department of Environmental Resources (DER) took the lead role in WIP development and coordination among the County agencies, the Maryland Department of the Environment (MDE) and Maryland Department of Natural Resources (DNR), the County Executive and County Council. The County hosted three public forums (08/16/11, 09/07/11, 10/18/11) where it presented information regarding the WIP development and the County's strategy for meeting WIP goals. Each meeting provided time for the public to review poster displays and talk to representatives from each sector. There was also a presentation explaining the WIP and the County's position and progress. Each event also provided opportunities for the public to ask questions after each presentation and to turn in hard copy questions. The County also has a public information website at [http://www.princegeorgescountymd.gov/Government/AgencyIndex/DER/ESG/watershed-plan.asp?nivel=foldmenu\(7\)](http://www.princegeorgescountymd.gov/Government/AgencyIndex/DER/ESG/watershed-plan.asp?nivel=foldmenu(7)).

Each sector applied different approaches for meeting the WIP goals, as summarized below and explored in detail in the next section.

- Agriculture: Focus on the highest efficiency implementation strategies.
- Septics: Improve tracking and continue to upgrade failing systems.
- Point sources: Adhere to current National Pollutant Discharge Elimination System (NPDES) permit requirements.

# Prince George's County Major Watersheds

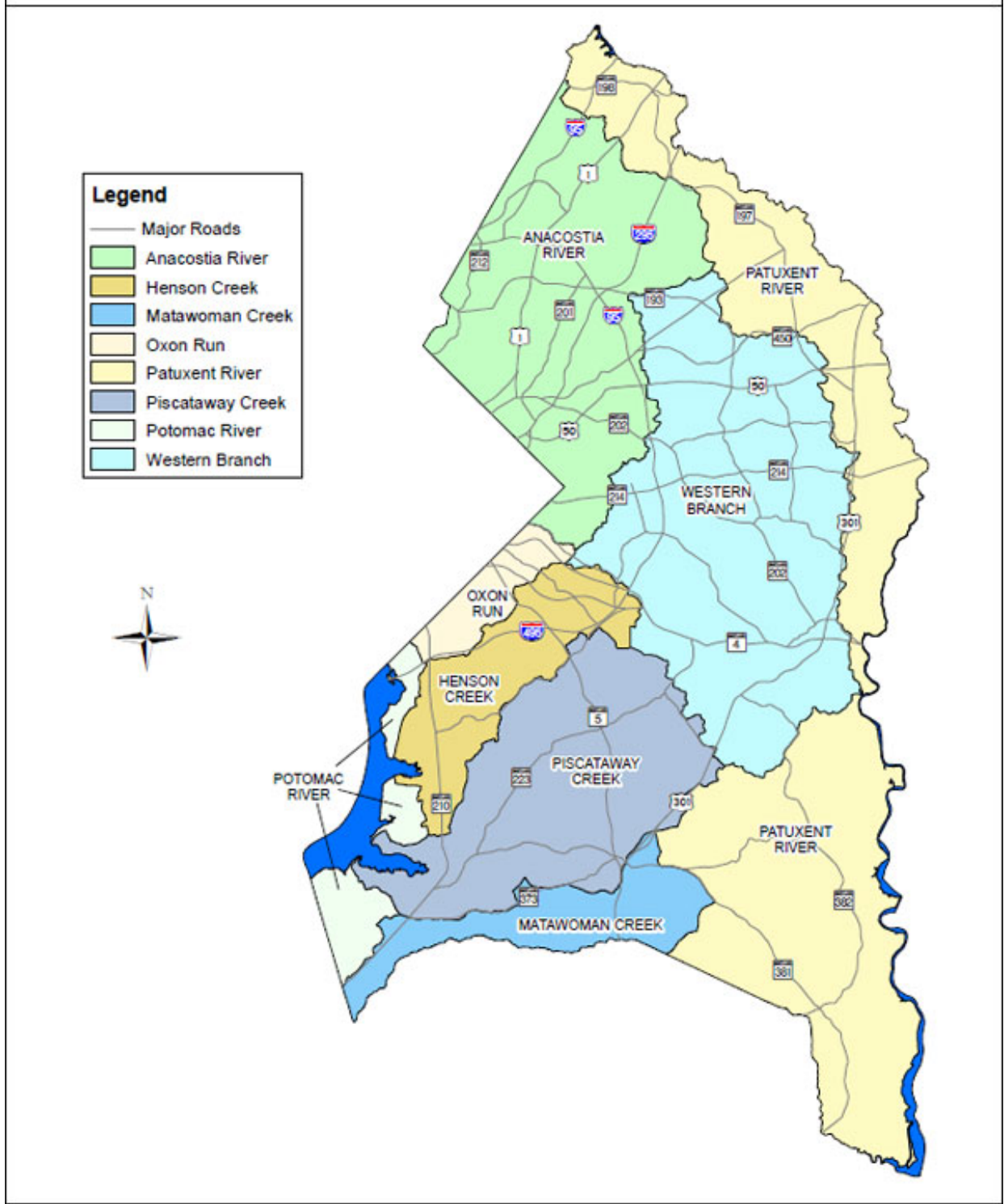


Figure 1. Watershed in Prince George's County.



- Urban: Achieve conditions specified in the anticipated new municipal separate storm sewer system (MS4) permits.

The Soil Conservation District's (SCD) largest challenge will be acquiring and keeping qualified engineers, engineering technicians, and planners experienced in the field of soil and water conservation to implement planned Best Management Practices (BMPs). The County's SCD was the first in Maryland to have approved soil conservation and water quality plans on every farm within the Chesapeake Bay Critical Areas. SCD maintains more than 650 soil conservation and water quality plans on 50,000 plus acres of farmland. The annual implementation of BMPs on farmland results in significant reductions of sediment, nitrogen and phosphorus from being delivered to County waterways and tributaries of the Chesapeake Bay. SCD is well regarded in the agricultural community as the agency for all of its conservation needs. SCD provides a one-stop-shop for the agricultural community in the County.

The biggest challenges for the wastewater sector is completing facility enhanced nutrient reduction (ENR) upgrades within the required NPDES schedules. Another challenge is funding the ENR upgrades. They receive only a portion of the necessary funds from the Bay Restoration Fund (BRF) grants. Once the upgrades are in place at each plant, the challenge for those in the wastewater sector is to consistently meet the stringent ENR nitrogen and phosphorus limits specified in their permits. Successes of the wastewater sector are that it has secured funding from BRF and that it has completed its ENR upgrade plans.

For septics, the biggest challenge will be funding. There is insufficient funding through the BRF to upgrade all on-site sewage disposal systems. In addition, many of those with failing septic systems are not in the critical area and, therefore, are not eligible to receive full funding through the BRF. One of the biggest challenges facing the Health Department is the remodeling of a failing septic system without the benefit of a permit in an effort to expedite the repair. Other challenges for the septic sector include encouraging property owners to maintain their system by having their septic tank pumped out, finding suitable soils for repairing systems, and having a more complete database and Geographical Information System (GIS) that locates and provides data for every septic system in the County. One of the Health Department's biggest successes is its extremely low rate of septic system failure with no serious health impacts.

For the urban sector, the two biggest challenges in implementing the Phase II WIP will be generating the estimated revenue to implement the WIP and finding enough suitable land for BMP implementation. The lack of efficient technology to treat nutrients through urban BMPs poses additional challenges. As this Phase II WIP strategy for the County describes, the County has a plan for generating the necessary revenue and is committed to implementing the WIP. In the past, the County has been successful in receiving grants for stormwater management. The County also plans on using BMP optimization practices to determine the most effective locations and types of BMPs. The County has been on the cutting edge of Low Impact Development (LID) stormwater management practices and has even authored manuals for implementing practices, such as bioretention practices. The County has been contracting with the University of Maryland to identify and introduce cutting edge technology in urban BMPs for more than a decade. The County will continue that effort to identify efficient technology that enables the County to economically meet WIP II goals.

## **2. County Area Phase II WIP Strategies**

This section summarizes the BMP reduction strategies for the Interim Target (2017) and Final Target (2025). Narrative descriptions of the implementation strategies provide a schedule of key actions and funding approaches for the 2017 strategy. Those strategies reflect a local perspective on how the targets could be achieved with the understanding that the strategies could be revised in the future as part of an adaptive management process.

The following local strategies are organized by the primary source sectors. They pertain primarily to the functions of local government. Strategies for State facilities (e.g. State Highway Administration) and Federal facilities (e.g., Joint Base Andrews) are addressed elsewhere in the Sections I and II of the Maryland Phase II WIP.

### ***Agriculture***

SCD is working with the Maryland Department of Agriculture (MDA) to develop agricultural strategies. Those strategies will be watershed based instead of County based and will be addressed separately from the County's WIP. SCD's overall strategy is to provide technical assistance to landowners to implement BMPs that maximize the reduction of sediment, nitrogen, and phosphorus on farms. Those BMPs include precision and decision agriculture, nutrient management, cover crops, no-till farming, manure management, and others. In addition, SCD is developing soil conservation and water quality plans on all private and non-private farms and updating existing conservation plans to current standards.

### ***Point Sources/Wastewater***

Wastewater and other permitted point source dischargers will follow their current permit and the current County water and sewer plan. The point source strategies will be addressed by the State and are the same as were presented by Maryland in its Phase I WIP. That includes major/minor municipal treatment plants, major/minor industrial plants, and extractive facilities.

### ***Septics***

The Health Department will introduce revised County Regulations (Subtitle 22) in 2012–2013 for on-site sewage disposal systems that will include any relevant State legislation passed during the next legislative session. The regulations will provide maintenance guidelines for on-site sewage disposal systems and guidance for the appropriate use of nutrient reduction systems.

Using BRF funds, the Health Department plans to continue replacing failing septic systems in the critical area on the basis of available funding. The County experiences few failing systems, however, it can be anticipated, that on average, two failing systems will be upgraded each year, which will result in less than one percent of the allocation. In addition, because of the higher cost associated with the nutrient reduction (best available technology [BAT]) systems, most homeowners who need to replace their systems opt for the lower cost septic tank systems. In addition, most homeowners are not eligible for full BRF reimbursement for the upgraded systems because of location and income. If additional funding becomes available through State or Federal programs to allow for higher homeowner reimbursements, the County expects that additional septic system upgrades would occur.

The Health Department will work with the Washington Suburban Sanitary Commission (WSSC) to develop a method to track houses that have abandoned their septic system and have connected to an advanced wastewater treatment plant (WWTP). Neither the Health Department nor WSSC has developed a method for tracking those conversions. Because of the lack of a tracking System, a future estimate of the number of conversions could not be made for the purpose of this

WIP. Similarly, the Health Department will work with septic system pump-out companies to develop a methodology for tracking septic system pump-outs. Because of the lack of a tracking system, future estimates of the number of septic system pump-outs could not be made for the purpose of this WIP.

### **Urban Stormwater**

As part of the urban stormwater sector, SCD will continue issuing erosion and sediment control plans for construction activity in the County. The County will continue permitting, inspecting, and enforcing the plans, with the exception of the cities of Bowie, Greenbelt, and Laurel, which have their own permitting and inspection program. Those municipalities will continue permitting, inspecting and enforcing the construction activity in their jurisdictions. WSSC also does permitting, inspecting, and enforcing of erosion and sediment control plans for its underground utility work.

By 2017 the County will have retrofitted 10 percent of untreated impervious land in the County, as required from its current Phase I MS4 permit, which has been administratively extended since October 2009. In addition, the County will retrofit an additional 20 percent of impervious urban area that has little or no stormwater treatment per its anticipated Phase I MS4 permit renewal. That is consistent with the Phase I Maryland WIP. The combined 30 percent retrofit requirements amount to 7,109 acres of untreated impervious area, which does not include any city of Bowie, state, or federal areas. That number of acres was determined using the County's GIS data, which have slightly different total urban acreages than in the Bay Model. In addition to the County's Phase I MS4 permit, the County is responsible for stormwater management for all municipalities in the County, except for Bowie. According to the Phase I WIP, the County will achieve its anticipated municipal Phase II MS4 requirements by retrofitting 20 percent of the untreated impervious area within municipalities. That area totals 928 untreated impervious acres, not including Bowie. In addition, Bowie will retrofit 20 percent of its untreated impervious urban area that has little or no stormwater treatment per its anticipated Phase II MS4 permit, and more specific information will be provided once the information has been approved by its city council.

Table 2 presents a possible combination of BMPs and practices that will be implemented by 2017 and the treated or equivalent untreated impervious acres, while Table 3 presents load reductions as estimated by the online Maryland Assessment Scenario Tool (MAST). Equivalent untreated impervious acres were determined through the procedure outlined in MDE's June 2011 draft document, *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated*.<sup>1</sup> Table 2 also presents the estimated total cost that was calculated either by budgeted activities or on estimated unit costs on the basis of previous BMP construction in the County. The exact mixture of BMPs and practices will be developed in 2012 using the County's Best Management Practice Decision Support System (BMPDSS), which is a BMP modeling, selection, and placement decision support system applicable at various scales, from site to watershed. By using BMPDSS, the County can determine the optimal placement for BMPs in the County to optimize load reduction while minimizing costs.

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<sup>1</sup> MDE (Maryland Department of the Environment). 2011. *DRAFT Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated*. Maryland Department of the Environment, Baltimore, MD.

Table 2. Preliminary scenario for urban impervious retrofits to meet County MS4 permit by 2017

BMP type	Impervious area (acres)	Pervious area (acres)	Estimated cost per impervious acre (\$/acre)	Estimated total cost
<b>County</b>				
Bioretention areas	305	1,728 <sup>a</sup>	\$100,000	\$30,500,000
Filtering practices	379	2,148 <sup>a</sup>	\$100,000	\$37,900,000
Infiltration practices	813	4,607 <sup>a</sup>	\$100,000	\$81,300,000
Filtration ponds	1,036	5,871 <sup>a</sup>	\$35,000	\$36,260,000
Wetland restoration	251 <sup>b</sup>	199 <sup>b</sup>	\$82,669 <sup>c</sup>	\$20,750,000
Stream restoration	645 <sup>b</sup>	3,655 <sup>a</sup>	\$55,764 <sup>c</sup>	\$35,968,000
Forest buffer	484 <sup>d</sup>	939 <sup>e</sup>	\$11,763 <sup>c</sup>	\$5,693,273
Dry pond retrofits	1,222 <sup>b</sup>	3,477 <sup>b</sup>	\$15,712 <sup>c</sup>	\$19,200,000
Urban nutrient management	1,000 <sup>d</sup>	11,108 <sup>e</sup>	Minimal	\$100,000
Impervious area disconnect	975 <sup>e</sup>		\$30,000	\$29,235,000
State phosphorus fertilizer reduction	tbd <sup>f</sup>	tbd	Minimal	Minimal
<b>Sum for County</b>	<b>7,109</b>	<b>33,732</b>	<b>\$41,764</b>	<b>\$296,906,273</b>
<b>Municipal without Bowie</b>				
Bioretention areas	75	175 <sup>a</sup>	\$100,000	\$7,500,000
Filtering practices	89	208 <sup>a</sup>	\$100,000	\$8,900,000
Infiltration practices	109	254 <sup>a</sup>	\$100,000	\$10,900,000
Filtration ponds	436	1,017 <sup>a</sup>	\$35,000	\$15,260,000
Urban nutrient management	111 <sup>d</sup>	1,232 <sup>e</sup>	Minimal	Included in above
Impervious area disconnect	108 <sup>e</sup>		\$30,000	\$3,240,000
State phosphorus fertilizer reduction	tbd	tbd	Minimal	Minimal
<b>Sum for Municipal without Bowie</b>	<b>928</b>	<b>2,886</b>	<b>\$49,360</b>	<b>\$45,800,000</b>
<b>County and Municipal (without Bowie)</b>				
<b>Total</b>	<b>8,037</b>	<b>36,618</b>	<b>\$42,641</b>	<b>\$342,706,273</b>

Notes:

- a. Pervious area estimated from amount of impervious land treated.
- b. Known number of acres.
- c. Estimated cost per acre is based on known total projected project cost.
- d. Impervious area is calculated from equivalent impervious acres per MDE's June 2011 draft document, *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated*.
- e. Estimated/assumed amount.
- f. These amounts will be determined by the State.

Table 3. Estimated load reductions from preliminary 2017 scenario

Land area	TN reduction (lbs)	TP reduction (lbs)
County impervious	22,356	4,309
Municipal impervious	4,462	895
<b>Total impervious</b>	<b>26,818</b>	<b>5,204</b>
County pervious	46,663	3,766



Municipal pervious	4,714	400
Total pervious	51,376	4,166
TOTAL	78,194	9,370
2017 Target (60% of 2025 target)	107,053	19,344

The following provide some additional information on the goals set in Table 2.

- County programs will help treat previously untreated impervious areas and will provide load reductions; however, the programs and the extent of implementation from each are not known. Those practices are expected to include structural BMPs such as bioretention areas, filtering practices, infiltration practices, and new wet ponds. Costs per impervious acre are estimated on the basis of the County’s experience installing those practices.
- Table 2 assumes that all wetland restoration projects from the Anacostia Restoration Action Plan<sup>2</sup> that have been identified on public land will be implemented. The Plan lists the estimated costs of those projects.
- Stream restoration will occur through agreements with the U.S. Army Corps of Engineers (COE) (10 miles) and with DNR (1.2 miles). Additional stream restoration will be completed along Paint Branch (1 mile). The costs listed in Table 2 are the budgeted total costs.
- The County plans on adding forest buffers to stream segments without adequate buffers along urban stream corridors within public land. That includes an estimated 442,857 feet of stream bank. It is anticipated that the buffers will treat an additional four times the amount of pervious land that the buffer will cover.
- The County will continue evaluating and converting dry ponds and extended dry ponds into a filtered pond system. That will increase nutrient reduction because dry ponds were originally designed only for hydrologic control. The conversions will account for 1,222 acres of impervious land and 3,477 acres of pervious land. The estimated cost per pond retrofit is \$150,000.
- The County will look into establishing an education and outreach program for residential fertilizer application. While the benefits of this program might be widespread, the quantification of the load reduction is difficult to determine. For this WIP, the County used the Urban Nutrient Management option in MAST and applied it to 12,340 acres of pervious residential land, which is reflected in Table 2. That amount was derived from a presentation from the Chesapeake Stormwater Network by estimating that 50 percent of homeowners might fertilize their lawns, of that, 20 percent use a lawn care company (loadings from this are covered in the State Phase II WIP), and 50 percent of the remainder over-fertilize their lawn and are the main targets of the education campaign. It is expected that additional reductions will be added by the State to account for urban nutrient management laws. According to MDE’s June 2011 draft document, *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated*, that calculates to 1,111 acres of equivalent untreated impervious area credit.

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<sup>2</sup> U.S. Army Corps of Engineers. 2010. *Final Draft Anacostia River Watershed Restoration Plan and Report*.

- A total of 4,336 acres of impervious commercial, industrial, and institutional land area has been identified through GIS analysis as available for possible disconnection from storm sewer systems. Sutherland (1995)<sup>3</sup> developed an analysis technique to determine the amount of impervious area that is directly connected to drainage systems from the total impervious area. This technique was used for this WIP to estimate the effective impervious area that can be disconnected. Using Sutherland (1995) it was determined that a credit of 2,165 impervious acres could be assumed for disconnecting impervious area. The County plans on disconnecting half of that area before 2017 and the other half by 2025.

The scenario laid out in Table 2, along with construction practices, account for only 44 percent of the target 2025 total nitrogen and 29 percent of the total phosphorus load allocation for the County and the municipalities for which the County is responsible, instead of the 60 percent goal established by MDE. Table 4 shows potential additional BMPs needed to work toward the County’s 2025 load reduction targets. Table 5 presents the load reductions from the 2017–2025 preliminary scenario.

Table 4. Preliminary additional BMP scenario for urban impervious retrofits for 2017–2025

BMP type	Impervious area (acres)	Pervious area (acres)	Estimated cost per impervious acre (\$/acre)	Estimated total cost
<b>County</b>				
Bioretention areas	471	2,669 <sup>a</sup>	\$85,000	\$40,035,000
Filtering practices	275	1,558 <sup>a</sup>	\$85,000	\$23,375,000
Infiltration practices	436	2,471 <sup>a</sup>	\$85,000	\$37,060,000
Filtration ponds	1,424	8,069 <sup>a</sup>	\$35,000	\$49,840,000
Wetland restoration	502	398	\$82,669 <sup>b</sup>	\$41,500,000
Stream restoration	1,613	9,138	\$55,764 <sup>b</sup>	\$89,919,450
Forest buffer	484	939	\$11,763 <sup>b</sup>	\$5,693,273
Impervious area disconnect	975 <sup>c</sup>		\$30,000	\$29,235,000
<b>Sum for County</b>	<b>6,179</b>	<b>25,242</b>	<b>\$51,247</b>	<b>\$316,657,723</b>
<b>Municipal without Bowie</b>				
Bioretention areas	165	385 <sup>a</sup>	\$85,000	\$14,025,000
Filtering practices	85	198 <sup>a</sup>	\$85,000	\$7,225,000
Infiltration	216	504 <sup>a</sup>	\$85,000	\$18,360,000

<sup>3</sup> Sutherland, R.C. 1995. Methodology for estimating the effective impervious area of urban watershed. *Watershed Protection Techniques* 2(1):282–284.

BMP type	Impervious area (acres)	Pervious area (acres)	Estimated cost per impervious acre (\$/acre)	Estimated total cost
practices				
Filtration ponds	716	1,671 <sup>a</sup>	\$35,000	\$25,060,000
Impervious area disconnect	108 <sup>c</sup>		\$30,000	\$3,240,000
<b>Sum for Municipal without Bowie</b>	<b>1,290</b>	<b>2,758</b>	<b>\$52,643</b>	<b>\$67,910,000</b>
<b>County and Municipal (without Bowie)</b>				
<b>Total</b>	<b>7,469</b>	<b>28,000</b>	<b>\$51,489</b>	<b>\$384,567,723</b>

Notes:

- a. Pervious area estimated from amount of impervious land treated.
- b. Estimated cost per acre is based on known total projected project cost from 2017 scenario.
- c. Estimated/assumed amount.

Urban nutrient management was represented in Table 2. Once installed, structural BMPs and impervious disconnection will begin performing toward required pollutant reduction with appropriate maintenance. The Urban Nutrient Program is an institutional control that should continue to be implemented continuously to meet required pollutant reduction and needs to be put into the model/MAST only once, as reported in Table 2.

Table 5. Estimated total load reductions from preliminary scenario

Land area	TN reduction (lbs)	TP reduction (lbs)
County impervious	42,858	8,187
Municipal impervious	10,232	1,988
<b>Total impervious</b>	<b>53,090</b>	<b>10,174</b>
County pervious	80,654	6,580
Municipal pervious	10,243	839
<b>Total pervious</b>	<b>90,896</b>	<b>7,419</b>
<b>TOTAL</b>	<b>143,986</b>	<b>17,593</b>
<b>2025 Target</b>	<b>178,421</b>	<b>32,240</b>

It is important to note that Table 2 and Table 4 are potential scenarios, especially Table 4. Several potential scenarios exist for achieving nutrient reduction. MDE and the U.S. Environmental Protection Agency (EPA) recognize that nutrient reduction will be an adaptive management process so strategies can be changed as the result of new information, enhanced technologies and changes in the regulatory environment, as long as the final targets are still met. It is expected that there will be several changes to the Bay Model before 2017 that will likely change the County's target allocation. The Bay Program is currently reviewing BMP efficiencies for existing and new practices, such as stream restoration. It is expected that these revisions will help the County toward their target loads. In addition, MDE is expected to apply urban nutrient management credit for the new Maryland fertilizer phosphorus ban to the County's scenario, which will reduce the need for BMPs. Several BMPs are in the County's database that are not represented or have the incorrect drainage areas in the Bay Model.

Unless new technologies or funding options are realized or the deadline for meeting the 2025 final target allocation is extended, the County feels that it is not feasible to meet the stormwater final 2025 target allocation using only stormwater implementation practices. Using the scenarios listed in Tables 2 and 4, the County would meet only 81 percent of its total nitrogen reduction goal and only 55 percent of its total phosphorus goal by 2025. To close those gaps, the County proposes the following actions:

1. The County will work with MDE to ensure the Bay Model reflects the latest updates in local land use information, number of BMPs in the County, and BMP efficiencies.
2. Coordinate with MDE and EPA to increase the number of urban land use categories in the Bay Model, which is anticipated to reduce the County's current land allocations.
3. The County will engage the University of Maryland to research the most cost-effective BMP technologies.
4. Provide MDE with local County monitoring data for calibrating the Bay Model.

More detailed information of those strategies is in Section 5 of the County's Phase II WIP. In addition, it is anticipated that additional reductions to phosphorus will be seen as a result of



Maryland’s new fertilizer law. MDE will calculate the load reduction from this nutrient reduction strategy and apply the reductions to the County’s target load reductions.

### Urban Stormwater Funding and Resources

It is estimated that up to ten times the amount of current annual Capital Improvements Program (CIP) funding will be needed to fully implement the WIP. The CIP is primarily funded through the sale of bonds. Stormwater *ad valorem* taxes (\$0.054/\$100 of assessed property value) are collected as part of the property taxes to help fund stormwater management programs and to buy back the bonds.

The Maryland House of Delegates recently passed House Bill 987<sup>4</sup>. The synopsis of the bill is:

Requiring a county or municipality subject to a specified municipal stormwater permit to adopt and implement laws or ordinances to establish a watershed protection and restoration program on or before July 1, 2013; exempting a county or municipality if the county or municipality has enacted and implemented a specified system of charges in a specified manner by a specified date; requiring the program to include a stormwater remediation fee and a local watershed protection and restoration fund; etc.<sup>4</sup>

The County is looking at several options including adding a stormwater management fee—based on impervious area—on top of the existing *ad valorem* tax. Table 6 is an example funding scenario and the County’s preliminary estimation of the revenue that will be generated. In the example, the existing *ad valorem* tax is expected to raise \$522 million and the potential stormwater management fee—which is projected to increase yearly—would essentially double that amount. The County plans on hiring a consultant to conduct a detailed financial analysis to refine their preliminary funding options, so as to meet the WIP and MS4 requirements and not levee an undue burden on County residents and businesses.

Table 6. Example funding scenario with existing stormwater management tax, in addition to new stormwater management fee.

Cos ts ×1,000	2013	2015	2017	2019	2021	2023	2025	Totals
Existin g <i>ad valore m</i> tax	\$39,911	\$38,100	\$39,251	\$40,040	\$40,844	\$41,665	\$42,503	\$522,124
Additio nal SWM fee	\$5,809	\$14,551	\$28,762	\$44,859	\$57,107	\$66,724	\$76,874	\$547,127
<b>Total tax + fee</b>	<b>\$45,720</b>	<b>\$52,651</b>	<b>\$68,013</b>	<b>\$84,899</b>	<b>\$97,951</b>	<b>\$108,389</b>	<b>\$119,377</b>	<b>\$1,069,251</b>
SWM fee rate	\$161.10	\$403.50	\$797.60	\$1,244.00	\$1,583.70	\$1,850.40	\$2,131.80	

<sup>4</sup> BILL INFO-2012 Regular Session-HB 987. <http://mlis.state.md.us/2012rs/billfile/hb0987.htm>. Accessed May 1, 2012.

(\$/Imp. Acre)								
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*Note: Total County impervious area is 36,060 acres, which does not include State, Federal, or City of Bowie lands.*

Grants (Federal, State, or other) are expected to be an essential contribution to funding. The County has been successful in the past obtaining various grants and expects that the trend will continue. The County will continue to aggressively pursue grant opportunities available for restoration projects. In addition to grants, Federal and State loans (e.g., state revolving fund) might be an option for helping to fund the WIP.

DER plans to hire up to 15 employees to help implement the WIP and its new MS4 permit. Additionally, the Department of Public Works and Transportation (DPW&T) plans to hire up to 10 employees. The employees will be phased in as implementation of the WIP increases.

### **3. 2012–2013 Milestones**

This section of the County’s WIP summarizes the implementation and programmatic milestones for the first two-year milestone period. All programmatic milestones are based on calendar year and BMP milestones are based on fiscal years. Those milestones illustrate the County’s near-term commitments to implementing the WIP. They are organized by sector and for urban stormwater, they are further organized by year.

#### **Urban Stormwater: Year 1**

- The County will initiate a research study with the University of Maryland to determine BMP efficiencies for new technologies to reduce nutrients in a more cost effective manner. The strategy requires full partnership of MDE and EPA to ensure that the County reaches its 2017 and 2025 goals.
- The County is expecting a new MS4 permit to be issued in 2012. The County is aware of the new requirements and has started and will continue to prepare for its implementation.
- The County’s CIP does not allocate the funding necessary in future years to complete BMP implementation. The County has the following milestones to identify additional funding.
  - The County plans to update its CIP for 2013–2018 to reflect the needs for stormwater BMP installations for WIP implementation;
  - The County will continue funding capital improvement projects and NPDES program through Stormwater Management Tax;
  - The County will complete a study that will evaluate funding via a stormwater fee that is based on impervious area. The County will work with the State regarding requirements for and feasibility of stormwater fee-based funding. On the basis of the study, the County might add a stormwater fee to fund WIP implementation. The County plans on hiring a consultant to conduct a detailed financial analysis to refine their preliminary funding strategy; and
  - The County will continue to look for and apply for State and Federal grants to assist in WIP implementation.
- DER will develop an organizational plan that includes the responsibilities of existing staff and new hires and a schedule and funding strategy for new hiring to appropriately implement WIP.

- There is no standardized County database for data collection across county agencies. Therefore, DER, DPW&T, SCD, and Maryland National-Capital Park and Planning (M-NCPPC) will work together to form a workgroup to build a standardized data collection methodology regarding BMPs, land use, permit issuance, and other data related to analyzing existing and future growth and WIP implementation. For instance, DPW&T and DER will enhance the *ePermit* system to enable the collection of pertinent data in the proper format for reporting WIP progress with respect to new development and redevelopment, in addition to stream/watershed restoration work.
- The DPW&T Office of Engineering will initially collect and track data relating to stormwater management BMPs for new development and redevelopment areas. That data will be incorporated into databases and stormwater management design plans in a format that can be migrated to a GIS environment and comply with the standardized format requested by MDE. Data collection and tracking systems will translate to field application with respect to the enforcement and inspection of sediment and erosion control during construction activities. DPW&T will work with DER to ensure that BMPs are not double counted between County databases.
- DPW&T will implement a program to identify rural roadways that could be considered treated because of being disconnected. That will be accomplished using GIS to identify the rural roadways that will be credited and removed from the County's total untreated impervious surface area. The process will entail field verification to ensure that the roadways qualify per the MDE June 2011 draft document, *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated*.
- The County recently adopted a new Stormwater Management Ordinance (Council Bill 15-2011) which references the County Code to update stormwater regulations and encourage environmental site design (ESD) to the maximum extent practicable (MEP), green building for retrofit, redevelopment and new development in line with MDE stormwater management water quality requirements.

#### **Urban Stormwater: Year 2**

- The M-NCPPC Planning Department, in partnership with DNR, will undertake a Climate Change Vulnerability Assessment for the County using grant funding from the National Oceanic and Atmospheric Administration. The analysis will include the in-stream loading impacts of the potential loss of marshes along the Patuxent River due to sea level rise.
- The County will complete field-verifying existing BMPs that are missing BMP information in the County database. The County will finalize the BMP database with updated drainage areas and update its BMP information with MDE. That will allow the County to receive credit for existing BMPs that are not reportable because of a lack of information.
- DER, DPW&T, SCD, and M-NCPPC will work together to ensure the development and completion of the revised *Stormwater Management Design Manual*.
- The County will look into developing a residential stormwater benefits program similar to Montgomery County's RainScapes program. The program would promote technologies such as rain gardens, rain barrels, dry wells, and permeable pavement on residential areas.

- The M-NCPPC Planning Department will create a future land use map for the County using community plans. The process will include establishing consistent land use categories for the County.
- The County will identify, target and protect sensitive watersheds, including water supply reservoirs, by using the biological, chemical and Basin Condition Scoring and the Sensitive Areas identified by DNR.
- DPW&T will reduce the existing untreated impervious surfaces through the Green Streets Program Initiative. The program will include BMPs such as treatment facilities or reducing impervious surfaces among other sustainable efforts to comply with MDE environmental site design to the maximum extent practicable.
- In accordance with the County's anticipated new MS4 permit, the County will develop a long-term schedule for completing detailed assessments for each County watershed and wasteload allocation implementation plans for each TMDL.
- DER has several BMPs slated for implementation as part of the initial 2-year milestones. In its 2010 Annual NPDES Report, it identified 18 projects that are in planning, design, or construction and would treat more than 300 acres, including almost 1,000 impervious acres. Below is a summarized list. More complete descriptions are in the County's 2010 Annual NPDES Report to MDE.
  - Stream restoration or stabilization projects totaling 14,700 linear feet, treating more than 200 acres, distributed between several sites including Paint Branch Stream Restoration working with the U.S. Army Corps of Engineers (in construction); Northwest Branch Stream Restoration (in planning stage); and other County projects.
  - Working with the COE, 14 acres of wetland creation and six acres of riparian forest enhancement throughout five sites along Western Branch.
  - Two separate bioretention areas treating 3.7 acres (in planning) and 11.6 acres (in design).
  - One Stormceptor in design to treat 1.5 acres.
- All DPW&T capital improvement projects that involve roadways and bridges by their nature include water quality amenities. Recent projects with water quality attributes are
  - Cherry Hill Road Phase II: This included improvements along Sellman Road. The project included installing new and expanded storm drain systems and a stormwater management facility.
  - Mount Oak/Woodmore/Church Intersection Reconstruction: This project added a storm drain system and stormwater management features including a pond and grassy swales to an area that previously had no defined management (rural section road).
  - MD 193 at Lottsford Road Intersection Improvement: Upgraded existing storm drains and added both a new stormwater facility and infiltration BMPs.
  - Fox Meadow/Archer/Lottsford Road Intersection Improvement: Added storm drains and water quality BMPs along Lottsford Road.



- Ritchie Marlboro Road Bridge: Improved water quality management by adding a storm drain system and BMPs.
- Rhode Island Avenue Intersection Improvement: Upgraded existing storm drains and added water quality management through infiltration.
- Allentown at Temple Hill Intersection Improvement: Upgraded existing storm drains and added water quality management through infiltration.
- Bock Road Bridge Replacement: Added storm drains and water quality through swales.
- Brinkley Road Bridge Replacement: Added storm drains and water quality through swales.

#### ***Urban Stormwater: By 2017***

- DER plans to hire up to 15 employees according to the reorganization plan developed in 2012 to help implement the WIP and its new MS4 permit. Additionally, DPW&T plans to hire up to 10 employees. The employees will be phased in as implementation of the WIP increases.
- The County will assess and identify near-term retrofit project sites and start implementation. In addition, through 2017, DER will complete 1,422 acres of County untreated impervious area and 186 acres of municipal (not including Bowie) untreated impervious area retrofit per year, in accordance with the County's MS4 permit. Bowie will complete untreated impervious area retrofit, in accordance with its anticipated MS4 permit. The retrofits include planning, design, and construction of BMPs.
- As the County's WIP reaches the implementation phase, the DPW&T Office of Engineering will ensure that watershed-specific goals and strategies are incorporated into all new development and redevelopment stormwater management plans during the concept, design review, and construction stages.
- As the M-NCPPC Community Planning Division undertakes new long-range planning efforts, it will incorporate watershed analysis. The analysis will include loading analysis when land use and zoning changes are proposed.
- The County will encourage the private sector (e.g., developers, homeowners, property owners) to use innovative stormwater management practices (ESD to the MEP) and green building into site and building design for retrofits, redevelopment, and new developments.

#### ***Urban Stormwater: City of Bowie***

- Hire a consultant to map all stormwater treatment structures and their drainage areas across the City.
- Hire a consultant to conduct a stormwater retrofit inventory and draft a plan for retrofitting 20 percent of untreated impervious cover as required by anticipated NPDES MS4 permit.
- Evaluate current staffing levels on the basis of anticipated NPDES MS4 permit and WIP II implementation requirements through 2017.
- Identify changes needed to the City's Capital Improvements Program budget to reflect WIP II and MS4 permit implementation

- Research grant opportunities to assist with implementation of the WIP II and MS4 permit.
- Continue reviewing projects identified by the DNR in the Watershed Restoration Action Strategies (WRAS) reports for the Upper Patuxent and Western Branch and in the City’s Environmental Infrastructure Action Strategy Plan.

**Septics: Milestones**

- The Health Department will introduce revised County Regulations (Subtitle 22) in 2012–2013 for on-site sewage disposal systems that will include pertinent State legislation passed during the upcoming legislative session. The regulations will provide maintenance guidelines for on-site sewage disposal systems and guidance for the appropriate use of nutrient reduction systems.
- The Health Department will work with WSSC to develop a method to track septic systems that are connected to an advanced WWTP. The County does not record how many conversions occur per year. That practice will help the Health Department maintain an accurate accounting of the number of septic systems in the County. Similarly, the Health Department will work with septic system pump-out companies to develop a method of tracking septic system pump-outs.
- Using BRF funds, the Health Department plans to continue replacing septic tanks during the remodeling of failing septic systems in the critical area with nitrogen reducing aerobic systems. It is expected that two failing systems will be upgraded each year with possibly more if the Governor’s septic systems initiatives are implemented through legislation next year.

**Point Sources: Milestones**

The major WWTPs will continue to upgrade to ENR technology as required in their permits. Table 7 summarizes the WWTPs and the 2012–2013 milestones. No anticipated actions or milestones exist for the remaining point sources.

Table 7. County’s data tracking and reporting system

NPDES ID	Facility name	Major/minor	Action/status	2012–2013 Milestones
MD0022781	Marlboro Meadows WWTP	Major	Flow will be transferred to Western Branch WWTP	Start construction June 2011. Substantially complete by June 2014; Permit limits end January 2015
MD0021725	Parkway WWTP	Major	Construction associated with upgrade to ENR	Substantially complete by July 2013; New permit limits effective January 2014
MD0021539	Piscataway WWTP	Major	Complete construction associated with upgrade to ENR	September 2012; New permit limits effective January 2013
MD0021741	Western Branch WWTP	Major	Construction associated with upgrade to ENR	Construction ongoing through 2012 and 2013
DC0021199	Blue Plains Advanced WWTP	Major	Construction associated with upgrade to ENR	Construction ongoing through 2012 and 2013. Comply with total nitrogen effluent limits in January 2015
MD0021628	Bowie WWTP	Major	ENR completed	None
MD0021865	Mattawoman WWTP	Major	ENR completed	None
MD0052680	Edgemeade WWTP	Minor		None

**4. County Tracking, Reporting, and Verification Methods**

The County will track and report to the appropriate State agencies implementation of actions to reduce local loads associated with point and nonpoint sources. The majority of the tracking is

completed through established routes, such as the annual MS4 permit report and database, Conservation Tracker, and through NPDES discharge monitoring reports (DMRs). Table 8 summarizes the data that will be tracked, the County agencies responsible for compiling and submitting data, types of data, to whom data will be submitted, and the pathway of submission. While one agency is the responsible agency for compiling and submitting data, in reality, multiple agencies can contribute data. For instance, BMPs can be installed by DPW&T and M-NCPPC, however they will report their BMP activity to DER for inclusion in the MS4 annual report submittal to MDE. That way, it is ensured that BMPs are not double counted and are submitted in a consistent format to MDE.

Table 8. County's data tracking and reporting system

Sector	Data tracked	Responsible office	Submitted to	Pathway
Stormwater	BMPs/retrofits	DER	MDE	MS4 permit annual report
	Acres of impervious surface	DER	MDE	MS4 permit annual report
	Watershed and stream restoration projects	DER	MDE	MS4 permit annual report
	Street sweeping & inlet cleaning	DPW&T	MDE	MS4 permit annual report
	Impervious surface reduction/disconnection	DER	MDE	MS4 permit annual report
Point sources	DMRs (flow and concentration)	Facility (e.g., WSSC)	MDE	Facility NPDES submission
	ENR upgrades	Facility (e.g., WSSC)	MDE	Facility NPDES submission
Septics	Septic pumpouts	Health Dept.	MDE	To be determined
	Conversion to ENR septic	Health Dept.	MDE	Health Department
	Connection to treatment plants	WSSC	Health Dept./MDE	To be determined
Agriculture	BMPs, cover crops, etc.	SCD	MDA	Conservation Tracker

## Agriculture

### Tracking and Reporting

SCD is responsible for submitting agricultural BMP data to MDA through Conservation Tracker. Conservation Tracker accounts for agricultural BMPs implemented with both public cost sharing assistance and those that are installed with private funds. The information used by SCD is collected from farm-specific soil conservation and water quality plans.

### Verification

At the County level, SCD will perform data validation at the time of data entry into Conservation Tracker, through the use of field data verification, inspection of BMP installation, and adherence to standards and specifications for specific BMP installation and preparing soil conservation and water quality plans.

## Point Sources

It is the responsibility of individual NPDES permit holders to submit self-monitoring results (DMRs) at the frequency specified by their permit. MDE is the delegated authority to carry out and administer the NPDES program in Maryland, and it is responsible for tracking and verifying the information.

## Septic Systems

### Tracking and Reporting

Installation of septic systems upgraded to BAT using BRF is tracked by Calvert County, as the managers of the County's BRF funding. Calvert County handles the reporting for the County. In addition, certified service providers are required to report to MDE all inspections and maintenance performed for BAT systems. The Health Department does not track septic

connections to wastewater treatment facilities or septic sewer pump-outs. Those items are part of the 2012–2013 milestones. It is likely that WSSC will track septic connections, to be reported to the Health Department which will subsequently submit a report to MDE.

#### **Verification**

MDE requires local health departments to report installation of the BAT systems upon completion of the final inspection. Once programs are set up for tracking and reporting septic connections to wastewater treatment facilities and sewer pump-outs, it is expected that WSSC will track and report the number of houses that have abandoned septic systems and connect to a public sewer system to the Health Department, which, in turn, will provide a report to MDE. The Health Department will track septic system pump-outs through reports provided by scavengers and report their findings to MDE.

### **Stormwater**

#### **Tracking and Reporting**

Maryland law and regulation mandates implementation of a stormwater management program at the local government level for private and local projects. The County's Stormwater Management Program, under DPW&T, reviews and approves new and redevelopment stormwater management projects and it requires the inspection and maintenance of all stormwater management practices. The County reports on stormwater activities to MDE through the County's MS4 Annual Report. Urban stormwater BMPs are included as part of the report in a geo-referenced database that is submitted. The database includes details such as the project locations, type of BMP, drainage area delineation, and acres of impervious surface treated. The annual report includes a geo-referenced database for all stream restoration and stream bank stabilization projects. It includes the location, details, phase, drainage area, and impervious area treated by each project. The annual report also includes a geo-referenced database identifying the locations of impervious surface throughout the County. Recently, an impervious surface layer was updated using identifiable features on 2009 aerial photography to make it a more accurate representation of impervious surfaces.

DPW&T is responsible for tracking street sweeping and inlet cleaning activities. The number of curb miles and tons of waste collected through street sweeping are tracked and reported in the MS4 Annual Report. The number of inlets cleaned annually is also tracked and reported.

#### **Verification**

DER provides a spreadsheet in its annual MS4 report that documents all BMP inspections on public and private properties for the previous year. DPW&T is responsible for conducting preventative maintenance inspections of public stormwater BMPs. Property owners are responsible for the inspection of privately maintained stormwater BMPs. DER ensures that inspection reports comply with the approved maintenance agreement.

In 2009, DER began implementing a new preventative maintenance inspection and enforcement program for privately owned stormwater management BMPs. Property owners are notified of a pending inspection and provided with program outreach materials, with additional one-on-one outreach during the inspection. Property owners are provided with a written assessment of maintenance deficiencies and a compliance schedule. DER re-inspects facilities that are out of compliance. The County also reports the compliance inspections and correction rates in the MS4 Annual Report.



## 5. Identification of Technical Discrepancies among State, CBP Bay Model, Local Area Data and Recommended Future Steps

The County believes that the loads represented in the model and the allocations from the State are not representative of and over-predict the actual loads from the County. Throughout the WIP process, the County had identified several technical deficiencies and discrepancies in the model and model allocations. Those deficiencies and discrepancies have artificially increased the perceived loadings from the County in the model and target allocations. The County requests that those be addressed before the next model revision, expected in 2015, and 2017 WIP revisions so that the model accurately reflects that County's loads. The County would like an open dialogue with Maryland and EPA to discuss the discrepancies and deficiencies. The County also requests that there be greater transparency in the model and how it operates, such as BMP efficiency determination. Because of the over-prediction, the County will not meet its goal. However, the County proposes to close the gaps through new research that will improve nutrient-removal efficiencies of BMPs. To meet its TMDL reduction goals, the County would need to retrofit approximately 80 percent of its impervious areas with LID technology, which is not financially feasible.

Between the model version 5.3.0 and the model version 5.3.2, the total nitrogen load reduction target load reduction for the urban sector increased by 4 times (from 52,000 to 217,000 lb/year). The explanation provided by MDE is that the *rural* residential areas (e.g., 1-acre, 2-acre, 5-acre lots) were updated from *forest* to *urban* in the latest Bay Model (version 5.3.2). Using GIS, the County estimates that the rural residential area is only about 25 percent of the entire County area. The County questions whether the change from forest to urban can really increase the total nitrogen required load reduction by four times.

The County requests that EPA include subcategories for urban land uses similar to how it subdivides the agricultural land in the model. The model separates only regulated/unregulated and pervious/impervious urban land, making four categories (e.g., regulated pervious urban). It is documented that the urban land subcategories (e.g., commercial, institutional, industrial, high-density residential, medium-density residential, low-density residential) have different loading rates.<sup>5</sup>

The County considers the loading rates for urban lands in the model as not representative of the County's loadings rates. The County did a study to determine the loadings through monitoring from different urban land uses several years ago. The results of the study will be shared with MDE and EPA for incorporation into the Bay Model.

The County notes that there are differences between the impervious area in MAST and the model and the impervious area calculated using the County's actual impervious GIS information. The County would like to see its actual land use areas, included impervious area, used in the model to better represent the County's contribution to the loads entering into the Chesapeake Bay. Similarly, there are differences among other land uses, such as construction and pervious urban area. The County is ready to work with MDE to make appropriate changes needed.

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<sup>5</sup> For example: Shaver, E., R. Horner, J. Skupien, C. May, and G. Ridley. 2007. *Fundamentals of Urban Runoff Management*. 2<sup>nd</sup> edition. North American Lake Management Society. Madison, WI.

The County disagrees with the number of septic systems recorded in the model and in MAST. The County has records for roughly 8,400 septic systems, while MAST and the model have almost 13,000 systems. Figure 2 shows septic locations in an example subarea of the County. In the example, it can be seen— particularly in the western portion of the map—that the State’s records include septics in areas that have been sewerred. The strategies listed in this plan reflect only the number of systems the County has on record. The County is in the process of documenting the septic systems and will submit the data to the State for use in the next model revision.

The County acknowledges that there is a discrepancy in the number of BMPs in MAST and County records, which do not include BMPs from the City of Bowie. That includes the total number of BMPs and the drainage areas of the mutually reported BMPs. Figure 3 shows the location of BMPs in County and State records. The County will work with MDE to update MDE’s records of County BMPs, so that the model will accurately reflect the County’s progress.

The County questions several BMP efficiencies in the Bay Model. The County feels that a number of the efficiencies are biased low, which results in the County not appearing to meet its target reductions. For instance, the load reductions for stream restoration are biased low, and additional studies are underway to determine a more accurate value for reductions for stream restoration. The County requests that EPA investigate BMP model efficiencies and update them as necessary. The County will provide to EPA any information on BMP efficiencies that it has for review and consideration.

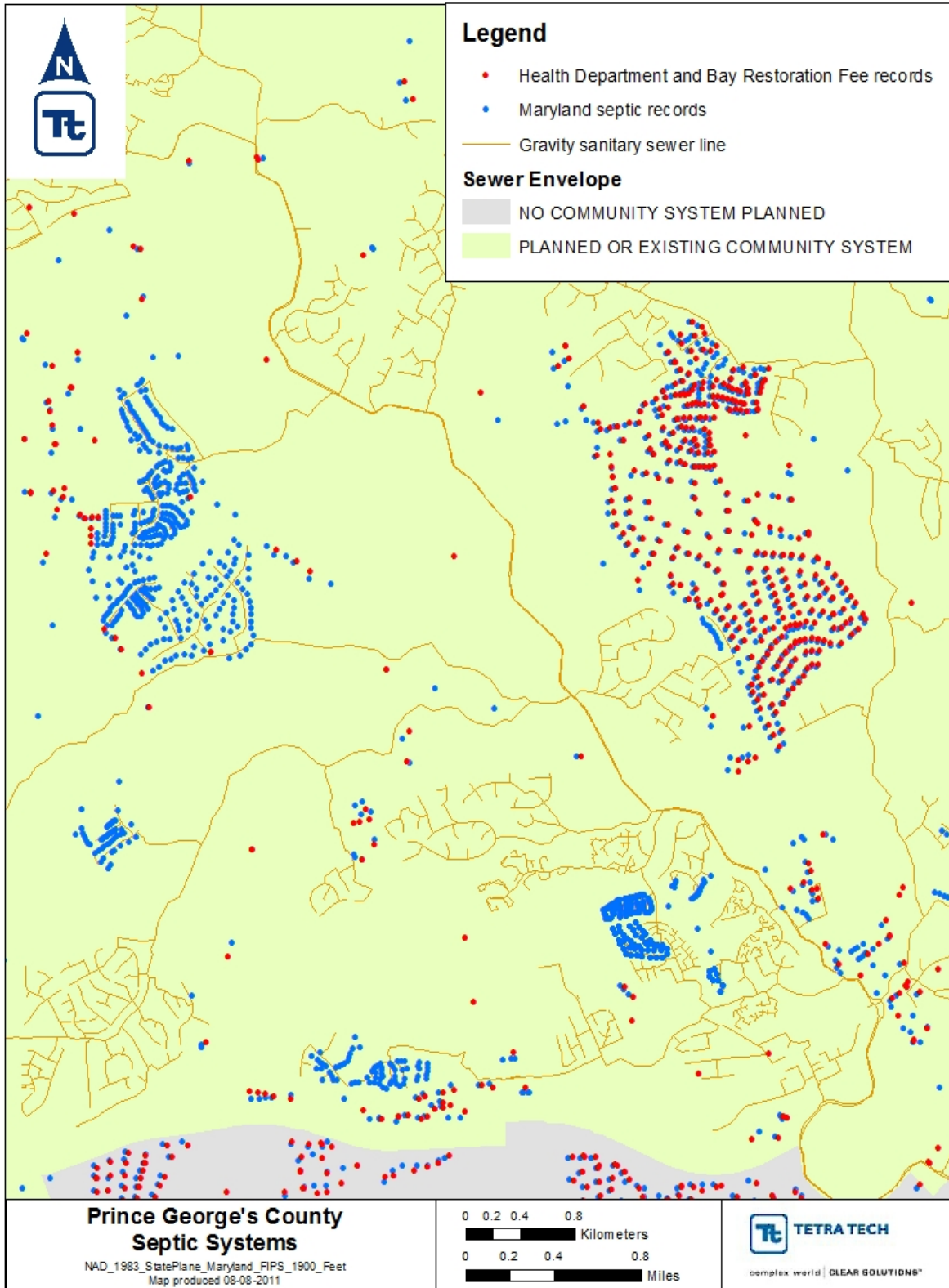


Figure 2. Example comparison of septic locations in County and MDE records.

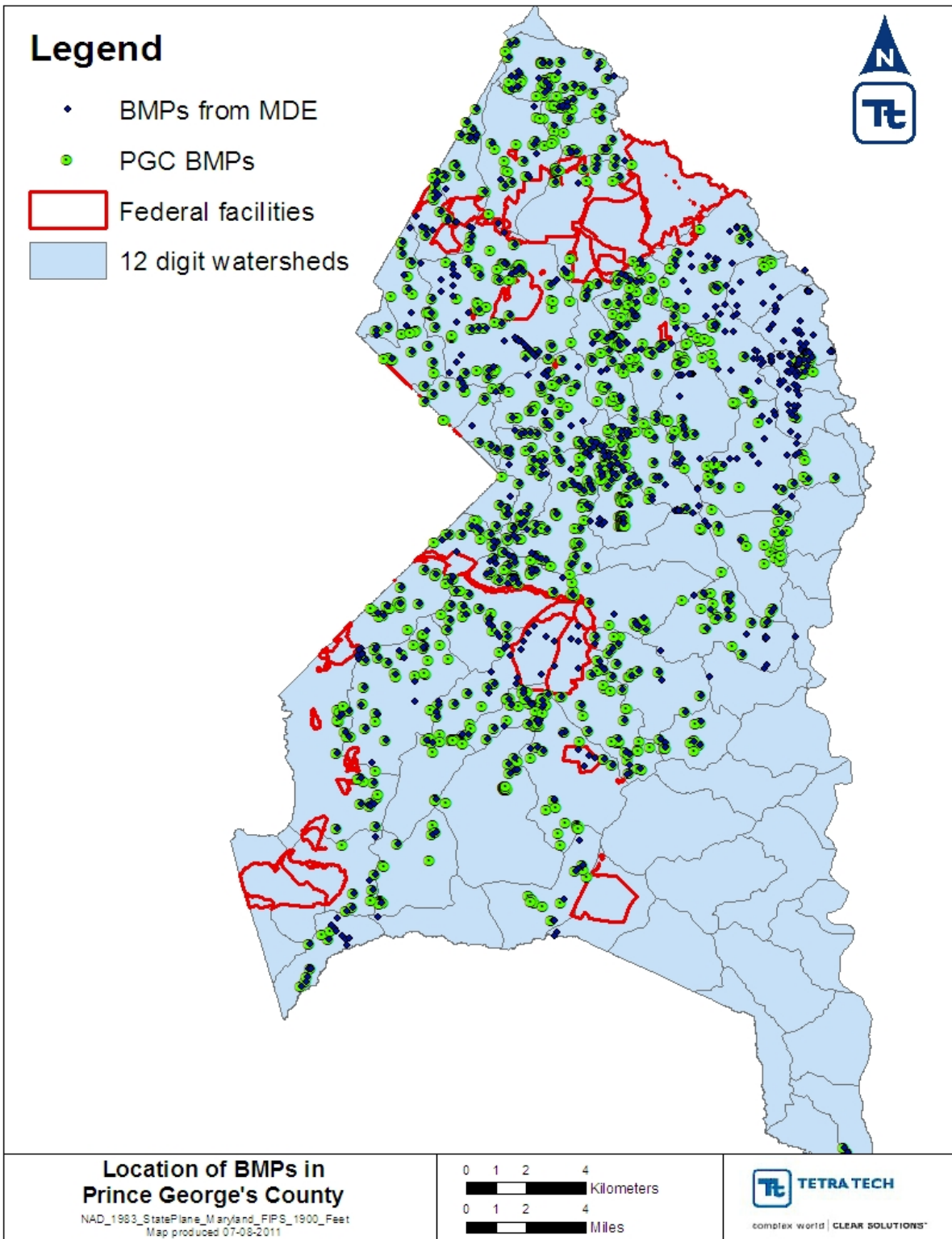


Figure 3. Comparison of BMPs in County records and MDE records

## 6. County-Scale Loads

Table 9 presents the Countywide, nonfederal load allocations for total nitrogen and total phosphorus. Table 10 presents the non-Federal, delivered urban loads broken down into subcategories by MDE. MDE provided a separate allocation for Bowie; therefore, the Municipal Phase II MS4 allocations in Table 10 are shown as a total and are broken out into loadings from Bowie and the municipalities under the jurisdiction of the County's MS4 permit. The loads in these tables are those loads delivered to the Chesapeake Bay after going through in-stream processes.

Table 9. 2009 loads and 2017 and 2025 nonfederal load allocations

Sector	Total nitrogen					Total phosphorus				
	2009 (lbs/yr)	2017		2025		2009 (lbs/yr)	2017		2025	
		Target (lbs/yr)	% Reduction	Target (lbs/yr)	% Reduction		Target (lbs/yr)	% Reduction	Target (lbs/yr)	% Reduction
Agriculture	198,439	169,688	14.49%	150,520	24.15%	37,275	33,520	10.07%	31,017	16.79%
Urban	832,131	710,078	14.67%	628,709	24.45%	106,306	83,876	21.10%	68,923	35.17%
Septic	93,098	74,776	19.68%	62,562	32.80%	-- <sup>a</sup>	--	--	--	--
Forest	200,386	199,550	0.42%	198,993	0.70%	6,850	6,786	0.93%	6,744	1.55%
Point sources	1,670,919	1,276,760	23.59%	1,674,936	-0.24% <sup>b</sup>	61,786	80,047	-29.56% <sup>b</sup>	97,880	-58.42% <sup>b</sup>
<b>Total</b>	<b>2,994,973</b>	<b>2,430,852</b>	<b>18.84%</b>	<b>2,715,720</b>	<b>9.32%</b>	<b>212,217</b>	<b>204,230</b>	<b>3.76%</b>	<b>204,564</b>	<b>3.61%</b>

Notes:

a. Septics are not considered a source of phosphorus in the Bay Model.

b. Negative reductions account for growth in WWTPs.

Table 10. Urban subcategory 2009 loads and 2017 and 2025 load allocations

Urban subsector	Total nitrogen					Total phosphorus				
	2009 (lbs/yr)	2017		2025		2009 (lbs/yr)	2017		2025	
		Target (lbs/yr)	% Reduction	Target (lbs/yr)	% Reduction		Target (lbs/yr)	% Reduction	Target (lbs/yr)	% Reduction
County Phase I/II MS4	465,818	402,771	13.53%	360,740	22.56%	47,859	36,780	23.15%	29,394	38.58%
Municipal Phase II MS4	126,840	111,457	12.13%	101,202	20.21%	13,459	10,661	20.79%	8,796	34.65%
Bowie	44,956	40,030	10.96%	36,746	18.26%	4,525	3,692	18.42%	3,136	30.70%
Other Municipal	81,884	71,427	12.77%	64,456	21.28%	8,934	6,970	21.99%	5,660	36.65%
Non-regulated	25,028	21,295	14.91%	18,807	24.86%	2,023	1,482	26.72%	1,122	44.54%
Construction	133,499	103,683	22.33%	83,805	37.22%	31,853	26,093	18.08%	22,253	30.14%
SHA Phase I/II MS4	52,545	45,866	12.71%	41,414	21.18%	6,064	4,754	21.61%	3,880	36.02%
State Phase II MS4	12,965	11,287	12.94%	10,168	21.57%	1,405	1,088	22.55%	877	37.58%
Regulated Industrial	6,436	5,591	13.14%	5,027	21.89%	789	617	21.83%	502	36.38%
Extractive	9,000	8,128	9.69%	7,546	16.16%	2,854	2,401	15.87%	2,099	26.45%
<b>Total</b>	<b>832,131</b>	<b>710,078</b>	<b>14.67%</b>	<b>628,709</b>	<b>24.45%</b>	<b>106,306</b>	<b>83,876</b>	<b>21.10%</b>	<b>68,923</b>	<b>35.17%</b>