

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**10.0 Permit Requirements****E. Total Maximum Daily Loads**

Section 402(p)(3)(B)(iii) of the Clean Water Act (CWA) states that municipal storm sewer permits must require stormwater controls to reduce the discharge of pollutants to the MEP. By regulation at 40 CFR §122.44, EPA further requires that BMPs and programs implemented pursuant to this permit must be consistent with applicable waste load allocations (WLAs) developed under EPA approved TMDLs (see list of impaired waters attached and incorporated as Attachment B). The goals of Maryland's NPDES municipal stormwater permit program are to control stormwater pollutant discharges by implementing the BMPs and programs required by this permit, show progress toward meeting WLAs, and contribute to the attainment of water quality standards according to the CWA

In pursuit of these goals, Baltimore County shall annually provide watershed assessments, restoration plans, opportunities for public participation, and TMDL compliance status. A systematic assessment shall be conducted and a detailed restoration plan developed for all watersheds within Baltimore County. As required below, watershed assessments and restoration plans shall include a thorough water quality analysis, identification of water quality improvement opportunities, and a schedule for BMP and programmatic implementation to meet stormwater WLAs included in EPA approved TMDLs.

1. Watershed Assessments

- a. By the end of the permit term, Baltimore County shall complete detailed watershed assessments for the entire County. Watershed assessments conducted during previous permit cycles may be used to comply with this requirement, provided the assessments include all the items listed in Part III.E.1.b. below. Assessments shall be performed at an appropriate watershed scale (e.g., Maryland's hierarchical eight or twelve-digit sub-basins) and be based on MDEs TMDL analysis or an equivalent and comparable County water quality analysis;
- b. Watershed assessments by the County shall:
 - i. Determine current water quality conditions;
 - ii. Include the results of a visual watershed inspection;
 - iii. Identify and rank water quality problems;
 - iv. Prioritize all structural and nonstructural water quality improvement projects; and
 - v. Specify pollutant load reduction benchmarks and deadlines that demonstrate progress toward meeting all applicable stormwater WLAs.

2. Restoration Plans

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- a. Within one year of permit issuance, Baltimore County shall submit an impervious surface assessment consistent with the methods described in the MDE document "Accounting for Stormwater Wasteload Allocations and Impervious Area Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits (MDE 2011 or subsequent versions). Upon approval by MDE, this impervious surface area assessment shall serve as the baseline for the restoration efforts required in this permit.
- b. By the end of the permit term, Baltimore County shall commence and complete the implementation of restoration efforts for twenty percent of the County's impervious surface area consistent with the methodology described in the MDE document cited in paragraph a. that is not already restored to the MEP;
- c. Within one year of permit issuance, Baltimore County shall submit to MDE a restoration plan for each stormwater WLA approved by EPA prior to the effective date of the permit. The County shall submit restoration plans for subsequent TMDL WLAs within one year of EPA approval. Upon approval by MDE, these restoration plans will be enforceable under this permit. As part of the restoration plans, Baltimore County shall:
 - i. Include a detailed schedule for implementing all stormwater structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives necessary for meeting applicable stormwater WLAs;
 - ii. Provide detailed cost estimates for individual projects, programs, controls, and plan implementation;
 - iii. Evaluate and track implementation of watershed restoration plans through monitoring or modeling to document progress toward meeting established benchmarks, deadlines, and stormwater WLAs; and
 - iv. Develop an ongoing, iterative process that continuously implements structural and nonstructural restoration projects, stormwater program enhancements, and alternative BMPs where EPA approved TMDL WLAs are not being met according to the benchmarks and deadlines established as part of the County's watershed assessments.

3. Public Participation

Baltimore County shall provide continual outreach to the public regarding the development of its watershed assessments and restoration plans.

Additionally, the County shall allow for public participation in the TMDL process, solicit input, and incorporate any relevant ideas and program

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improvements that can aid in achieving TMDLs and water quality standards. Baltimore County shall provide:

- a. Notice in a local newspaper and the County's web site outlining how the public may obtain information on the development of the watershed assessments and watershed restoration plans and opportunities for comment;
- b. Procedures for providing watershed assessments and watershed restoration plans to interested parties upon request;
- c. A minimum 30 day comment period before finalizing watershed assessments and watershed restoration plans; and
- d. A summary in each annual report of how the County addressed or will address any material comment received from the public.

4. TMDL Compliance

Baltimore County shall evaluate and document progress toward meeting all applicable WLAs included in EPA approved TMDLs. An annual TMDL assessment report with tables shall be submitted to MDE. This assessment shall include complete descriptions of the analytical methodology used to evaluate the effectiveness of the County's stormwater restoration plans and how these plans are working to achieve compliance with EPA approved TMDLs. Baltimore County shall provide:

- a. Estimated net change in pollutant load reductions from all completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives;
- b. A comparison of the net change in pollutant load reductions detailed above with the established benchmarks, deadlines, and applicable stormwater WLAs;
- c. Itemized costs for completed projects, programs, and initiatives to meet established pollutant reduction benchmarks and deadlines;
- d. Cost estimates for completing all project, programs, and alternatives necessary for meeting applicable WLAs; and
- e. A description of a plan for implementing additional watershed restoration actions that can be enforced when benchmarks, deadlines, and applicable stormwater WLAs are not being met or when projected funding is inadequate.

10.1 Introduction

This section covers watershed management planning activities and status of TMDL development (10.2), pollution load reduction calculations (10.3), restoration progress (10.4), and progress in meeting the impervious cover restoration targets (10.5) and TMDL reduction allocations (10.6). Section 10.2 discusses the development of Small Watershed Action Plans, the status of TMDL

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development and the development of TMDL Implementation Plans. These plans meet the requirements for development of watershed assessment and restoration plans. The plans are intended to provide the road map for meeting TMDL reduction requirements, protecting our Tier II waters, and meeting locally developed water quality goals.

Section 10.3 clearly lays out the process used in determining the pollutant load reduction attributable to the various types of restoration conducted to meet water quality objectives. The information for the calculations is derived from the latest Chesapeake Bay Program spreadsheet on BMP efficiencies, CBP expert panel reports on various BMP practices (as they are available), and the draft document entitled *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (MDE August, 2014).

Section 10.4 details the restoration progress made to date due to capital program restoration projects, community reforestation program efforts, and restoration efforts by the various local watershed associations. The information is presented by program and by watershed.

Section 10.5 details progress made in meeting the impervious cover treatment acres required as a tracking mechanism in the stormwater permit. An impervious cover analysis has been conducted to determine the amount of impervious cover in 2002 (the base year) in Baltimore County. The current target is 20% of the impervious cover in Baltimore County. With the issuance of the next NPDES – MS4 permit the impervious cover target is anticipated to increase to 40%. Section 10.6 details progress made in meeting the local TMDL reduction allocations and the Chesapeake Bay TMDL for the reduction of nutrients and sediment.

10.2 Status of Watershed Management Plans

10.2.1 Water Quality Management Plans

Water quality management plans have been completed for ten of the fourteen major watersheds in Baltimore County. The four remaining watersheds have limited urban development and therefore are not required by the NPDES – Municipal Stormwater Discharge Permit to have water quality management plans. However, recognizing the benefits of a watershed management plan, Baltimore County has completed the development of a Prettyboy Watershed Plan under the State's Watershed Restoration Action Strategy (WRAS) process. Harford County in conjunction with stakeholders has also completed the WRAS process to develop a watershed plan for Deer Creek watershed.

10.2.2 Small Watershed Action Plans (SWAPs)

In 2005, Baltimore County initiated a new round of watershed planning, entitled Small Watershed Action Plans (SWAPs). The SWAP planning process is meant to bring together the many mandates that the County is charged to meet in each individual watershed, including the requirements of the NPDES – Municipal Stormwater Discharge Permit, Total Maximum Daily Loads (TMDLs), both local and the Bay TMDL, and the Reservoir Management Program. The Chesapeake Bay TMDL is being addressed in SWAPs currently under development and will be addressed in future SWAPs. The small watershed action planning process is designed to bring all these individual mandates together at a subwatershed level that will help residents understand the intent of each program, how to most efficiently meet the goals, and define the roles of the partners. The SWAPs build on the previously completed technical Water Quality Management Plans.

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Stakeholders are invited to participate in the development of each SWAP. A series of two to three public stakeholder meetings are held over the course of the development of each SWAP. The first introduces the stakeholders to the process and solicits their input on the characterization of the planning area and goals. The second meeting presents the final characterization document and solicits input on preferred restoration options. The third meeting presents the SWAP, which includes not only County actions and projects, but also citizen based and business based restoration activities and options. For some SWAPs the agendas of the second and third meetings are combined into one meeting. The SWAP steering committee includes local stakeholders as representatives from the watersheds being studied. Planning areas were selected on similarity of impacts within each area, allowing focus on specific issues related to the stakeholders that live and work within each planning area. Twenty-three planning areas have been delineated. Since the reissuing of the MS4 permit, newly completed SWAPs have and will continue to be posted for a 30-day comment period prior to finalization.

When the SWAPs have been completed the Steering Committee becomes the Implementation Committee, which will meet twice each year to determine progress being made, barriers to making progress, and the need for any revisions. Since the last NPDES Annual Report the following SWAPs have been completed:

- Rural Jones Falls SWAP (Area G) – December 2015
- Urban Lower Gunpowder SWAP (Area N) – March 2016
- Little Gunpowder Falls SWAP (Area P)

Previously completed SWAPs include:

- Prettyboy WRAS (Area T) – January 2008
- Spring Branch SWAP – March 2008 (will be included in the larger Area O SWAP)
- Lower Jones Falls SWAP (Area H) – October 2008
- Upper Back River SWAP (Area L) – November 2008
- Tidal Back River SWAP (Area E) – February 2010
- Upper Gwynns Falls SWAP (Area V) – May 2011
- Beaver Dam Run, Baisman Run, and Oregon Branch SWAP (Area I) – November 2011
- Middle River and Tidal Gunpowder SWAP (Area F) – February 2012
- Lower Patapsco SWAP (Area A) – May 2012
- Northeastern Jones Falls SWAP (Area M) – December 2012
- Bear Creek/Old Road Bay SWAP (Area D) – December 2012
- Middle Gwynns Falls SWAP (Area C) – September 2013
- Loch Raven East SWAP (Area R) – February 2014
- Bird River SWAP (Area K) – April 2014
- Loch Raven North SWAP (Area X) – May 2015
- Liberty Reservoir SWAP (Area S) – May 2015

An additional four SWAPs are currently under development with an expected completion date within the next year, except Area O which is being done in-house, and on an independent time schedule:

- Southeastern Loch Raven Reservoir SWAP (Area O)
- Rural Patapsco SWAP (Area B)
- Loch Raven West SWAP (Area W)

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- Rural Lower Gunpowder Falls (Area Q)

All study areas that have yet to receive a SWAP have either had their studies initiated already or are scheduled to be underway by 2017. Moreover, all SWAPs will be completed by the end of the term of the permit, as required. Figure 10-1 shows the planning areas and schedule, while Table 10-1 shows the status, schedule, and the acres for each planning area. The completed SWAPs are posted on the County web site:

<http://www.baltimorecountymd.gov/Agencies/environment/watersheds/swap.html>

Table 10-1: SWAP Schedule

Watershed	SWAP Area	Acres	Completed By:	Status
Patapsco	A	17,569	Consultant	May 2012
Patapsco	B	15,761	Consultant	November 2016*
Gwynns Falls	C	14,884	Consultant	September 2013
Balt Harbor	D	11,484	Consultant	December 2012
Back River	E	7,858	Consultant	February 2010
Gunpowder/Middle R.	F	6,520	Consultant	February 2012
Jones Falls	G	13,187	Consultant	December 2015
Jones Falls	H	5,777	EPS/Consultant	October 2008
Loch Raven	I	8,350	Consultant	November 2011
Bird River	K	22,528	Consultant	April 2014
Back River	L	15,385	EPS	November 2008
Jones Falls	M	6,957	EPS	December 2012
Lower Gunpowder	N	10,553	Consultant	March 2016
Loch Raven	O	17,523	EPS	July 2018*
Little Gunpowder	P	17,217	Consultant	November 2016
Lower Gunpowder	Q	18,931	Consultant	July 2017*
Loch Raven	R	11,466	Consultant	February 2014
Liberty Reservoir	S	16,449	Consultant	March 2015
Prettyboy Reservoir	T	24,027	EPS	January 2008
Deer Creek	U	7,132	Harford County	July 2007
Gwynns Falls	V	13,618	Consultant	May 2011
Loch Raven	W	38,515	Consultant	November – 2016*
Loch Raven	X	61,436	Consultant	March 2015

* In progress/anticipated completion

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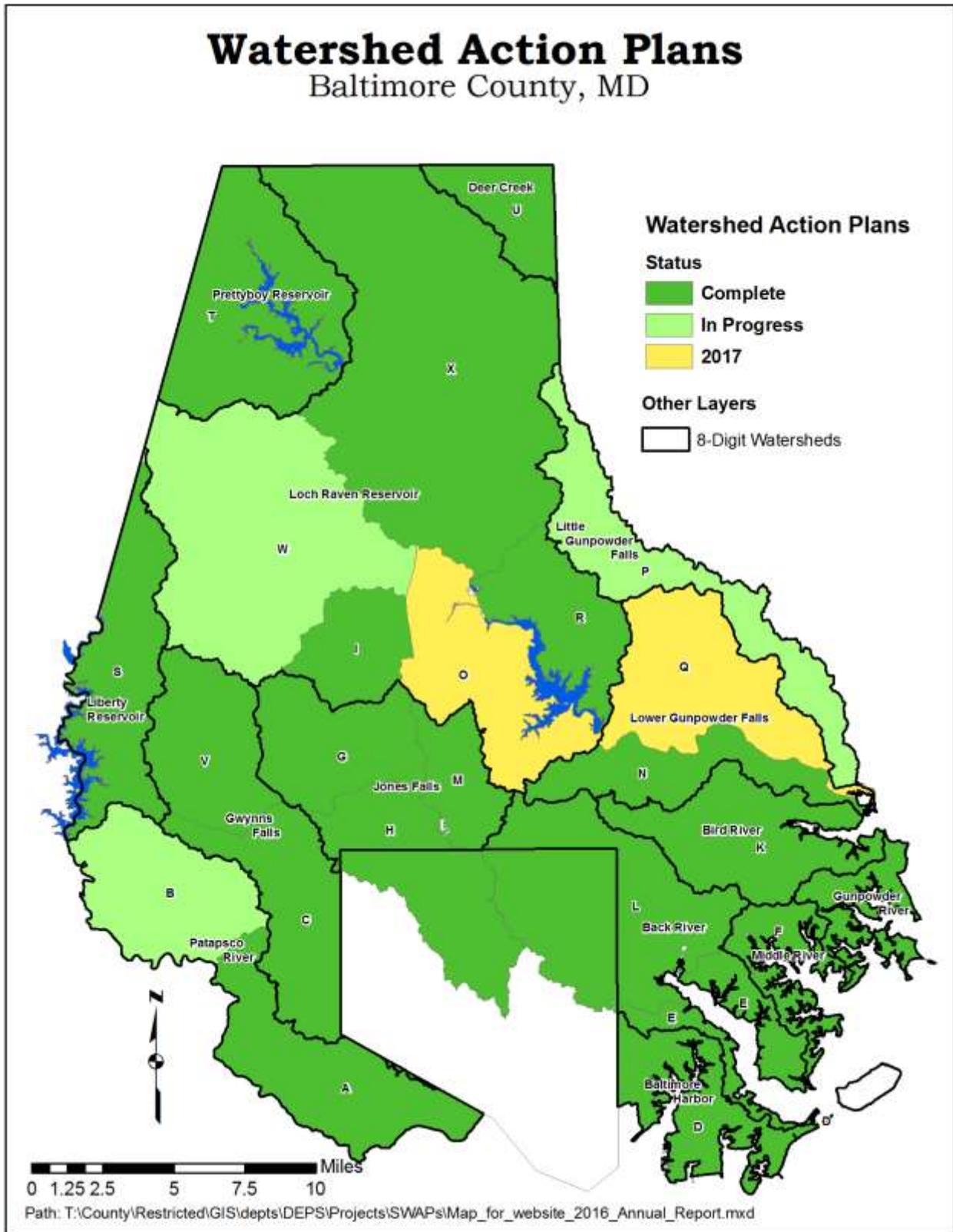


Figure 10-1: Baltimore County SWAP Status

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10.2.3 Total Maximum Daily Load (TMDL) Implementation Plans

The Baltimore County NPDES – MS4 Permit was renewed December 23, 2013. A new provision of the permit was a requirement to develop a TMDL Implementation Plan for each EPA approved local TMDL within one year of permit issuance, or within one year of EPA approval for those local TMDLs that were not approved at the time of the permit renewal. Baltimore County has developed 26 local TMDL Implementation Plans. The completed plans include the following pollutants:

- Bacteria – 7 plans
- Sediment – 5 plans (3 stream based, 2 reservoir based)
- Phosphorus – 3 plans
- Nutrients – 2 plans
- Mercury – 3 plans
- Chlordane – 2 plans
- PCBs – 3 plans
- Trash – 1 plan

The County EPS developed the TMDL Implementation Plans in-house (with exception to the plans for Liberty Reservoir, which were developed in tandem with the SWAP for that area), after meeting with other Baltimore County agencies and local watershed associations for input. Prior to posting for public comment, the draft plans were distributed to Baltimore County agencies, Maryland Department of the Environment, and local watershed associations to solicit comments. The comments provided were used to improve the plans prior to posting for public comment. The documents were then revised based on the public comments as appropriate and a comment response document was prepared.

After final submission, MDE has provided additional feedback. The Trash TMDL Implementation Plan was revised based on MDE comments and resubmitted August 1, 2016. The balance of the TMDL Implementation Plans have been revised based on MDE comments and a comment response document has been prepared and is being submitted with this annual report. If MDE has no additional comments the documents will be posted on the County website, along with the comment response document.

TMDLs are developed by the State for waters listed as impaired on the 303(d) list. The 303(d) list is updated during the course of the development of the Integrated Report. The Integrated Report is required by federal law to be submitted to EPA every two years. The Integrated Report and further information on the Report can be found on the MDE web page:

<http://www.mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/index.aspx> . The most recent Integrated Report was developed in 2014; it was approved by EPA – Region 3 on October, 16, 2015 (see-<http://www.mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/2014IR.aspx>). Table 10-2 presents the status of TMDL development for watersheds within Baltimore County and impairment status as reported in the 2014 Integrated Report. Those waters listed as impaired will have a TMDL developed in future years. For review of the TDMLs, see MDE webpage:

<http://www.mde.maryland.gov/programs/Water/TMDL/CurrentStatus/Pages/Programs/WaterPrograms/TMDL/Sumittals/index.aspx> The TMDLs and the Water Quality Assessments (WQAs)

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are listed by watershed with links to the TMDL or WQA document and supporting information. Water Quality Assessments are performed when there is limited data for the impairing substance. It is often found that the substance is not causing an impairment in the water body, so the impairment listing will be removed in the next Integrated Report. A number of assessment methodologies have been developed for determining impairments (see - http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/maryland%20303%20dlist/ir_listing_methodologies.aspx). For aquatic biological community impairments, the impairment listing is removed once the cause of the impairment is determined and the waterbodies are listed for the impairing substances. For streams the assessment methodology *Maryland Biological Stressor Identification Process* (http://www.mde.state.md.us/programs/Water/TMDL/ApprovedFinalTMDLs/Documents/www.mde.state.md.us/assets/document/BSID_Methodology_Final.pdf).

The impairment listings can be based on water body type, typically they are listed based on streams, impoundments (reservoirs) or tidal water receiving waters.

Table 10-2: TMDL, WQA, and Impairment Listing Status by Watershed and Tidal Segment

Watershed	Nutrients	Sediment	Bacteria	Toxics Organics	Toxics Metals	Other
Deer Creek	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired
Prettyboy Reservoir Streams	Not Impaired	Not Impaired	TMDL - 2009	Not Impaired	WQA - 2003	Not Impaired
Prettyboy Reservoir Impoundment	Phosphorus TMDL – 2008	Not Impaired	Not Impaired	Impaired – PCBs -	TMDL - Hg in fish tissue – 2006 WQA – Zn, Ni, Pb, Cu, Cr, Cd, AS - 2006	Not Impaired
Loch Raven Reservoir Streams	Not Impaired	Not Impaired	TMDL - 2009	Not Impaired	WQA- 2003	Biological Community Impaired – Sulfates, Chlorides, Temperature (water)
Loch Raven Reservoir Impoundment	Phosphorus TMDL – 2008	TMDL – 2008	Not Impaired	Impaired – PCBs	TMDL - Hg in fish tissue – 2006 WQA – Ni, Pb, Cu, Cr, Cd, As - 2004	Not Impaired
Lower Gunpowder	Impaired - Phosphorus	Impaired	Not Impaired	Not Impaired	WQA – As, Hg, Zn, Ni, Pb, Cr, Cd - 2004	Impaired – Sulfates, Chlorides, Stream Alteration
Little Gunpowder	WQA - 2009	Not Impaired	Not Impaired	Not Impaired	WQA – Hg – 2004 WQA – Zn, Ni, Pb, Cu,	Impaired – Temperature (water)

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Watershed	Nutrients	Sediment	Bacteria	Toxics Organics	Toxics Metals	Other
					Cr, Cd, As - 2004	
Bird River	WQA - 2005	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Impaired – Cause unknown Biological Community – Insufficient Data
Gunpowder River	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired
Middle River	Not Impaired	Not Impaired	Not Impaired	Not Impaired	WQA – Pb, Cd - 2003	Not Impaired
Liberty Reservoir - Streams	Not Impaired	Not Impaired	TMDL - 2009	Not Impaired	Not Impaired	Impaired – Chlorides, Temperature (water)
Liberty Reservoir - Impoundment	Phosphorus – TMDL – 2014	Sediment – TMDL – 2014	Not Impaired	Not Impaired	WQA - Hg - Pending WQA – Cr, Pb – 2003	Not Impaired
Lower North Branch Patapsco River	WQA - 2009	TMDL - 2011	TMDL - 2009	Not Impaired	WQA – As, Zn, Pb, Hg, Cu, Cr, Cd - 2006	Impaired – Sulfates, Chlorides, Stream Alteration
Gwynns Falls	WQA - 2010	TMDL - 2010	TMDL - 2008	Not Impaired	Not Impaired	Impaired – Chlorides, Temperature (water), Stream Alteration
Jones Falls	WQA – 2010	TMDL - 2011	TMDL – 2008	Lake Roland – PCBs- TMDL - 2014	WQA – Zn, Pb, Cu - 2004	Impaired – Sulfates, Chlorides, Stream Alteration, Temperature (water)
				Chlordane – TMDL - 2001 (Delisted: 2012)		
Back River	TMDL - 2005	Impaired	TMDL – Herring Run only - 2008	See tidal segments below	Not Impaired	Impaired – Sulfates, Chlorides, Stream Alteration
Baltimore Harbor	TMDL - 2007	Impaired	Not Impaired	See tidal segments below	Not Impaired	Biological Community Impaired – Chlorides, Sulfates

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Watershed	Nutrients	Sediment	Bacteria	Toxics Organics	Toxics Metals	Other
GUNOH	TMDL - 2010	TMDL - 2010	Not Impaired	Impaired	Impaired -Hg in fish tissue	Not Impaired
MIDOH	TMDL - 2010	TMDL - 2010	Not Impaired	Impaired	Impaired -Hg in fish tissue; WQA - Pb, Cd - 2004	Biological Community - Insufficient Data
CB2OH	TMDL - 2010	TMDL - 2010	Not Impaired	Not Impaired	Not Impaired	Not Impaired
BACOH	TMDL - 2005, 2010	TMDL - 2010	Not Impaired	PCBs - TMDL - 2012 Chlordane - TMDL - 1999	Impaired - Hg in fish tissue WQA - Zn 2006	Biological Community - Insufficient Data
CB3MH	TMDL - 2010	TMDL - 2010	Not Impaired	Not Impaired	Not Impaired	Impaired - Biological Community
PATMH	TMDL - 2005, 2010	TMDL - 2010	Not Impaired	PCBs - TMDL -2012 Chlordane - TMDL - 2001	Impaired - Cr, Zn Sediments	Impaired - Trash - Middle Branch, Northwest Harbor, Biological Community (TMDL 2015)
Total TMDLs¹	6 (5)	6 (5)	7 (7)	5 (5)	2 (2)	1 (0)
Total Impaired - Need TMDL¹	1 (1)	2 (2)	0 (0)	4 (2)	4 (0)	33 (28)

1. Including Chesapeake Bay TMDL (Not including Chesapeake Bay TMDL/local only).

A total of 25 local TMDLs have been developed for Baltimore County waters, not counting the Chesapeake Bay TMDLs. The Chesapeake Bay can be considered as a single TMDL; although it includes nitrogen, phosphorus, and sediment pollutants for 53 Maryland tidal segments and could be considered as 159 TMDLs. There are an additional 33 impairment listings that will require TMDLs in Baltimore County in the future, and an unknown number of additional impairment listings that will be developed once the causes of the biological community impairments are determined. Each one of these current and future TMDLs will require the development of a TMDL Implementation Plan in the future. For existing TMDLs, within one-year of the permit reissuance, for future TMDLs, within one year of EPA approval of the TMDL. The Chesapeake Bay TMDL has been addressed through the development of the Baltimore County Phase II Watershed Implementation Plan (<http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/WIPPhaseIICountyDocuments.aspx>). The categories of TMDLs are discussed below (all Chesapeake Bay related TMDLs are counted as a single TMDL, e.g. Back River Nutrients and Baltimore Harbor Nutrients fall under the same Bay TMDL).

Nutrient TMDLs: There are four nutrient TMDLs for Baltimore County waters. The three drinking water reservoirs (Prettyboy, Loch Raven, and Liberty) located in Baltimore County have TMDLs completed for phosphorus. Each reservoir exceeds the water quality standards for epilimnion chlorophyll *a* and hypolimnion for dissolved oxygen. The two standards are linked through algal production, which in turn is related to the amount of phosphorus delivered to the

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reservoir, changes in nitrogen have been found through modeling to not have an effect on the amount of algal production within the reservoirs. This follows the general ecological principle that fresh waters are phosphorus limited and not nitrogen limited in terms of production. The increase in algal biomass can cause problems in the final drinking water product. High amounts of algae can cause taste issues with the drinking water and the algal organic matter can react with the chlorination to produce trihalomethanes in the finished water (<http://water.epa.gov/drink/contaminants/basicinformation/disinfectionbyproducts.cfm>). When the algal biomass dies it drifts through the thermocline to the hypolimnion where bacteria break down the organic matter and in the process reduce the oxygen in the hypolimnion (for further information http://www.ourlake.org/html/dissolved_oxygen.html or <http://pubs.usgs.gov/sir/2011/5090/pdf/sir2011-5090.pdf>). This in turn impacts the biological community's ability to survive.

For the Chesapeake Bay TMDL both nitrogen and phosphorus lead to increased algal growth. This has the effect in tidal water of decreasing the dissolved oxygen levels when the algae die and the algal biomass also has an effect on water clarity by intercepting the sunlight and causing shading of submerged aquatic vegetation (<http://www.chesapeakebay.net/issues/issue/nutrients>). These algae blooms may also have health effects for both the aquatic biological communities and humans (<http://www.dnr.state.md.us/bay/hab/index.html>). The Bay TMDL applies to Back River and Baltimore Harbor watersheds, which have separate local TMDLs for nitrogen and phosphorus and for which TMDL Implementation Plans have been developed.

Sediment TMDLs: There are six sediment TMDLs for Baltimore County waters, two are related to drinking water reservoirs, three are related to stream biological community impacts, and one final sediment TMDL is related to water clarity in the Chesapeake Bay. Sediment TMDLs come from a variety of impacts. Sediment TMDLs for reservoirs are typically based on increasing the longevity of the drinking water supply (<http://www.eolss.net/Sample-Chapters/C07/E2-12-02-05.pdf>), while those for streams are based on impacts on the aquatic community (http://www.csu.edu.au/_data/assets/pdf_file/0011/749936/Harrison_Evan_139.pdf). The sediment TMDL for the Chesapeake Bay is based on water clarity standards for the support of submerged aquatic vegetation (SAV) that provides nursery habitat for a variety of fish and crabs in support of aquatic wildlife (<http://chesapeake.usgs.gov/SedimentBay605.pdf> or http://www.chesapeakebay.net/indicators/indicator/reducing_sediment_pollution). The Bay TMDL applies to the stream based sediment TMDLs for Jones Falls, Gwynns Falls, and Patapsco River watersheds.

Bacteria TMDLs: The seven bacteria TMDLs developed to date have all focused on bacteria impairments in streams, with no impairments indicated for the drinking water reservoirs, and none currently to tidal water segments (although this may change for Baltimore Harbor). High levels of bacteria are an indicator of potential human health impacts for people using the waters for recreational purposes. The bacteria TMDLs present some unique challenges, due mainly to the input of wildlife and the current state of knowledge on bacteria dynamics in streams and effectiveness of various treatment options. Meeting the [Consent Decree](#) to eliminate Sanitary Sewer Overflows (SSOs) is expected to provide a majority of the reduction to bacteria counts in affected areas. Baltimore County is in the process of developing pet waste education and outreach programs to address the bacteria sources from domestic pets; and has existing programs to address rats and deer, which will address some of the wildlife sources. The livestock sources

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are the responsibility of the agricultural sector over which Baltimore County has no control. We have established a workgroup with the Soil Conservation District to relay our bacteria monitoring findings, which in turn can be used to target agricultural BMPs to address livestock sources of bacteria.

Toxics-Organics: This class of pollutants includes all those with a hydrocarbon based molecular structure and includes a variety of pesticides, polychlorinated biphenyls (PCBs), and a variety of petroleum products and their derivatives. There are two in this class that currently have TMDLs, the pesticide chlordane, and PCBs; both of these have been banned for use for several decades. The listings are typically based on presence in fish tissue and therefore available for human consumption.

Toxics-Metals: To date this category has been limited to mercury (Hg) in fish tissue related to human health. The balance of the various types of metals have not been determined to be impairing biological communities to date.

Temperature: While no TMDLs have been developed, at the time of this document's writing, temperature impairments in streams have been noted in various Baltimore County waterways. The County is currently collecting data and partnering with consultants to research possible causes of high temperature within select watersheds.

Other Impairing Substances: This is a catchall category that includes trash, and ions, such as, chlorides and sulfates. The ions, chloride and sulfate have been identified as impairing the stream biological community in a number of watersheds. No TMDLs for these two pollutants have been developed as yet. An additional category of impairment has been identified as impairing the stream communities in a number of watersheds. This is stream channel alterations. Since stream alterations are not a pollutant, TMDLs will not be developed for these types of impairments.

10.3 Pollutant Load Reduction Calculations and Crediting Actions

There are several types of restoration programs and projects completed by EPS, the local EPS funded watershed associations and other Baltimore County agencies that result in quantifiable pollution reduction. Baltimore County EPS has drafted standard operating procedures for calculating these pollution reductions. Table 10-3 lists the SOPs and provides links to those documents that have drafts completed.

Table 10-3 Pollutant Load Reduction SOPs

SOP Title	SOP #	Status
Appendix A: Land Use Pollution Load Calculations	RT-001	Draft Complete
Use of Delivery Ratios	RT-002	Draft Complete
Septic System Nitrogen Loading Rates	RT-003	Draft Complete
Septic System Connections to Waste Water	RT-004	Draft Complete
Septic System Denitrifying Upgrades	RT-005	Draft Complete
Septic System Pumpouts	RT-006	Draft Complete
Actual Versus Estimated Land Disturbed by Redevelopment	RT-007	In Progress
	RT-008	In Progress

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Quarry Conversions	RT-009	In Progress
Stormwater Management Facilities	RT-010	Draft Complete
Stream Restoration	RT-011	Draft Complete
Shoreline Enhancement	RT-012	Draft Complete
Tree Planting	RT-013	Draft Complete
Forest Buffers	RT-014	Draft Complete
Impervious Surface Removal	RT-015	Draft Complete
Downspout Disconnections	RT-016	Draft Complete
Rain Barrels	RT-017	Draft Complete
Rain Gardens	RT-018	Draft Complete
Illicit Discharge Elimination - Program	RT-019	Draft Complete
Illicit Discharge Elimination - Individual	RT-020	In Progress
Street Sweeping	RT-021	Draft Complete
Inlet Cleaning and Stormdrain Pipe Cleaning	RT-022	Draft Complete
Outfall Stabilization	RT-023	Draft Complete
Nutrient Management	RT-024	Draft Complete
SSO Elimination	RT-025	In Progress
Trash Cleanup Events	RT-026	In Progress
Household Hazardous Waste Events	RT-027	In Progress
Public Education	RT-028	In Progress
Validating Addresses with general and specific geocoders	RT-029	In Progress

10.4 Restoration Progress

This section presents information on the restoration progress not covered elsewhere (Section 7 street sweeping and storm drain cleaning, Section 5 Illicit Connection Program) in the report. The Department of Environmental Protection and Sustainability (EPS) through a variety of programs is responsible for the bulk of the restoration activity within the County. These activities are reported in section 10.4.1. The Baltimore County Department of Public Works (DPW) restoration activities are reported in section 10.4.2. The citizen based restoration actions of the local watershed associations supported by the Baltimore County Watershed Restoration Planning and Implementation grants are summarized in Section 10.4.3. Redevelopment/revitalization projects that have resulted in water quality improvements are reported in Section 10.4.4. All actions that result in water quality improvement are summarized by watershed in Section 10.4.5.

10.4.1 EPS Restoration Programs

EPS restoration programs are administered by various sections within the department. The restoration progress of the EPS programs are reported by the Section administering the program. The Watershed Restoration Section administers the Watershed Restoration Program (formerly the Capital Improvement Program). Watershed Restoration is responsible for the oversight of the design and construction of capital projects that include stream restoration, shoreline erosion control, conversion of existing stormwater facilities for enhanced water quality treatment, and stormwater retrofits. The Forest Management and Sustainability Section is responsible for

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programs related to reforestation and tree planting. These activities are detailed in Section 10.4.1.2. The Groundwater Management Section has responsibility for administration of the Bay Restoration Fund grants to Baltimore County that result in connections of existing on-site disposal systems (OSDS) to the sanitary sewer and upgrades of existing OSDS to denitrifying systems, both resulting in the reduction of nutrients discharged to the environment. These activities along with OSDS pump-out information are presented in Section 10.4.1.3

10.4.1.1 Watershed Restoration Section - Capital Restoration Projects

Capital Restoration Projects are reported by watershed below and include both completed projects and projects under design or construction, with a table for each watershed showing these projects. Each table includes columns for project name, project type, either linear feet or acres of the project depending on project type, cost for completed projects or estimated costs for projects under design or construction, year of completion (fiscal year after 2011, calendar year prior), calculated pollutant removal for nitrogen, phosphorus, and sediment for completed projects (estimated for projects under design or construction), and the impervious surface restoration credit for each completed project (estimated for projects under design or construction).

10.4.1.1.1 Deer Creek Watershed

Due to the rural nature of this watershed, a watershed management plan is not required by previous NPDES – Municipal Stormwater Discharge Permits, but is required by the latest permit. Baltimore County participated in the Harford County sponsored Deer Creek Watershed Restoration Action Strategy development, and considers this document as meeting the requirement to assess all of the County waters by the end of the current permit. Baltimore County's portion of this watershed is approximately eleven square miles. There are no capital improvement projects existing in or currently planned for this watershed. Deer Creek is part of the Susquehanna River Basin. The predominate land use in the watershed is agriculture.

10.4.1.1.2 10.4.1.1.2 Prettyboy Reservoir Watershed

There have not been any capital improvement projects completed by Baltimore County EPS – Watershed Restoration Section in the Prettyboy watershed to date.

10.4.1.1.3 Loch Raven Reservoir Watershed

Capital Improvement projects completed by Baltimore County EPS in the Loch Raven watershed are shown in Table 10-4. At the end of fiscal year 2016, nine stream restoration projects had been completed resulting in the restoration of 4.5 miles of stream channel. An additional 2.4 miles of stream restoration are either in design or construction and are anticipated to be completed within the next four years. Five existing stormwater management facilities representing 69.5 acres of urban land have been converted to provide better water quality treatment, while an additional 183.5 acres of urban land have been retrofitted with new stormwater management facilities to provide water quality treatment.

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10.4.1.1.5 Little Gunpowder Falls Watershed

No capital restoration projects have been completed or are planned in the Little Gunpowder Falls watershed.19

10.4.1.1.6 Bird River Watershed

Capital Improvement projects completed by Baltimore County EPS in the Bird River watershed are shown below in Table 10-6. Ten completed stream restoration projects have resulted in the restoration of 4.8 miles of degraded stream channel by the end of fiscal year 2016. An additional 3.7 miles of stream channel restoration are under design or construction. Seven stormwater management facilities serving 259.7 acres of urban land have been converted to provide better water quality, while 4 stormwater retrofit projects have provided new facilities to provide water quality for a further 190 acres of urban land.

Table 10-6: Bird River Watershed – CIP Status

Capital Improvement Projects Through FY16 Bird River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
Burnam Woods (#348)	CNV	31.7	11,687	95	50.4	6.9	3,695.5	5.1
Featherhill (#493)	CNV	77.5	18,013	95	82.0	15.4	8,481.5	0.0
Lawrence Hill (#650)	CNV	52.5	102,091	96	99.8	11.1	5,633.5	8.5
S Fork WMR SR	SR	(1,900)	391,803	98	142.5	129.2	85,272.0	19.0
N Fork WMR @ Perryvale	SR	(800)	120,000	99	60.0	54.4	35,904.0	8.0
Perryvale Retrofit (#754)	CNV	42.8	120,000	99	66.2	8.4	4,430.2	6.4
S Fork @ Franklin Square (#2057.1, .2, .3)	SM	46.0	935,416	99	123.8	21.7	11,277.1	10.4
White Marsh Mall Retrofit (#2878)	RET	129.6	435,838	99	205.6	28.6	14,326.9	15.5
White Marsh Bus. Comm.* (#4994)	RET	53.9	235,597	99	na	na	na	na
N Fork WMR @ Slvr Mdw	SR	(400)	128,945	99	30.0	27.2	17,952.0	4.0
White Marsh Run SR	SR	(4,000)	982,387	00	300.0	272.0	179,520.0	40.0
WMR @ Woodcroft	SR	(2,000)	700,000	00	150.0	136.0	89,760.0	20.0
Evergreen Pond Retrofit (#478)	CNV	22.2	40,828	02	33.3	4.5	2,409.9	3.3
N. Fork White Marsh Run	SR	(7,000)	1,239,140	04	525.0	476.0	314,160.0	70.0
East Br. Honeygo Run	SR	(4,000)	1,330,000	04	300.0	272.0	179,520.0	40.0
S Fork @ Franklin Sq SR	SR	(2,600)	600,000	04	195.0	176.8	116,688.0	26.0
S Fork WMR@ Kings Ave.	SR	(2,500)	800,000	10	187.5	170.0	112,200.0	25.0
WMR @ Orbitan	SR	(300)	175,000	10	22.5	20.4	13,464.0	3.0
Southfield Pond 2 (#978)	CNV	27.0	86,764	14	31.3	6.7	806.6	9.7
Magnolia	RET	6.5	574,845	15	30.5	3.2	1,341.8	2.2
Silver Hill Fac 2 #1260	CNV	6.0	127,374	16	24.3	4.6	770.6	6.7
Walther Blvd #2243	RET	0.3		94	0.1	0.0	19.5	0.0
TOTALS		496.0 (25,500)	9,155,728		2,659.8	1,845.1	1,197,633.1	322.8

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Capital Improvement Projects Through FY16 Bird River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
Projects Under Design or Construction								
WMR @ WM Rd **	SR	(10,000)	13,064,171	17	750.0	680.0	151,300.0	100.0
N. Fork II West Branch	SR	(8,000)	1,948,250	18	600.0	544.0	121,040.0	80.0
WMR @ Upton Rd	SR	(1,350)	944,501	18	101.3	91.8	20,425.5	13.5
Estimated Totals		(19,350)	15,956,922		1,451.3	1,315.8	292,765.5	193.5
Abbreviations								
CNV: SWM Pond Conversion				SM: Shallow Marsh				
SR: Stream Restoration				RET : Retrofit				
*This project is no longer there due to I-95 expansion								
** Project is complete, final as-built acceptance pending								

10.4.1.1.7 Gunpowder River Watershed

Capital Improvement projects completed by Baltimore County EPS in the Gunpowder River watershed are shown below in Table 10-7. Due to the limited amount of urban land in the Gunpowder River watershed, little restoration effort has been completed to date, that effort consisted of a single shoreline erosion control project addressing 140 feet of shoreline, a single stormwater retrofit addressing 52.9 acres of urban land and the conversion of an existing stormwater management facility serving 4.7 acres of urban land to provide better water quality treatment. An additional conversion is planned for FY17.

Table 10-7: Gunpowder River Watershed – CIP Status

Capital Improvement Projects Through FY16 Gunpowder River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
Carrollwood Shoreline	SE	(140)	150,000	93	20.5	13.5	56,160.0	5.6
Carrollwood Park (#1422)	RET	52.9	350,000	95	148.0	22.2	13,663.2	17.2
Carrollwood Shoreline Replacement	REP	na	207,645	13	na	na	na	na
Chase Manor Pond (#1167)	CNV	4.7	68,834	14	7.0	1.6	343.0	2.9
TOTALS		57.6 (140)	776,479		175.5	37.3	70,166.2	25.7
Projects Under Design or Construction								
Cunninghill Cove Pond 2 (#435)	CNV	38.1	155,885	17	101.6	15.4	9,497.6	14.5
Abbreviations								
REP : Repair			SE : Shoreline Enhancement			RET : Retrofit		
CNV : SWM Pond Conversion								

10.4.1.1.8 Middle River Watershed

Capital Improvement projects completed by Baltimore County EPS in the Middle River watershed are shown below in Table 10-8. Five shoreline erosion control projects have been

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completed in Middle River addressing 0.94 miles of eroding shoreline. A single stream restoration project has restored 1,000 feet of degraded stream channel, and 4 stormwater retrofit projects have provided water quality for 343.7 acres of urban land and one conversion of an existing stormwater facility provides better water quality treatment for an additional 15.9 acres of urban land.

Table 10-8: Middle River Watershed – CIP Status

Capital Improvement Projects Through FY16 Middle River Watershed								
Project	Facility Type	DA (ft)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Dark Head Park	SE	(780)	168,000	90	426.2	280.2	1,167,600	31.2
Rocky Point Beach	SE	(1,110)	324,945	93	1,319.7	867.7	3,615,600	44.4
Pottery Farm Park	SE	(1700)	351,000	95	190.5	125.3	521,914	68.0
Hawthorne Park	SE	(350)	64,000	95	39.1	25.7	107172	14.0
Norman Creek (#4993)	STWET	25.3	131,151	95	39.6	4.6	2,529.6	1.7
Turkey Point	SE	(1,000)	127,539	97	112.7	74.1	308,880	40.0
Sue Creek (#4992)	STWET	6.4	93,274	97	12.5	1.8	1,014.3	1.1
Dark Head Park II (repair)	REP	na	15,094	99	na	na	na	na
Tall Trees	SR	(1,000)	1,100,000	06	75.0	68.0	15,130.0	10.0
Tall Trees (#4254)	RET	183.1	combined	06	263.9	38.8	22,030.2	32.4
Frog Mortar (#4208)	RET	128.9	82,000	08	149.3	20.7	11,743.7	16.8
Middleborough Rd. (#711)	CNV	15.9	65,558	14	17.7	2.8	538.7	3.0
TOTALS		359.6 (5,940)	2,522,561		2,646.2	1,509.7	5,774,152.5	262.6
Abbreviations:								
SR: Stream Restoration				SE: Shoreline Enhancement				
RET: Retrofit				STWET: Stormwater Wetland				
REP: Repair				CNV : SWM Pond Conversion				

10.4.1.1.9 Liberty Reservoir Watershed

No capital restoration projects have been completed or are planned in the Liberty Reservoir watershed.

10.4.1.1.10 Lower North Branch Patapsco River Watershed

Capital Improvement projects completed by Baltimore County EPS in the Lower North Branch Patapsco watershed are shown in Table 10-9. Six stream restoration projects have been completed in the Lower North Branch of the Patapsco River watershed, however, one project does not count toward meeting either pollutant load reductions or impervious surface restoration credit as it was a required environmental project included in the Baltimore County Sanitary Sewer Conccent Decree. We have left it in the table for informational purposes. The remaining 5 completed stream restoration projects have restored 0.6 miles of degraded channel. An additional 4 projects will triple the miles of stream channel restored by addressing an additional 1.8 miles of channel. Two completed stormwater retrofits have addressed water quality for 23.3 acres of urban land. Two additional conversions of existing stormwater management facilities are in design and when constructed will provide enhanced water quality treatment for an additional 34.4 acres of urban land.

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Table 10-9: Patapsco River Watershed – CIP Status

Capital Improvement Projects Through FY16 Patapsco River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Bloomsbury (DPW) (#4256)	RET	10.3	unknown	90	27.5	1.9	2,540.2	0.8
Herbert Run @ Selma Ave.	SR	(550)	227,000	00	41.3	37.4	24,684.0	5.5
Herbert Run @ Leeds Ave	SR	(300)	78,144	03	22.5	20.4	13,464.0	3.0
2203 Sulphur Spring Rd	SR	(200)	111,000	03	15.0	13.6	8,976.0	2.0
Halethorpe Streambank	SR	(100)	61,500	03	7.5	6.8	4,488.0	1.0
Bens Run SR	SR	(2,000)	570,964	04	150.0	136.0	89,760.0	20.0
Bens Run Retrofit (#4390)	STWET	14.1		04	33.5	3.2	3,665.7	1.6
<i>Herbert Run @ Paradise Ave. – cd</i>	SR	<i>(1,000)</i>	<i>482,000</i>	<i>10</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>
Catonsville Community Park (#358)	CNV	9.3	84,595	16	27.8	1.8	2,602.2	1.6
Crowin Property (#421)	CNV	14.0	74,106	16	41.6	2.8	4,064.2	3.1
TOTALS		47.7 (4,150)	1,674,077		386.3	226.6	158,241.6	39.9
Projects Under Design or Construction								
Catonsville Park	SR	(2,340)	1,897,000	17	175.5	159.1	105,019.2	23.4
Cooper Branch @ Oella	SR	(2,400)	1,250,000	18	180.0	163.2	107,712.0	24.0
Cedar Branch @ Inwood	SR	(3,320)	2,056,896	18	249.0	225.8	149,001.6	33.2
Sawmill Trib @ Patleigh	SR	(1,920)	1,248,000	19	144.0	130.6	86,169.6	19.2
Huntsmoor South Pond 1 (#596)	CNV	25.8	127,660	17	104.7	9.1	13,221.1	10.1
Garywood #521	CNV	8.6	82,264	17	35.3	3.2	4,871.3	2.4
Estimated Totals		(9,980) 34.4	6,661,820		853.2	687.8	461,123.5	109.9
Abbreviations								
SR: Stream Restoration		STWET: Stormwater Wetland			D: Design		C: Construction	
RET: Retrofit		cd: Consent Decree requirement						
* joint project w/DPW								

10.4.1.1.11 Gwynns Falls Watershed

Capital Improvement projects completed by Baltimore County EPS in the Gwynns Falls watershed are shown in Table 10-10. By the end of FY2016, 7,758 linear feet (1.5 miles) of degraded stream channel had been restored, however, 2,500 linear feet (0.5 miles) of stream restoration were required for the sanitary sewer consent decree and therefore cannot be counted toward pollutant load reductions or impervious surface restoration credit. Two hundred and fifty feet are also not counted toward pollutant load and impervious surface as the project listed is associated with a repair of a previous project. An additional 250 are also not counted as the project consisted of a buffer enhancement for which there is currently no crediting of pollution reduction nor impervious surface restoration. Ten existing stormwater management facilities serving 228.5 acres of urban land have been converted to facility types providing greater water quality benefits, while an additional 64.2 acres of urban land have been retrofitted with stormwater management facilities providing water quality improvement.

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Table 10-10: CPO Projects in the Gwynns Falls Watershed

Capital Improvement Projects Through FY16 Gwynns Falls Watershed								
Project	Facility Type	DA (LF)	Cost	Year	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
GF Trib @ Greenshire Ct	SR	(135)	17,690	99	10.1	9.2	6,058.8	1.4
Dead Run @ Security/McD	BE	(250)	23,690	02				na
Rutherford Business Ctr. (#841)	CNV	52.5	134,000	03	215.3	22.7	36,641.1	22.2
Dead R@ HS Ftbridge/wall	SR	(200)	141,000	03	15.0	13.6	8,976.0	2.0
Woodlawn HS retrofit (#3646)	RET/BE	10.3	206,000	03	79.7	5.1	6,804.9	3.2
Dead Run@ Whitehead 1 #3695	SCR	17.0	155,000	03	13.7	2.1	2,861.2	0.0
Dead Run@ Whitehead 2 #3696	SCR	7.0			5.5	0.8	1,116.8	0.0
DR @ Woodlawn Dr (Fox)	SR	(450)	232,594	04	33.8	30.6	20,196.0	4.5
GF @ Chartley SR	SR	(2,000)	970,000	06	150.0	136.0	89,760.0	20.0
Gwynns Falls @ Gwynnbrook - cd	SR	(2,500)	470,000	09				NA
Upper Gwynns Falls 5 #27	CNV	19.6	816,366	13	73.3	5.7	9,671.8	4.6
Upper Gwynns Falls 5 #26	CNV	19.4			47.1	3.3	5,431.0	2.2
Upper Gwynns Falls 5 #47	CNV	11.1			68.3	4.5	7,412.9	3.3
Upper Gwynns Falls 5 #33	CNV	21.4			59.8	4.2	6,969.2	3.1
Upper Gwynns Falls 5 #110	CNV	85.8			114.9	10.6	17,548.9	0.0
The Woods of Winands #996	CNV	3.7	47,738	14	10.0	0.6	986.0	0.3
Scott's Level @ McDonogh	SR/RET	(1,973)	2,013,059	14	148.0	134.2	88,548.2	19.7
Gwynns Falls @ Gwynnbrook Repair	REP	(250)	150,000	15				NA
Rider Mill Pond 1 (#2090)	CNV	5.8	69,706	15	14.7	1.5	831.0	1.2
The Mills @ Owings Mills Pond 1 (#1687)	CNV	3.8	27,854	15	2.7	0.5	0.0	0.4
The Mills @ Owings Mills Pond 2 (#1688)	CNV	5.4	43,504	15	8.4	0.9	239.4	1.0
Discovery Acres 2 #451	CNV	23.5	150,661	16	73.1	5.3	8,765.9	4.1
Holsan Prop Sec 1 #270	CNV	5.9	62,080	16	18.2	2.2	1,222.4	2.8
Church La #408	CNV	7.7	95,701	16	39.2	3.5	6,018.6	4.5
Courtland Manor #157	CNV	22.8	70,069	16	38.7	5.6	1,478.6	5.5
Sunset Ridge #1112	CNV	20.5	63,120	16	24.7	3.1	227.8	2.9
Village of Winterset #3478	CNV	35.2	130,210	16	85.3	10.0	5,291.4	1.1
Owings Ridge Pond A #1054	CNV	36.5	91,013	16	95.1	6.4	10,412.0	4.2
Scotts Level SR Outfall 1 #5603	RET	16.0		15	32.7	2.3	3,554.2	0.9
Scotts Level SR Outfall 2 #5604	RET	3.8		15	7.5	0.6	939.9	0.3

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Wood Valley	SR	(2,000)	1,077,510	04	150.0	136.0	89,760.0	20.0
Roland Run-Riderwd. Hills	SR	(2,400)	1,100,000	07	180.0	163.2	107,712.0	24.0
Roland Run @ Kellogg	SR	(1,500)	823,642	12	112.5	102.0	67,320.0	15.0
Towson Run RET #2242	SCR	1.9		12	1.5	0.2	157.5	0.0
TOTALS		197.8 (10,050)	4,658,951		1,420.3	744.2	496,006.5	137.4
Projects Under Design or Construction								
Rol Run @ Greenspring	SR	(3,500)	2,887,000	18	262.5	238.0	157,080.0	35.0
Rol Run @ Greenspring	RET*							
Towson Run @ Cloisters	SR	(3,000)	1,558,401	18	225.0	204.0	134,640.0	30.0
Moore's Branch @ Lightfoot	SR	(6,330)	2,700,000	20	474.8	430.4	284,090.4	63.3
Slaughterhouse Run (Upper)	SR	(2,300)	1,000,000	18	172.5	156.4	103,224.0	23.0
Slaughterhouse Run (Middle)	SR	(4,700)	1,084,780	18	352.5	319.6	210,936.0	47.0
Estimated Totals		(19,830)	9,230,181		1,487.3	1,348.4	889,970.4	198.3
*too early to report data on this aspect of the project								
Abbreviations								
SR: Stream Restoration				RET: Retrofit				
DET: Detention Pond				SCR: StormCeptor				

10.4.1.1.13 Back River Watershed

Capital Improvement projects completed by Baltimore County EPS in the Back River watershed are shown below in Table 10-12. A significant number of restoration projects have been completed in the Back River watershed, including:

- 11 stream restoration projects restoring 2.6 miles of stream channel,
- 6 shoreline erosion control projects restoring 1.7 miles of eroded shoreline,
- 17 stormwater management projects providing water quality improvement for 542.9 acres of urban land, and
- 18 stormwater facility conversion projects providing additional water quality for 340.0 acres of urban land.

An additional 1.1 miles of stream channel restoration and 0.4 miles of shoreline management are currently planned/under construction.

Table 10-12: CPO Projects in the Back River Watershed

Capital Improvement Projects Through FY13 Back River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Coxs Point I	SE	(220)	45,000	91	113.5	74.6	311,200	8.8
Rocky Point Long Creek	SE	(1,370)	151,667	94	407.2	267.7	1,115,618	54.8
Coxs Point II	SE	(1,950)	295,000	95	1,388.2	912.8	3,803,352	78.0
Lynch Point Cove – SM #1380	RET	26.7	250,000	95	50.8	7.7	3,345.3	4.1
Rocky Point @ Ballestone	SE	(2,000)	389,480	97	290.1	190.8	794,851.0	80.0

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Capital Improvement Projects Through FY13 Back River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Stemmers Run@ Dbl Rock	SR	(1,881)	362,905	97	141.1	127.9	84,419.3	18.8
Stemmers Run VFW #2240	SCR	15.4	121,000	98	6.1	1.3	474.3	0.0
Stemmers Run Garnet #2241	SCR	13.0			4.9	0.9	309.8	0.0
Stemmers Run BIO #10001	RET	1.0			3.7	0.5	197.9	0.3
Redhouse E.S. Retrofit #4202	RET	56.2			136,794	98	103.8	12.9
Greenhill WQ Retrofit #2112	SCR	3.5	35,273	98	1.4	0.3	97.7	0.0
Redhouse Run Md-7 #1933	SCR	1.9	49,925	99	0.9	0.3	105.5	0.0
Briens Run @ Rossville Industrial Park #820	CNV	161.9	184,210	99	269.6	43.3	19,641.8	34.7
Herring Run (Wiltondale)	SR	(1,400)	295,860	99	105.0	95.2	62,832.0	14.0
Hart Miller Island	SE	(3,000)	338,000	99	353.0	232.1	967,075.0	120.0
Herring Run (Goucher)	SR	(300)	158,538	00	22.5	20.4	13,464.0	3.0
Redhouse Run @ Overlea Trib C	SR	(2,600)	529,260	01	195.0	176.8	116,688.0	26.0
Linover Park	SR	(1,000)	206,745	02	75.0	68.0	44,880.0	10.0
Rocky Pt. Habitat Creation	SE	(690)	519,505	02	78.0	51.3	213,670.0	27.6
BR @ Martin Blvd Interchange (#3420 & 3421)	NEXT	417.9	629,144	04	387.2	54.9	25,690.1	36.6
Linwood Avenue	SR	(500)	283,968	04	37.5	34.0	22,440.0	5.0
Glenwest	SR	(500)	203,220	04	37.5	34.0	22,440.0	5.0
Golden Tree Sec I #532.01	CNV	25.2	Dev paid	04	33.5	2.9	3,003.7	0.0
Golden Tree Sec III ED #535	CNV	15.7	Dev paid	04	17.0	0.9	1,598.6	0.0
Herring Run Bank Sta @ Weatherbee	SR	(100)	30,000	07	7.5	6.8	4,488.0	1.0
Herring Run @ Sussex Rd.	Srepair	na	96,572	07	na	na	na	na
BR Trash Boom	TRA	na	80,000	10	na	na	na	na
<i>Her Run @Collinsdale-cd</i>	<i>SR</i>	<i>(2,000)</i>	<i>661,395</i>	<i>10</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>
Rdhse Rn@ St. Pat Rd	SR	(2,000)	943,361	11	150.0	136.0	89,760	20.0
BR Trash Boom Maintenance	TRA	na	70,000	11	na	na	na	na
Essex Skypark	SE	(2,610)	1,267,588	12	596.3	392.1	1,633,647.6	104.4
BR Trash Boom Maintenance	TRA	na	70,000	12	na	na	na	na
SWAP SWM Conv #1829	CNV	10.7	15,526	13	16.1	2.4	1,174.1	2.2
SWAP SWM Conv #553	CNV	8.3	27,687	13	21.3	2.6	1,251.8	0.0
SWAP SWM Conv #932	CNV	7.8	29,229	13	8.4	1.6	151.7	2.1
SWAP SWM Conv #305	CNV	6.7	23,441	13	3.7	1.8	0.0	2.8
BR Trash Boom Maintenance	TRA	na	88,100	13	na	na	na	na
Urbanwood (#381)	CNV	4.19	48,701	14	8.8	0.9	417.3	0.9
Woodward Square Pond 1 (#164)	CNV	12.1	115,531	14	13.1	2.4	281.0	2.8
Woodward Square Pond 2 (#170)	CNV	7.4	69,354	14	8.7	1.5	219.2	1.8
Perring Woods Court #181	CNV	8.5	75,613	14	11.7	2.1	314.8	2.4
Kahler Property #624	CNV	10.5	19,327	15	7.9	2.2	0.0	2.6
Bread & Cheese Creek	SR	(1,523)	1,102,472	15	114.2	103.6	23,043.0	15.2

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Capital Improvement Projects Through FY13 Back River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Tidal Back River Greening SWM-8 facilities	Multiple RET	7.3	1,207,388	16	41.1	4.9	1,926.3	3.6
Tidal Back River Greening Tree Planting-11 Sites	FPU	5.0 acres		16	24.88	1.26	306.49	1.9
Rustic Ridge #832	CNV	4.4	46,267	16	3.6	0.7	59.5	0.9
Goldentree Sec 1 #532.02	CNV	25.2	69,022	16	25.1	5.1	495.6	6.7
Goldentree Sec 2 Pond 1 #533	CNV	3.8	19,643	16	5.2	0.3	429.6	0.0
Goldentree Sec 2 Pond 2 #534	CNV	7.5	55,846	16	17.8	2.2	990.4	2.2
Goldentree Sec. 3 SF #535	CNV	15.9	58,244	16	11.4	2.3	2.9	4.1
Stemmers Run RET Area 4 #2239	SCR	4.2		98	1.5	0.2	80.8	0.0
TOTALS		882.9 (25,644)	11,475,80 1		5,220.8	3,084.5	9,392,019.8	710.8
Projects Under Design or Construction								
HR @ Overlook	SR	(6,050)	2,602,462	18	453.8	411.4	271,524	60.5
Cox's Point III	SE	(2,000)	1,183,432	18	150.0	136.0	274,000	80.0
Estimated Totals		(8,050)	3,785,894		603.8	547.4	545,524	140.5
*waiting for as-builts, may require recalculating reductions								
Abbreviations								
CNV: SWM Pond Conversion			ENH: Enhancement			TRA: Trash Removal		
NWET: New Wet Pond			SCR: StormCeptor					
RET: Retrofit			SR: Stream Restoration					
SE : Shoreline Enhancement			HAB: Habitat improvement					
cd-consent decree			FPU: Forestation on Pervious Urban					

10.4.1.1.14 Baltimore Harbor Watershed

Capital Improvement projects completed by Baltimore County EPS in the Baltimore Harbor watershed are shown in Table 10-13. In the Baltimore Harbor watershed 12 shoreline erosion control project addressing 2.0 miles of eroded shoreline have been completed and 9 retrofit projects addressing 795.4 acres of urban land have been completed. An additional three shoreline control projects currently under design will address ~1.5 miles of additional eroded shoreline.

Table 10-13: CPO Projects in the Baltimore Harbor Watershed

Capital Improvement Projects Through FY13 Baltimore Harbor Watershed								
Project	Facility Type	DA (ft.)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Concrete Homes	SE	(430)	65,000	90	133.4	87.7	365,452	17.2
Watersedge Park	SE	(480)	92,000	90	72.8	47.9	199,400	19.2
Merritt Point Park	SE	(1880)	175,000	90	128.5	84.5	352,000	75.2
Bear Creek I	SE	(475)	66,000	90	112.6	74.1	308,599	19.0
West Inverness	SE	(230)	19,000	90	14.1	9.3	38,800	9.2

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Geise Ave. (#1365)	SCR	1.5	unk	89	0.6	0.1	61.1	0.0
Chink Creek (#4618)	RET	93.3	unk	90	185.1	28.0	15,222.6	16.7
Hughes Ave (#1965)	SCR	9.8	unk	90	3.4	0.6	255.1	0.0
Charlesmont Park	SE	(750)	47,000	93	76.9	50.5	210,600	30.0
Sandy Plains Elem.	SE	(380)	108,000	98	82.7	54.4	226,568	15.2
Tabasco Cove (#2917)	STWET	161.3	128,209	96	301.4	53.8	28,250.2	28.3
Battle Grove Park	SE	(420)	82,000	95	153.2	100.8	419,852	16.8
North Point Creek (#3575)	NEXT	83.6	117,277	98	154.2	20.0	10,605.7	10.3
Schoolhouse Cove 8 SCRs (#1934)	SCR	4.7	419,133	98	1.8	0.4	166.3	0.0
Schoolhouse Cove 8 SCRs (#1935)	SCR	7.4			2.9	0.6	270.1	0.0
Schoolhouse Cove 8 SCRs (#1936)	SCR	8.4			3.3	0.7	290.2	0.0
Schoolhouse Cove 8 SCRs (#1937)	SCR	7.5			3.0	0.6	280.7	0.0
Schoolhouse Cove 8 SCRs (#1938)	SCR	9.0			3.4	0.7	293.8	0.0
Schoolhouse Cove 8 SCRs (#1939)	SCR	10.3			4.2	1.0	419.3	0.0
Schoolhouse Cove 8 SCRs (#1940)	SCR	11.7			2.6	0.6	249.2	0.0
Schoolhouse Cove 8 SCRs (#1941)	SCR	11.9			4.0	1.1	492.2	0.0
Bear Creek II Shore	SE	(700)	138,558	99	83.2	54.7	228,010	28.0
Bear Creek II SD Retrofit (#4644)	NWET	10.1	93,026	99	20.8	3.4	1,867.5	2.3
Watersedge Park II (repair)	SE	(90)	21,062	99	na	na	na	na
Lynch Cove Retrofit site-I #10002	STWET	240.0	500,000 combined	03	366.1	77.6	43,904.3	87.3
Lynch Cove Retrofit site-II #10003	STWET	188.9		03	197.7	45.7	27,565.4	56.07
Fleming Park	SE	(1,767)	540,303	07	25.6	16.9	70,228	70.7
Pleasure Island	SE	(2,200)	4,200,000	11	352.0	242.0	992,200	88.0
Schoolhouse Cove SCR & RET (#1942)	SCR	6.9	146,000	11	2.6	0.5	217.4	0.0
Stansbury Park (Rec and Parks Project)	SE	(317)	198,400	16	23.8	21.6	43,429	12.68
TOTALS		866.3 (10,119)	7,155,968		2,515.9	1,079.8	3,585,549.1	602.2
Projects Under Design or Construction								
Fort Howard Park	SE	(4,000)	8,936,348	19	300.0	272.0	548,000	160.00
Inverness Park	SE	(1,840)	813,460	18	138.0	125.1	252,080	73.6
Watersedge Park	SE	(2,000)	1,129,058	18	150.0	136.0	274,000	80.00
Estimated Totals		(7,840)	10,878,866		588.0	533.1	1,074,080.0	313.6
Abbreviations CNV: SWM Pond Conversion NWET: New Wet Pond SR: Stream Restoration STWET: Stormwater Wetland NEXT: New Extended Detention Pond SCR: StormCeptor SE: Shoreline Enhancement								

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**10.4.1.2 Forest Management and Sustainability - Reforestation and Urban Tree Planting**

The Forest Management and Sustainability Section administers a number of present and past programs that provide restoration credits for meeting nutrient and sediment reductions. These include; the Community Reforestation Program (CRP) – Section 10.4.1.2.1, Cool Trees Project – Section 10.4.1.2.2, the Growing Home Campaign – Section 10.4.1.2.3, and the Big Tree Sale Program – Section 10.4.1.2.4. The Cool Trees Project and the Growing Home Campaign are no longer in existence.

10.4.1.2.1 Community Reforestation Program

The Community Reforestation Program (CRP) was established by the Department of Environmental Protection and Sustainability to provide a dedicated workforce for planting, monitoring, and maintaining forest mitigation projects. The Program is funded primarily through fees-in-lieu of mitigation for forests removed as a result of public and private land development, as required by the implementation of the County's Forest Conservation Act and Chesapeake Bay Critical Area Regulations. The plantings conducted with mitigation monies will not be given nutrient reduction credits due to the fact that these tree plantings are offsetting deforestation. The CRP is the only full-time countywide reforestation mitigation program among Maryland's counties.

The CRP includes a four-person reforestation crew that carries out year-round reforestation operations. The crew is based at a 1-acre site in eastern Baltimore County that is provided by the Department of Recreation and Parks. This home base houses a growing out nursery for 10,000 tree seedlings; equipment and machinery needed for planting, monitoring, and maintaining the reforestation projects; and office space for the reforestation team.

In the past, the CRP would occasionally undertake special grant-funded projects to improve water quality and groundwater recharge, as well as wildlife habitat. Unlike the plantings conducted with fee-in-lieu monies, grant funded projects will be given nutrient reduction credit. An example is the expansion of forest buffers and the reforestation of fields on private rural properties in 2009. Recently, the county has hired contractors to supplement the County reforestation efforts. Table 10-14 shows these projects by watershed, these numbers were recalculated for the 2016 report based on better data. In FY14 the CRP began planting trees to meet Watershed Implementation Plan (WIP) goals and these plantings are also eligible for nutrient reduction credits. The reforestation efforts are also part of the nutrient and sediment reduction strategy for meeting local TMDLs. These plantings are shown in Table 10-15 and Table 10-16. The method for calculating pollutant reduction involves a land use conversion from urban pervious to forest. Additional reduction efficiency is applied for trees planted within a riparian buffer.

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Table 10-14: Baltimore County Non-Mitigation Reforestation Projects by Watershed Through FY13

Watershed	Acres Planted With Non-Mitigation Funds	N Reduction from Non-Mitigation Projects (lbs/yr)	P Reduction From Non-Mitigation Projects (lbs/yr)	Sed Reduction From Non-Mitigation Projects (lbs/yr)	Impervious Acre Equivalent
Prettyboy	10.56	93.85	2.80	1,657.52	4.01
Loch Raven	14.92	146.29	4.64	3,657.90	5.67
Little Gunpowder Falls	12.74	111.86	3.31	2,442.66	4.84
Grand Totals	38.2	352.0	10.8	7,758.1	14.5

Table 10-15: Baltimore County Non-Mitigation Reforestation Projects by Watershed FY14

Watershed	Planting Type	Acres Planted	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Impervious Acre Equivalent
Loch Raven	Upland	10.68	93.66	2.78	1,669.1	4.06
Middle River	Upland	12.80	62.21	3.07	913.7	4.86
Bird River	Upland	2.60	12.64	0.62	167.4	0.99
Patapsco	Buffer	0.12	1.11	0.04	46.7	0.05
Gwynns Falls	Upland	0.10	0.88	0.03	19.8	0.04
Total Upland		26.18	170.49	6.54	2,816.7	9.99
Total Buffer		0.12	1.11	0.04	46.7	0.05
Grand Totals		52.6	342.1	13.12	5,680.1	20.04.04

Table 10-16: Baltimore County Non-Mitigation Reforestation Projects by Watershed FY15

Watershed	Planting Type	Acres Planted	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Impervious Acre Equivalent
Prettyboy	Upland	3.50	30.73	0.91	519.6	1.33
Loch Raven	Upland	42.16	369.74	10.96	6,588.8	16.02
	Buffer	10.68	119.14	4.03	2,511.78	4.06
Lower Gunpowder	Upland	1.70	14.93	0.44	321.8	0.65
	Buffer	1.79	20.22	0.67	816.02	0.68
Bird River	Upland	2.51	12.20	0.60	161.6	0.95
Liberty Reservoir	Buffer	0.60	6.48	0.21	200.3	0.23
Patapsco	Buffer	1.78	16.40	0.58	692.8	0.68
Gwynns Falls	Upland	1.32	11.58	0.34	261.7	0.5
Jones Falls	Upland	2.28	20.02	0.59	234.0	0.87
	Buffer	0.13	1.45	0.05	30.6	0.05
Back River	Buffer	1.24	8.12	1.98	209.1	0.47
Baltimore Harbor	Upland	1.67	8.13	0.40	102.2	0.63
	Buffer	4.70	31.41	1.88	1,034.63	1.79
Total Upland		55.14	467.33	14.25	8,189.7	20.95
Total Buffer		20.92	203.22	9.41	4,495.2	7.95
Grand Totals		76.06	670.54	23.66	13,684.9	28.90

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Table 10-17: Baltimore County Non-Mitigation Reforestation Projects by Watershed FY16

Watershed	Planting Type	Acres Planted	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Impervious Acre Equivalent
Prettyboy	Upland	8.14	71.47	2.12	1,208.4	3.09
	Buffer	2.80	30.75	1.04	895.02	1.07
Loch Raven	Upland	11.23	98.57	2.92	1,754.55	4.27
	Buffer	4.21	46.75	1.58	1,504.04	1.60
Lower Gunpowder	Buffer	5.00	56.49	1.94	2,279.38	1.90
Bird River	Upland	0.55	2.67	0.13	35.42	0.21
Liberty Reservoir	Upland	10.24	89.81	2.66	1,658.3	3.89
	Buffer	1.70	18.32	0.61	565.81	0.64
Gunpowder River	Upland	5.41	25.90	1.30	436.22	2.06
	Buffer	6.58	38.38	2.11	990.21	2.50
Middle River	Buffer	0.90	5.76	0.34	173.25	0.34
Patapsco	Upland	1.27	8.83	0.27	152.57	0.48
	Buffer	2.08	19.16	0.68	809.54	0.79
Gwynns Falls	Buffer	1.10	13.08	0.47	695.32	0.42
Jones Falls	Upland	0.28	2.46	0.07	28.73	0.11
	Buffer	0.07	0.78	0.03	16.46	0.03
Back River	Upland	2.36	11.47	0.57	123.17	0.90
Total Upland		39.48	311.18	10.04	5,397.36	15.01
Total Buffer		24.44	229.47	8.80	7,929.03	9.29
Grand Totals		63.92	540.65	18.84	13,329.39	24.30

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Table 10-18: Baltimore County Non-Mitigation Proposed Reforestation Projects

Watershed	Planting Type	Acres	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Impervious Acre Equivalent
Bird River	Upland	1.88	9.14	0.45	121.07	0.71
Deer Creek	Upland	0.60	5.27	0.16	123.09	0.23
Prettyboy	Upland	23.18	203.52	6.03	3,441.30	8.81
	Buffer	2.03	22.26	0.75	648.03	0.77
Loch Raven	Upland	25.39	222.96	6.60	3,968.52	9.65
	Buffer	1.60	17.76	0.60	571.24	0.61
Lower Gunpowder	Upland	22.36	196.10	5.81	4,232.75	8.50
	Buffer	5.90	66.66	2.29	2,689.66	2.24
Middle River	Upland	0.15	0.73	0.04	10.71	0.06
Liberty Reservoir	Upland	1.00	8.77	0.26	161.94	0.38
Patapsco	Upland	6.74	46.84	1.42	809.68	2.56
	Buffer	1.59	14.65	0.52	618.83	0.60
Gwynns Falls	Upland	1.49	13.07	0.39	295.41	0.57
Jones Falls	Upland	7.30	64.09	1.90	749.05	2.77
	Buffer	1.7	18.96	0.64	399.81	0.65
Back River	Upland	4.80	23.33	1.15	250.51	1.82
	Buffer	0.6	3.93	0.24	101.19	0.23
Total Upland		94.89	793.82	24.21	14,164.03	36.06
Total Buffer		13.42	144.22	5.04	5,028.76	5.1
Grand Totals		108.31	938.04	29.25	19,192.79	41.16

10.4.1.2.2 Cool Trees

Refer to the 2014 NPDES report for a description of the Cool Trees project. Table 10-19 below shows the watersheds and nutrient reductions that result from this project. This program was grant funded and with the end of the grant funding period is no longer in operation.

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Table 10-19: Cool Trees Planting Projects by Watershed Through FY13

Watershed	Acres Planted	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Impervious Acre Equivalent
Upper Western Shore					
Loch Raven	0.43	3.8	0.1	67.2	0.2
Lower Gunpowder	0.64	5.6	0.2	121.2	0.2
Bird River	0.76	3.7	0.2	48.9	0.3
Gunpowder River	0.19	0.9	0.1	15.33	0.1
Middle River	0.16	0.8	0.0	11.4	0.1
Patapsco/Back River					
Patapsco	2.21	15.4	0.5	265.5	0.8
Gwynns Falls	1.78	15.6	0.5	352.9	0.7
Jones Falls	0.19	1.7	0.0	19.5	0.1
Back River	1.28	6.2	0.3	66.8	0.5
Baltimore Harbor	1.91	9.3	0.5	116.9	0.7
Grand Totals	9.6	62.9	2.3	1,085.6	3.6

10.4.1.2.3 Growing Home Campaign

Refer to the 2014 NPDES report for a description of the Growing Home campaign. Table 10-20 shows Growing Home data for the Upper western Shore and Patapsco/Back Basin watersheds. This program is no longer operated through Baltimore County, but has been supplanted by the Maryland Department of Natural Resources – Marylanders Plant Trees Program.

Table 10-20: Growing Home Trees Planted by Watershed Through FY13

Watershed	Acres Planted	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Impervious Acre Equivalent
Upper Western Shore					
Deer Creek	0.65	5.7	0.2	133.3	0.2
Prettyboy Reservoir	0.52	4.6	0.1	77.2	0.2
Loch Raven	10.48	91.9	2.7	1,637.8	4.0
Lower Gunpowder	3.94	34.6	1.0	745.8	1.5
Little Gunpowder	1.79	15.7	0.5	343.2	0.7
Bird River	3.16	15.4	0.8	203.5	1.2

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Gunpowder River	1.30	6.2	0.3	104.9	0.5
Middle River	2.03	9.9	0.5	144.9	0.8
Patapsco/Back River					
Liberty Reservoir	0.39	3.4	0.1	63.2	0.1
Patapsco	2.42	16.8	0.5	290.7	0.9
Gwynns Falls	2.32	20.3	0.6	460.0	0.9
Jones Falls	4.61	40.5	1.2	473.0	1.8
Back River	4.70	22.8	1.1	245.3	1.8
Baltimore Harbor	1.08	5.3	0.3	66.1	0.4
Grand Totals	39.4	293.1	9.9	4,988.9	15.0

10.4.1.2.4 *Big Tree Sale*

EPS hosted its first Big Tree Sale in 2009. In FY15, Big Tree Sales were held on October 18, 2014 and May 9, 2015. There were 780 total trees sold at the sales in FY15 to address in Baltimore County. Watershed locations for all trees sold are not available, but nutrient reductions for those with location data that are located within Baltimore County are shown in Table 10-21 for FY13 and in Table 10-22 for FY14. Table 10-23 shows the most recent data for sales in FY15. For the sake of producing conservative nutrient reduction estimates, trees are presumed planted in upland areas and not in stream buffers.

Table 10-21: Big Tree Sale #s and Associated Nutrient Reductions Through FY13

8 Digit Watershed	# Trees	N Red	P Red	Sed Red	Imp Ac Eq
Deer Creek	18	1.6	0.0	36.9	0.1
Prettyboy	36	3.2	0.1	53.4	0.1
Loch Raven	691	60.6	1.8	1,079.9	2.6
Lower Gun	45	4.0	0.1	85.2	0.2
Little Gun	34	3.0	0.1	65.2	0.1
Bird River	35	1.7	0.1	22.5	0.1
Gunpowder River	6	0.3	0.0	4.8	0.0
Middle River	17	0.8	0.0	12.1	0.1
Liberty	17	1.5	0.0	27.5	0.1
Patapsco	46	3.2	0.1	55.3	0.2
Gwynns Falls	19	1.7	0.0	37.7	0.1
Jones Falls	212	18.6	0.6	217.5	0.8

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Back River	35	1.7	0.1	18.3	0.1
Baltimore Harbor	107	5.2	0.3	65.5	0.4
Totals	1,318	107.0	3.4	1,781.9	5.0

Table 10-22: Big Tree Sale #s FY14 by 8 Digit Watershed and Associated Nutrient Reductions

8 Digit Watershed	# Trees	N Red	P Red	Sed Red	Imp Ac Eq
Deer Creek	14	1.2	0.0	28.7	0.1
Prettyboy	0	0.0	0.0	0.0	0.0
Loch Raven	317	27.8	0.8	495.4	1.2
Lower Gun	27	2.4	0.1	51.1	0.1
Little Gun	13	1.1	0.0	24.9	0.0
Bird River	18	0.9	0.0	11.6	0.1
Gunpowder River	0	0.0	0.0	0.0	0.0
Middle River	11	0.5	0.0	7.9	0.0
Liberty	13	1.1	0.0	24.9	0.0
Patapsco	39	2.7	0.1	46.9	0.1
Gwynns Falls	23	2.0	0.1	45.6	0.1
Jones Falls	119	10.4	0.3	122.1	0.5
Back River	43	2.1	0.1	22.4	0.2
Baltimore Harbor	15	0.7	0.0	9.2	0.1
Totals	652	52.9	1.5	890.7	2.5

Table 10-23: Big Tree Sale #s FY15 by 8 Digit Watershed and Associated Nutrient Reductions

8 Digit Watershed	# Trees	N Red	P Red	Sed Red	Imp Ac Eq
Deer Creek	0	0.0	0.0	0.0	0.0
Prettyboy	12	1.1	0.0	17.8	0.0
Loch Raven	257	22.5	0.7	401.6	1.0
Lower Gun	52	4.6	0.1	98.4	0.2
Little Gun	43	3.8	0.1	82.4	0.2

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8 Digit Watershed	# Trees	N Red	P Red	Sed Red	Imp Ac Eq
Bird River	44	2.1	0.1	28.3	0.2
Gunpowder River	24	1.1	0.1	19.4	0.1
Middle River	15	0.7	0.0	10.7	0.1
Liberty	8	0.7	0.0	13.0	0.0
Patapsco	63	4.4	0.1	75.7	0.2
Gwynns Falls	28	2.5	0.1	55.5	0.1
Jones Falls	73	6.4	0.2	74.9	0.3
Back River	36	1.7	0.1	18.8	0.1
Baltimore Harbor	125	6.1	0.3	76.5	0.5
Totals	780	57.7	1.9	973.1	3.0

Table 10-24: Big Tree Sale #s FY16 by 8 Digit Watershed and Associated Nutrient Reductions

8 Digit Watershed	# Trees	N Red	P Red	Sed Red	Imp Ac Eq
Deer Creek	14	1.23	0.04	9.79	0.06
Prettyboy	0	0.0	0.0	0.0	0.0
Loch Raven	161	14.14	0.42	251.61	0.61
Lower Gun	54	4.74	0.14	102.22	0.21
Little Gun	11	0.97	0.03	21.09	0.04
Bird River	0	0.0	0.0	0.0	0.0
Gunpowder River	8	0.38	0.02	6.45	0.03
Middle River	4	0.19	0.01	2.86	0.02
Liberty	18	1.58	0.05	29.15	0.07
Patapsco	47	3.27	0.10	56.46	0.19
Gwynns Falls	23	2.02	0.06	45.60	0.09
Jones Falls	28	2.46	0.07	28.73	0.11
Back River	60	2.92	0.14	31.31	0.23

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8 Digit Watershed	# Trees	N Red	P Red	Sed Red	Imp Ac Eq
Baltimore Harbor	16	0.78	0.04	9.79	0.06
Totals	444	34.68	1.12	595.06	1.72

10.4.1.3 Groundwater Management Section - Septic System Related Programs

The OSDS Strategy for meeting the OSDS nitrogen reduction target for 2025 is presented in Table 10-25. This translates into 20 upgrades per year of existing OSDS to denitrifying systems, 14 hook-ups to the sanitary sewer system per year of existing OSDS, and 7,800 pump-outs per year.

Table 10-25: OSDS Strategy for Meeting Nitrogen Reductions Targets by 2025

Strategy	# of Systems	Nitrogen Reduction	Remaining Nitrogen Load	Remaining to Meet Target
2009 Progress from MAST			166,285	60,148
Health Projects	1,537	-24,201	142,084	35,947
Growth Area Adjustments	7,805	-33,649	108,435	2,298
De-nitrifying Systems	220	-897	107,538	1,401
Future Health Projects	200	*	*	*
OSDS Pump-outs	7,800/yr	-464	106,469	332

The installation of OSDS denitrifying systems is supported by the Bay Restoration Fund (see: <http://www.mde.maryland.gov/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Pages/Water/cbwrf/index.aspx> for further information). Maryland Department of the Environment provides assessment of the nitrogen removal efficiencies for the various denitrifying systems available through the Maryland Verification Process. There are seven different types of systems installed in Baltimore County during the reporting period.

Only BAT systems installed to replace existing septic systems count as credit toward meeting our septic system reduction allocation for nitrogen and are reported below.

Table 10-26 indicates the number of systems installed by type, location, and the MDE reported pollutant removal efficiencies for FY 2012 and FY 2013, the first 2-yr milestone. Table 10-27 presents the same data for the FY 2014 and FY2015 2-year milestone and Table 10-28 presents the same data for FY 2016.

Table 10-26: FY 2012 and FY 2013 - Number of Denitrifying Systems Installed by Type and Removal Efficiency for Replacement Systems Only

System Type	Number Installed	Removal Efficiency
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	CBCA	>1,000	<1,000	
Hoot	4	7	4	64%
Singular	6	4	4	55%
Biomicrobics – Microfast/Retrofast	0	0	1	57%
Adventex	1	0	0	71%
Septi-Tech	0	0	2	67%
Waterloo	0	0	1	55%
Total Installations	11	11	12	

Table 10-27: FY 2014 and 2015 - Number of Denitrifying Systems Installed by Type and Removal Efficiency for Replacement Systems Only

System Type	Number Installed			Removal Efficiency
	CBCA	>1,000	<1,000	
Advantex AX20	0	3	0	71%
Advantex RT	1	1	0	76%
Biomicrobics – Microfast/Retrofast	1	0	0	57%
Bionest	0	0	1	unknown
Hoot	3	8	14	64%
Septi-Tech	1	2	2	67%
Singulair	0	4	6	55%
Singulair Green	0	1	0	55%
Total Installations	6	19	23	

Table 10-28: FY 2016 - Number of Denitrifying Systems Installed by Type and Removal Efficiency for Replacement Systems Only

System Type	Number Installed			Removal Efficiency
	CBCA	>1,000	<1,000	
Hoot	0	3	7	64%
Hydro-Action	0	0	1	50%
Septi-Tech	0	0	1	67%
Singulair	0	3	5	55%
Singulair Green	1	0	0	55%

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Total Installations	1	6	14
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The amount of nitrogen delivered to the Chesapeake Bay from OSDS is the result of the landscape location of the system and the delivery ratio of the watershed for nitrogen. There are three landscape position factors that relate to the delivery of nitrogen from OSDS to the edge-of-stream:

- Chesapeake Bay Critical Area (CBCA) – 16.44 pounds nitrogen per OSDS
- Less than 1,000 feet from a perennial stream (<1,000) – 10.27 pounds nitrogen per OSDS
- Greater than 1,000 feet from a perennial stream (>1,000) – 6.16 pounds nitrogen per OSDS.

The numbers above are derived from Maryland Assessment Scenario Tool (MAST) by dividing the number of MAST derived septic systems into the Edge-of-Stream nitrogen load. Using this information and the geographical location of the installed denitrifying systems, the edge-of-stream (EOS) nitrogen load, the EOS nitrogen reduction and delivered load (based on the watershed specific nitrogen delivery ratio) can be calculated. The impervious acre equivalent multiplier comes from [Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated: Guidance for the National Pollutant Discharge Elimination System Stormwater Permits \(August 2014\)](#). The impervious surface equivalent credits are as follows:

- Septic Pumping – 0.03 per pumpout
- Septic Denitrification – 0.26 per installation
- Septic connection to WWTP – 0.39 per connection

The results of the calculations are presented in Table 10-29 for first 2-year milestone period; Table 10-30 shows the FY 2014-2015 septic 2-year milestone; and Table 10-31 shows FY 2016 results.

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**Table 10-29: OSDS Upgrades to Denitrifying Systems July 1, 2011 Through June 30, 2013 (FY12 - FY13) by Watershed for Replacement Systems Only**

Watershed	OSDS Location			EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBCA	<1,000 feet	>1,000 feet					
Deer Creek	0	0	0	0.00	0.00	57.40%	0.00	0.00
Prettyboy	0	0	0	0.00	0.00	5.50%	0.00	0.00
Loch Raven	0	4	3	59.56	35.90	25.90%	9.30	1.82
Lower Gunpowder	0	5	6	88.31	54.24	88.80%	48.16	2.86
Little Gunpowder	0	2	0	20.54	12.22	70.80%	8.65	0.52
Bird River	7	0	0	115.08	71.84	87.50%	62.86	1.82
Gunpowder River	3	0	0	49.32	27.13	100.00 %	27.13	0.78
Middle River	0	0	0	0.00	0.00	100.00 %	0.00	0.00
Liberty	0	0	1	6.16	3.39	0.00%	0.00	0.26
Patapsco River	0	0	0	0.00	0.00	53.20%	0.00	0.00
Gwynns Falls	0	0	0	0.00	0.00	33.70%	0.00	0.00
Jones Falls	0	0	2	12.32	7.02	18.60%	1.31	0.52
Back River	1	0	0	16.44	9.04	96.20%	8.70	0.26
Baltimore Harbor	0	0	0	0.00	0.00	100.00 %	0.00	0.00
Totals	11	11	12	367.73	220.78		166.11	8.84

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Table 10-30: OSDS Upgrades to Denitrifying Systems July 1, 2013 Through June 30, 2015 (FY14-FY15) by Watershed for Replacement Systems Only

Watershed	OSDS Location			Total Systems	EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBCA	<1,000 feet	>1,000 feet						
Deer Creek	0	0	0	0	0.00	0.00	57.40%	0.00	0.00
Prettyboy	0	0	0	0	0.00	0.00	5.50%	0.00	0.00
Loch Raven	0	3	8	11	80.09	51.42	25.90%	13.32	2.86
Lower Gunpowder	0	8	3	11	100.64	60.96	88.80%	54.13	2.86
Little Gunpowder	0	1	3	4	28.75	18.89	70.80%	13.38	1.04
Bird River	5	0	1	6	88.36	57.87	87.50%	50.63	1.56
Gunpowder River	0	0	0	0	0.00	0.00	100.00 %	0.00	0.00
Middle River	0	0	0	0	0.00	0.00	100.00 %	0.00	0.00
Liberty	0	0	0	0	0.00	0.00	0.00%	0.00	0.00
Patapsco River	0	5	3	8	69.83	46.25	53.20%	24.61	2.08
Gwynns Falls	0	0	0	0	0.00	0.00	33.70%	0.00	0.00
Jones Falls	0	3	4	7	55.45	32.59	18.60%	6.06	1.82
Back River	1	0	1	2	22.60	14.46	96.20%	13.91	0.52
Baltimore Harbor	0	0	0	0	0.00	0.00	100.00 %	0.00	0.00
Totals	6	20	23	49	445.72	282.45		176.04	12.74

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Table 10-31: OSDS Upgrades to Denitrifying Systems July 1, 2015 Through June 30, 2016 (FY16) by Watershed for Replacement Systems Only

Watershed	OSDS Location			Total Systems	EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBC A	<1,000 feet	>1,000 feet						
Deer Creek	0	0	0	0	0.00	0.00	57.40%	0.00	0.00
Prettyboy	0	0	0	0	0.00	0.00	5.50%	0.00	0.00
Loch Raven	0	3	7	10	73.93	44.73	25.90%	11.58	2.60
Lower Gunpowder	0	2	4	6	45.18	26.57	88.80%	23.60	1.56
Little Gunpowder	0	1	1	2	16.43	9.78	70.80%	6.92	0.52
Bird River	0	0	1	1	6.16	3.94	87.50%	3.45	0.26
Gunpowder River	0	0	0	0	0.00	0.00	100.00%	0.00	0.00
Middle River	1	0	0	1	16.44	9.04	100.00%	9.04	0.26
Liberty	0	0	0	0	0.00	0.00	0.00%	0.00	0.00
Patapsco River	0	0	0	0	0.00	0.00	53.20%	0.00	0.00
Gwynns Falls	0	0	1	1	6.16	3.39	33.70%	1.14	0.26
Jones Falls	0	0	0	0	0.00	0.00	18.60%	0.00	0.00
Back River	0	0	0	0	0.00	0.00	96.20%	0.00	0.00
Baltimore Harbor	0	0	0	0	0.00	0.00	100.00%	0.00	0.00
Totals	1	6	14	21	164.30	97.45		55.74	5.46

The installation of thirty-four denitrifying systems during the first 2-year milestone period resulted in 166 pounds of nitrogen reduction. During the second 2-yr milestone period, 49 systems were installed resulting in a reduction of 176 pounds of nitrogen.

During the first year of the third 2-year milestone period (FY2016), 21 denitrifying systems were installed for a reduction of 56 pounds. The lower reduction for FY2016 is the result of the distribution of the installed systems, both in relation to the tidal water and the streams, and with a greater number in watersheds that have lower delivery ratio to the Bay.

The target of the 2-year milestones was 40 denitrifying systems and 163.2 pounds of nitrogen reduction (an average of 4.08 pounds nitrogen reduction per system times 40 systems). This

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target was met for second 2-year milestone period and we're on target to meet it for the FY16-17 milestone period.

The OSDS pump out information for fiscal year 2015 is presented in Table 10-32 and Table 10-33 shows data for fiscal year 2016.

Table 10-32: OSDS Pump-outs July 1, 2014 Through June 30, 2015 by Watershed (FY2015)

Watershed	OSDS Location			EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBCA	<1,000 feet	>1,000 feet					
Deer Creek	0	0	10	61.60	3.08	57.40%	1.77	0.30
Prettyboy	0	7	53	398.37	19.92	5.50%	1.10	1.80
Loch Raven	0	168	318	3,684.24	184.21	25.90%	47.71	14.58
Lower Gunpowder	0	36	69	794.76	39.74	88.80%	35.29	3.15
Little Gunpowder	0	17	40	420.99	21.05	70.80%	14.90	1.71
Bird River	1	1	7	69.83	3.49	87.50%	3.06	0.27
Gunpowder River	0	1	1	16.43	0.82	100%	0.82	0.06
Middle River	2	0	0	32.88	1.64	100%	1.64	0.06
Liberty	0	32	74	784.48	39.22	0.00%	0.00	3.18
Patapsco River	0	46	125	1,242.42	62.12	53.20%	33.05	5.13
Gwynns Falls	0	24	56	591.44	29.57	33.70%	9.97	2.40
Jones Falls	0	72	144	1,626.48	81.32	18.60%	15.13	6.48
Back River	0	2	3	39.02	1.95	96.20%	1.88	0.15
Baltimore Harbor	1	0	1	22.60	1.13	100%	1.13	0.06
Totals	4	406	901	9,785.54	489.28		167.43	39.33

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Table 10-33: OSDS Pump-outs July 1, 2015 Through June 30, 2016 by Watershed (FY2016)

Watershed	OSDS Location			Total Systems	EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBC A	<1,000 feet	>1,000 feet						
Deer Creek	0	12	45	57	400.44	20.02	57.40 %	11.49	1.71
Prettyboy	0	31	91	122	878.93	43.95	5.50%	2.42	3.66
Loch Raven	0	553	1184	1737	12,972.75	648.64	25.90 %	168.00	52.11
Lower Gunpowder	0	124	185	309	2,413.08	120.65	88.80 %	107.14	9.27
Little Gunpowder	1	95	186	282	2,137.85	106.89	70.80 %	75.68	8.46
Bird River	8	14	18	40	386.18	19.31	87.50 %	16.90	1.20
Gunpowder River	2	0	5	7	63.68	3.18	100%	3.18	0.21
Middle River	2	0	4	6	57.52	2.88	100%	2.88	0.18
Liberty	0	53	144	197	1,431.35	71.57	0.00%	0.00	5.91
Patapsco River	0	75	165	240	1,786.65	89.33	53.20 %	47.52	7.20
Gwynns Falls	0	72	128	200	1,527.92	76.40	33.70 %	25.75	6.00
Jones Falls	0	193	332	525	4,027.23	201.36	18.60 %	37.45	15.75
Back River	7	14	15	36	351.26	17.56	96.20 %	16.90	1.08
Baltimore Harbor	9	0	11	20	215.72	10.79	100%	10.79	0.60
Totals	29	1,236	2,513	3,778	28,650.56	1,432.53		526.09	113.34

The number of OSDS pump-outs still runs below the target of 7,800 systems per year (FY2015 – 1,311 and FY2016 – 3,778); however, in FY2016, the County exceeded the target reduction of 464 pound of nitrogen (FY2016 – 526). The credits for OSDS pump-outs are annual, so only the most recent year counts.

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Connection to the sanitary sewer system and abandonment of OSDS systems (AKA septic hook-ups) reduce nitrogen discharges from the OSDS source sector. Please refer to [PLRC SOP RT-004.01](#) for protocols on how septic connections are conducted and how pollutant load calculations are performed in Baltimore County.

Note that the BRF billing file is not updated between May and August, to free up staff time for the annual tax bill season. Changes during those months are reflected in the BRF billing file by August. To best approximate the fiscal year, comparisons are made August to August. Note also that this mechanism for tracking septic to sewer connections began in 2014. Before then, BRF billing files were capture as-needed. We have grouped the available BRF billing file comparisons in a way that approximates fiscal years as closely as possible. Table 10-34 shows the septic to sewer connections completed for FY2012 and 2013; Table 10-35 shows connections for FY2014 and FY2015; and Table 10-36 shows connections for FY2016.

Table 10-34: Septic to Sewer Connections completed between 10/18/2011 and 1/23/2014 (approx.FY2012 - FY2013)

Watershed	OSDS Location			EOS Total Nitrogen	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBC A	<1,000 feet	>1,000 feet				
Deer Creek	0	0	0	0.00	57.40%	0.00	0.00
Prettyboy	0	0	0	0.00	5.50%	0.00	0.00
Loch Raven	0	0	1	6.16	25.90%	1.60	0.39
Lower Gunpowder	0	0	0	0.00	88.80%	0.00	0.00
Little Gunpowder	0	0	0	0.00	70.80%	0.00	0.00
Bird River	1	2	4	61.62	87.50%	53.92	2.73
Gunpowder River	0	0	0	0.00	100.00 %	0.00	0.00
Middle River	3	0	0	49.32	100.00 %	49.32	1.17
Liberty	0	0	0	0.00	0.00%	0.00	0.00
Patapsco River	0	3	1	36.97	53.20%	19.67	1.56
Gwynns Falls	0	1	0	10.27	33.70%	3.46	0.39
Jones Falls	0	2	0	20.54	18.60%	3.82	2.78
Back River	21	0	0	345.24	96.20%	332.12	8.19
Baltimore Harbor	0	0	0	0.00	100.00 %	0.00	0.00
Totals	25	8	6	530.12		463.90	17.21

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Table 10-35: Septic to Sewer Connections completed between 1/23/2014 and 8/20/2015 (approx. FY2014-FY2015)

Watershed	OSDS Location			EOS Total Nitrogen	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBCA	<1,000 feet	>1,000 feet				
Deer Creek	0	0	0	0.00	57.40%	0.00	0.00
Prettyboy	0	0	0	0.00	5.50%	0.00	0.00
Loch Raven	0	1	0	10.27	25.90%	2.66	0.39
Lower Gunpowder	0	0	1	6.16	88.80%	5.47	0.39
Little Gunpowder	0	0	0	0.00	70.80%	0.00	0.00
Bird River	1	4	19	174.56	87.50%	152.74	9.36
Gunpowder River	2	0	0	32.88	100.00 %	32.88	0.78
Middle River	2	0	0	32.88	100.00 %	32.88	0.78
Liberty	0	0	0	0.00	0.00%	0.00	0.00
Patapsco River	0	0	1	6.16	53.20%	3.28	0.39
Gwynns Falls	0	0	4	24.64	33.70%	8.30	1.56
Jones Falls	0	0	0	0.00	18.60%	0.00	0.00
Back River	1	0	0	16.44	96.20%	15.82	0.39
Baltimore Harbor	104	0	0	1,709.76	100.00 %	1,709.76	40.56
Totals	110	5	25	2,013.75		1,963.79	54.60

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Table 10-36: Septic to Sewer Connections completed between 8/20/2015 and 8/20/2016 (approx. FY2016)

Watershed	OSDS Location			Total Systems	EOS Total Nitrogen	Delivery Ratio	Delivered Load Reduction	Equiv. Imperv. Acres
	CBCA	<1,000 feet	>1,000 feet					
Deer Creek	0	0	0	0	0.00	57.40%	0.00	0.00
Prettyboy	0	0	0	0	0.00	5.50%	0.00	0.00
Loch Raven	0	3	1	4	36.97	25.90%	9.58	1.56
Lower Gunpowder	0	1	5	6	41.07	88.80%	36.47	2.34
Little Gunpowder	0	0	0	0	0	70.80%	0	0.00
Bird River	0	1	14	15	96.51	87.50%	84.45	5.85
Gunpowder River	6	0	0	6	98.64	100.00 %	98.64	2.34
Middle River	5	0	0	5	82.2	100.00 %	82.20	1.95
Liberty	0	1	0	1	10.27	0.00%	0	0.39
Patapsco River	0	1	4	5	34.91	53.20%	18.57	1.95
Gwynns Falls	0	7	5	12	102.69	33.70%	34.61	4.68
Jones Falls	0	2	4	6	45.18	18.60%	8.40	2.34
Back River	4	1	1	6	82.19	96.20%	79.07	2.34
Baltimore Harbor	1	0	2	3	28.76	100.00 %	28.76	1.17
Totals	16	17	36	69	659.39		480.74	26.91

The target number of OSDS hook-ups to the sanitary sewer system is 14 per year. Baltimore County continues to exceed that number (FY2012-2013 – average 20 per year, FY2014 – 111, FY2015 – 29, and FY2016 - 69). A total of 248 connections have resulted in a 2,908.4 pound reduction in nitrogen delivered to the Bay since October 2011.

10.4.2 DPW Restoration Programs

Several programs under Baltimore County's Department of Public Works result in restoration pollutant reductions. These programs are listed below. For information on street sweeping, storm drain cleaning and sanitary sewer projects, please see Section 7 of this report. Retrofits of the County facilities that fall under the General Industrial Stormwater Permit, with the exception of the Public School and Community College sites, are being coordinated by DPW (Section 10.4.2.1). The Storm Drain Engineering Section is addressing problems related to storm drain outfalls, of which some of the corrections will result in nutrient and sediment reductions (Section

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10.4.2.2). Finally, DPW is the lead in organizing the annual rain barrel sale that Baltimore County offers for citizens (Section 10.4.2.3)

10.4.2.1 County Facility Retrofits Under the General Industrial Stormwater Permit

The Department of Public Works (DPW) has assumed responsibility for ensuring that regulated general government facilities comply with the new permit requirements. Consultants were hired to conduct stormwater assessments on industrial sites, develop Stormwater Pollution Prevention Plans (SWPPPs) (see Section 7 of this report for the status of plan development), and to design restoration plans to address untreated impervious surface area. Municipal facilities were specifically exempted from the restoration requirement in the final version of the General Industrial Stormwater Permit based on the fact that the MS4 permit would have a restoration requirement. Further clarification of this requirement revealed that industrial sites impervious areas can be addressed through the general stormwater permit impervious reduction requirements. Table 10-37 shows the completed and planned projects associated with this effort. The pollutant reduction and impervious surface credits for the planned projects are based on the per acre reductions and impervious surface credits for the completed projects. The calculated per acre reductions and impervious surface credits are:

- Nitrogen – 5.1189 pounds per acre
- Phosphorus – 0.4343 pounds per acre
- TSS – 446.97 pound per acre
- Impervious Acre Credit – 0.7653 acres of impervious credit per restored acre.

When the project are constructed the actual amount of pollutant reduction and impervious surface credit will be calculated and reported.

Table 10-37: DPW Stormwater Projects Associated With the Industrial Permit

Projects Through FY16								
Project	Facility Type	DA	Watershed	FY	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Longview Highway Shop (#5416)	BS	0.27	Loch Raven Reservoir	15	2.1	0.1	121.3	1.3
Ridge Road Highway Shop (#5401)	MB	0.46		16	5.2	0.5	495.7	1.0
Public Works Training Facility (#5397)	RBs	0.11		16	0.5	0.1	58.3	0.2
Essex Utility Yard (#5400)	ESD	0.91	Back River	15	4.2	0.6	239.0	1.0
Double Rock Maintenance Facility (#5412)	MB, RB	0.28		15	2.5	0.4	166.9	0.9
Clarks Lane Highway Shop 3 (#5405)	BS	2.28	Liberty Reservoir	15	14.8	0.8	851.8	1.1
Windsor Mill Highway Shop Phase 1 (#5403)	MB	4.43	Gwynns Falls	15	19.5	1.9	2,754.1	0.71
Chesterwood Park (#5404)	SFB	1.50	Baltimore Harbor	15	6.4	0.4	189.1	1.0

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Projects Through FY16								
Project	Facility Type	DA	Watershed	FY	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Middletown Rd Highway Shop Improvements (#5406)	GS, PP	0.18	Prettyboy Reservoir	16	1.8	0.2	187.8	1.0
Totals		10.4			57.0	5.0	5,064.0	8.2
Projects Under Design or Construction								
Industry Lane Salt Dome (#5402)	MB	0.52	Loch Raven Reservoir	No ASB	2.7	0.2	232.4	0.4
White Hall Highway Shop 4-3 (#5407)	BS	0.52		No ASB	2.7	0.2	232.4	0.4
Special Forces (#5486)	ESD	1.60		No ASB	7.7	0.7	715.2	1.2
Brady Ave Highway and Utility Yard (#5398)	BS	0.65	Patapsco River	No ASB	3.3	0.3	290.5	0.5
Emala Ave Highway Shop Improvements (#5396)	SGW	2.80	Middle River	No ASB	14.3	1.2	1,251.5	2.1
Essex VOM Facility (#5399)	PP	0.42	Back River	No ASB	2.1	0.2	187.7	0.3
Perry Rd Highway Shop Improvements (#5410)	ESD	1.02		No ASB	5.2	0.4	455.9	0.8
Estimated Totals		7.5			38.0	3.2	3,365.6	5.7
Abbreviations								
BS: Bioswale			MB: Micro-bioretenion			SGW: Submerged gravel wetland		
SFB: Sheet flow to buffer			ESD: Environmental Site Design			RB: Rain barrel		
PP: Porous pavement			GS: Grass swale			ASB: As-built		

10.4.2.2 DPW Storm Drain System Restoration Program

In addition to projects completed for industrial permit compliance, DPW also has other restoration projects planned related to the storm drain system that will contribute to nutrient reductions, impervious surface credits and possibly nutrient reductions. These projects are shown in Table 10-38. Many of the DPW projects listed in last year's report have been cancelled or passed on to SHA. Projects that have been cancelled or given to SHA are shown in Table 10-39 below but will be removed from future reports. Note that an MOU has been developed where Baltimore County will receive a portion of restoration credit for SHA projects completed on County lands.

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because, as the bins help to reduce material sent to county landfills, rain barrels help reduce stormwater flowing to local streams.

In the future, Baltimore County will implement an audit program to determine the rate of installation of the rain barrels and the rate at which those installed are emptied prior to storm events. This program will be designed to meet the validation requirements that are currently being prepared by Maryland. This will improve the accuracy of the pollutant reduction estimates attributed to the sale. For the purposes of this report, 100% of barrels sold are assumed to have been installed and frequently emptied, maximizing the effectiveness of storm water benefits.

Table 10-40 shows the number of barrels sold per year to Baltimore County addresses. Table 10-41 shows the number of rain barrels and the amount of pollutants reduced and the impervious surface equivalents by watershed from 2011-FY13 for tracking WIP 2-year milestones. Table 10-42 displays the same information for FY2014 and FY2015. Table 10-43 shows the information for FY2016. Locations are based on addresses given on the receipts from the rain barrel sales. Each rain barrel is estimated to drain 250 sq ft of rooftop for pollution reduction calculation purposes. Note that this analysis of the receipts showed lower numbers sold for each year than reported by the vendor, especially for 2010. This will need to be addressed and possibly re-analyzed in future reports.

Table 10-40: Baltimore County Rain Barrel Sales by Fiscal Year

Year	# Barrels Sold to Baltimore County Addresses
FY10	469
FY11	894
FY12	620
FY13	536
FY14	505
FY15	523
FY16	331
Totals	3,878

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Table 10-41: Baltimore County Rain Barrel Total Sales and Associated Nutrient Reductions Through FY13 by 8 Digit Watershed

Watershed	# Barrels Sold	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Equivalent Impervious Acres Treated
Lower Susquehanna					
Deer Creek	4	0.14	0.01	22.17	0.01
Upper Western Shore					
Loch Raven	445	15.89	1.61	1,830.02	0.89
Lower Gunpowder	339	12.11	1.23	1,694.76	0.68
Bird River	262	5.20	0.93	424.55	0.53
Little Gunpowder	64	2.29	0.23	349.80	0.13
Gunpowder	29	0.58	0.10	57.09	0.06
Middle River	71	1.43	0.26	132.42	0.14
Patapsco/Back River					
Liberty	9	0.32	0.03	39.40	0.02
Patapsco	214	6.38	0.65	851.62	0.43
Gwynns Falls	148	5.28	0.54	781.72	0.30
Jones Falls	206	7.36	0.75	512.26	0.41
Back River	573	11.42	2.04	826.64	1.16
Baltimore Harbor	131	2.60	0.46	227.35	0.26
Prettyboy	20	0.71	0.07	84.44	0.04
Totals	2,519	71.70	8.91	7,834.22	5.06

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Table 10-42: Baltimore County Rain Barrel Sales FY14 & 15 by 8 Digit Watershed and Associated Nutrient Reductions

Watershed	# Barrels Sold	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Equivalent Impervious Acres Treated
Lower Susquehanna					
Deer Creek	3	0.11	0.01	16.63	0.01
Upper Western Shore					
Prettyboy	6	0.21	0.02	25.09	0.01
Loch Raven	122	4.36	0.44	591.02	0.24
Lower Gunpowder	134	4.78	0.49	599.84	0.27
Bird River	110	2.18	0.39	178.25	0.22
Little Gunpowder	25	0.89	0.09	122.5	0.05
Gunpowder	21	0.69	0.07	102.11	0.04
Middle River	21	0.58	0.08	70.22	0.04
Patapsco/Back River					
Liberty	3	0.11	0.01	11.25	0
Patapsco	124	3.21	0.4	388.58	0.25
Gwynns Falls	105	3.17	0.38	435.32	0.21
Jones Falls	85	3.03	0.31	295.23	0.17
Back River	226	4.48	0.81	324.34	0.46
Baltimore Harbor	43	0.86	0.15	74.63	0.09
Totals	1,028	28.65	3.64	3,234.99	2.06

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Table 10-43: Baltimore County Rain Barrel Sales FY16 by 8 Digit Watershed and Associated Nutrient Reductions

Watershed	# Barrels Sold	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Equivalent Impervious Acres Treated
Lower Susquehanna					
Deer Creek	1	0.02	0.00	5.54	0.00
Upper Western Shore					
Prettyboy	1	0.04	0.00	4.22	0.00
Loch Raven	66	2.36	0.24	271.42	0.13
Lower Gunpowder	36	1.29	0.13	179.97	0.07
Bird River	21	0.42	0.07	34.03	0.04
Little Gunpowder	9	0.32	0.03	49.19	0.02
Gunpowder	4	0.08	0.01	7.87	0.01
Middle River	5	0.10	0.02	9.20	0.01
Patapsco/Back River					
Liberty	4	0.14	0.01	17.51	0.01
Patapsco	36	1.07	0.11	143.26	0.07
Gwynns Falls	46	1.64	0.17	242.97	0.09
Jones Falls	40	1.43	0.14	99.47	0.08
Back River	48	0.95	0.17	68.89	0.10
Baltimore Harbor	14	0.28	0.05	24.30	0.03
Totals	331	10.13	1.17	1,157.84	0.66

10.4.3 Local Watershed Associations Restoration Efforts

Baltimore County has several active volunteer organizations whose mission is focused on enhancement of environmental resources. In an effort to expand their ability to organize and conduct restoration activities, EPS developed a grant program entitled the *Watershed Association Restoration Planning and Implementation Grant* program. This grant program was developed to keep permanent staff with the county's local Watershed Associations. The groups implement restoration projects and educational activities, participate in County restoration planning and support the Stream Watch program. The funds can be used by the groups to leverage additional grant funding. The grant program captures an accounting of the group's efforts and then adds these restoration activities into the County's totals for meeting nutrient reduction goals. Table 10-44 below is the nutrient reductions by group through FY13. For the purposes of tracking

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progress in meeting the Baltimore County Watershed Implementation Plan (WIP) 2-year milestones for addressing the reduction requirements of the Chesapeake Bay TMDL, FY14 and FY15 data are presented in Table 10-45 and Table 10-46.

Table 10-44: Watershed Groups' Projects Pollutant Reductions FY13

Watershed Group	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)
Gunpowder Valley Conservancy (GVC)	905.1	30.8	21,814.8
Blue Water Baltimore (BWB)	403.7	17.2	9,211.1
Patapsco Heritage Greenway (PHG)	39.7	1.5	1,704.4
Prettyboy Watershed Association (PWA)	171.4	5.8	4,919.0
Back River Restoration Committee (BRRC)	25.5	2.1	368.7
Dundalk Renaissance Corporation (DRC)	16.3	0.9	332.7
TOTALS	1,561.7	58.3	38,350.8

Table 10-45: Watershed Groups' Projects Pollutant Reductions FY14

Watershed Group	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)
GVC	100.2	3.6	1,845.5
BWB	13.8	0.5	191.7
PHG	3.5	0.1	60.1
PWA	34.2	1.0	576.2
BRRC	12.8	0.6	152.3
DRC	29.5	1.9	651.7
TOTALS	194.1	7.6	3,477.5

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Table 10-46: Watershed Groups' Projects Pollutant Reductions FY15

Watershed Group	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)
GVC	107.5	4.0	1,762.2
BWB	39.2	1.3	629.8
PHG	0.0	0.0	0.0
PWA	7.3	0.2	100.3
BRRC	0.5	0.0	13.9
DRC	0.1	0.0	12.2
TOTALS	154.6	5.6	2,518.5

Table 10-47: Watershed Groups' Projects Pollutant Reductions FY16

Watershed Group	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)
GVC trees	32.3	1.3	657.0
GVC ESD	1.8	0.2	109.5
BWB trees	54.8	2.0	855.7
BWB ESD	0.1	0.0	10.2
PHG trees	2.6	0.1	44.4
PHG ESD	0.2	0.0	17.6
PWA trees	22.6	0.7	384.0
PWA ESD	0.0	0.0	0.0
BRRC trees	1.17	0.1	12.5
BRRC ESD	1.3	0.2	92.8
DRC trees	14.0	0.7	172.2
DRC ESD	0.1	0.0	7.0
TOTALS	131.0	5.3	2,362.9

Table 10-48 through Table 10-50 show the pollutant reductions achieved by the watershed groups by watershed.

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**Table 10-48: Watershed Group Projects Pollutant Reductions Through FY13 by Watershed**

Watershed	N Red	P Red	Sed Red	Imp Acres
Prettyboy	166.9	5.7	4,825.0	5.8
Loch Raven	649.2	21.2	11,788.4	24.2
Lower Gunpowder	227.5	7.7	9,395.5	8.6
Little Gunpowder	0.4	0.0	18.6	0.0
Bird River	0.4	0.0	6.1	0.0
Gunpowder River	42.1	2.1	713.4	3.3
Middle River	1.3	0.2	120.7	0.2
Liberty	1.1	0.0	19.4	0.0
Patapsco River	45.5	1.7	1,837.0	2.2
Gwynns Falls	93.8	3.1	3,247.3	3.7
Jones Falls	224.3	8.5	4,769.2	9.7
Back River	95.3	7.4	1,404.3	16.2
Baltimore Harbor	15.5	0.9	332.2	1.1
Totals	1,563.3	58.5	38,477.1	75.0

Table 10-49: Watershed Group Projects Pollutant Reductions FY14 & 15 by Watershed

Watershed	N Red	P Red	Sed Red	Imp Acres
Prettyboy	36.6	1.1	619.1	1.6
Loch Raven	192.4	6.1	3,051.8	7.6
Lower Gunpowder	3.4	0.1	96.4	0.1
Little Gunpowder	4.1	0.1	89.0	0.2
Bird River	11.1	0.6	191.3	0.9
Gunpowder River	10.9	0.6	194.9	0.9
Middle River	12.4	0.9	368.3	1.2
Liberty	0.2	0	3.2	0.6
Patapsco River	4.3	0.1	77.3	0.2
Gwynns Falls	12.4	0.4	288.8	0.5
Jones Falls	26.8	0.8	332.1	1.2
Back River	20.5	1.1	252.7	1.6
Baltimore Harbor	27.9	1.8	633.5	2.1
Totals	363.0	13.7	6,198.4	18.7

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**Table 10-50: Watershed Group Projects Pollutant Reductions FY16 by Watershed**

Watershed	N Red	P Red	Sed Red	Imp Acres
Prettyboy trees	20.2	0.6	341.5	0.9
Prettyboy SWM	0.0	0.0	0.0	0.0
Loch Raven trees	28.4	0.9	664.9	1.1
Loch Raven SWM	0.1	0.0	8.3	0.0
Lower Gunpowder trees	0.8	0.0	17.0	0.0
Lower Gunpowder SWM	0.1	0.0	5.0	0.0
Little Gunpowder trees	0.0	0.0	0.0	0.0
Little Gunpowder SWM	0.0	0.0	0.0	0.0
Bird River trees	10.4	0.5	137.8	0.8
Bird River SWM	0.3	0.0	21.3	0.0
Gunpowder River trees	0.0	0.0	0.8	0.0
Gunpowder River SWM	0.0	0.0	2.0	0.4
Middle River trees	0.0	0.0	0.7	0.0
Middle River SWM	1.5	0.2	101.9	0.1
Liberty trees	0.3	0.0	4.9	0.0
Liberty SWM	0.0	0.0	0.0	0.0
Patapsco River trees	3.8	0.1	66.1	0.2
Patapsco River SWM	0.2	0.0	17.6	0.0
Gwynns Falls trees	14.8	0.4	335.1	0.6
Gwynns Falls SWM	0.0	0.0	5.3	0.0
Jones Falls trees	12.2	0.4	142.6	0.5
Jones Falls SWM	0.1	0.0	9.6	0.0
Back River trees	23.6	1.2	253.6	1.8
Back River SWM	0.9	0.1	55.7	0.1
Baltimore Harbor trees	12.8	0.6	161.0	1.0
Baltimore Harbor SWM	0.1	0.0	10.5	0.0
Totals	130.6	5.0	2,363.2	7.5

10.4.4 Redevelopment/Revitalization Pollutant Load Reductions

A process has been developed for tracking redevelopment/revitalization projects and the calculation of the pollutant load reductions due to these projects. Baltimore County has identified redevelopment/revitalization as one of the restoration actions to meet the Chesapeake Bay TMDL and local nutrient and sediment TMDLS. Redevelopment has also been identified as an action for meeting the 20% impervious surface treatment requirements of the NPDES – MS4 permit.

Redevelopment is defined as a pre-development site impervious cover >40% as per the stormwater management regulations. Revitalization, for purposes of calculating pollutant load reductions, is defined as pre-development impervious cover that ranges from 20% to 40%. Both redevelopment and revitalization projects are already accounted for in the Chesapeake Bay Watershed Model as urban land, and therefore included in the load reduction allocation for Baltimore County. For the identified projects, pollutant load calculations were performed to calculate the pre-development load and the post development load, using the watershed specific

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Edge-of-Stream loading rates and the efficiencies of the various Best Management Practices. The differential between the pre-development load and the post-development load is then calculated to determine the pollutant load reduction on a project by project basis. The pre and post impervious cover is also calculated.

The crediting of redevelopment/revitalization is based on different time scales. For the Chesapeake Bay TMDL, credits are based on any project completed after 2011. As the reduction allocations are based on the 2010 progress run of the Watershed Model. For the local TMDLs and the impervious surface treatment credits the time period is based on the re-issuance of the MS4 permit and the development of the local TMDL Implementation Plans. That time period is from the beginning of fiscal year 2014. Table 10-51 provides information from the time period of January 1, 2011 through June 30, 2013. Table 10-52 provides information from the time period of July 1, 2013 through June 30, 2015. The load reductions from both tables is used for crediting nutrient load reductions for the Chesapeake Bay TMDL, while only the information from Table 10-52 is used for crediting nutrient and sediment load reductions for the local TMDLs and impervious surface treatment credits.

**Table 10-51: Pollutant Load Reduction as a Result of Redevelopment/Revitalization Projects
(January 1, 2011 through June 30, 2013)**

Project Name	Pre-development			Type*	Post Development Impervious	Pollutant Load Change			As-built Date	Fiscal Year	Watershed
	Site Acres	Impervious Acres	% Impervious			N	P	TSS			
Towson Manor	19.3	5.5	28.4	Rev	8.9	-43.5	-1.5	-1,323	6/20/2013	13	JF
1400 Taylor Avenue PUD	13.6	6.7	49.4	Red	11.6	13.5	3.7	831	11/10/2011	12	BR
Landsdowne Station	40.2	17.9	44.6	Red	26.6	-96.0	-9.6	-16,934	1/12/2011	11	PA
Walgreens – Rt. 40	1.7	1.5	88.6	Red	1.4	-2.0	-0.3	-440	4/11/2011	11	PA
Minis of Owings Mills	3.9	2.0	52.6	Red	3.2	-35.2	-2.5	-3,758	2/28/2011	11	GF
Hillcrest Elementary School	11.1	2.3	21.0	Rev	3.4	0.3	0.5	609	4/11/2011	11	PA
McDonalds – Dundalk	1.0	0.7	73.7	Red	0.8	-7.4	-1.0	-479	8/30/2011	12	BH
Target – Whitmarsh	1.0	0.9	86.4	Red	0.9	-9.3	-0.9	-1,394	10/6/2011	12	BI
York Road 1209	5.7	4.7	82.3	Red	4.8	-92.0	-7.2	-9,847	10/18/2011	12	LR
Sonic - Pulaski Highway	1.1	0.7	61.9	Red	0.5	-1.9	-0.5	-203	3/23/2012	12	BR
Oella Mill Property	3.4	1.9	57.3	Red	2.2	-12.7	-1.4	-2,279	4/28/2012	12	PA
Cardiff Hall Apt.	3.6	1.5	40.5	Red	2.7	-3.9	0.6	887	5/15/2012	12	JF
YMCA – Chesapeake Ave.	1.4	0.8	57.0	Red	1.0	-5.63	-0.44	-641	5/25/2012	12	JF
Patient First – Catonsville	0.8	0.7	85.2	Red	0.5	-4.2	-0.6	-822	8/7/2012	13	PA
WAWA – 516 Main Street	2.2	0.9	39.5	Red	1.6	-29.8	-1.7	-2,146	3/7/2013	13	GF
Lord Property	0.3	0.2	75.7	Red	0.2	-0.9	-0.2	-95	10/26/2012	13	BR
Walmart Golden Ring	1.9	1.9	100	Red	1.9	-2.2	-0.5	-256	1/2/2013	13	BR
Franklin Woods	10.6	2.3	22.0	Rev	2.8	-8.7	-0.1	40	1/9/2013	13	BI

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Project Name	Pre-development			Type*	Post Development Impervious	Pollutant Load Change			As-built Date	Fiscal Year	Watershed
	Site Acres	Impervious Acres	% Impervious			N	P	TSS			
Loh Property	0.8	0.5	65.4	Red	0.5	-0.6	-0.2	-83	6/24/2013	13	BR
Hunt Valley Town Center – Main Street and Loop Road	3.1	2.8	88.7	Red	2.6	-52.0	-4.3	-5,882	1/11/2013	13	LR
NDX Archives	3.5	3.0	83.9	Red	3.0	-1.9	-0.2	-324	3/27/2013	13	GF
Royal Farms Store #181	1.4	1.4	100	Red	1.3	-10.6	-0.9	-1,278	7/24/2013	13	BI
Hereford United Methodist Church	1.8	1.2	66.9	Red	1.6	-27.5	-2.0	-2,659	9/10/2013	13	LR
Totals	133.4	62.0			84.0	-434.13	- 31.24	-48,476			

*Red = Redevelopment, Rev = Revitalization

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Table 10-52: Pollutant Load Reduction as a Result of Redevelopment/Revitalization Projects (July 1, 2013 through June 30, 2016)

Project Name	Pre-development			Type*	Post Development Impervious	Pollutant Load Change			Imp. Surface Credit	As-built Date	Fiscal Year	Watershed
	Site Acres	Impervious Acres	% Impervious			N	P	TSS				
Projects Completed in FY 2014												
McDonalds – Bel Air Road	0.4	0.4	90.5	Red	0.4	-1.34	-0.24	-97	0.23	3/11/2014	14	BR
Villa Julie Front Parking	15.7	7.3	46.6	Red	9.8	-112.0	-7.44	-10,592	10.67	5/22/2014	14	GF
Osprey at Pikeswood Apts.	0.4	0.2	57.1	Red	0.3	-4.23	-0.36	-472	0.23	6/9/2014	14	GF
Holly Hill Nursing Facility	2.0	0.6	27.1	Rev	0.6	-1.51	-0.10	-101	0.22	6/26/2014	14	BR
Projects Completed in FY 2015												
Royal Farms Store #191	3.6	2.6	71.7	Red	2.2	-17.86	-1.58	-2,260.5	1.26	12/2/2014	15	LR
Maryland Food Bank	6.6	3.7	55.4	Red	4.8	-9.76	0.01	90	1.16	12/8/2014	15	PA
Valley Center Lot 3	3.1	2.2	72.7	Red	2.2	-12.01	-1.17	-1,717	1.16	1/5/2015	15	GF
The Greens at Logan Field	3.1	3.0	98.4	Red	1.8	-5.95	-1.82	-886	1.57	1/20/2015	15	BH
Easter Seals	1.6	0.7	40.8	Red	0.7	-5.59	-0.44	-652	0.48	3/11/2015	15	GF
Mr. Tire	1.0	0.5	50.0	Red	0.6	-5.78	-0.59	-871	0.57	3/19/2015	15	BI
Sheppard Pratt Gatehouse	0.7	0.6	82.6	Red	0.7	-4.1	-0.4	-517	0.30	4/2/2015	15	JF
Dulaney Valley Apts. – Ph II	7.2	2.6	36.7	Rev	4.6	-31.88	-2.05	-3,115	4.32	6/12/2015	15	LR
Projects Completed in FY 2016												
Towson Square	4.6	3.4	74.5	Red	3.9	-11.2	-1.1	-924.9	1.89	12/8/2015	16	JF
Totals	4.6	27.8			3.9	-11.2	-1.1	-924.9	24.06			

*Red = Redevelopment, Rev = Revitalization

A number of redevelopment/revitalization projects are currently in the project planning or construction phase. These projects and the anticipated pollutant load reductions and impervious surface credits are presented in Table 10-53. When these projects are completed and the as-builts are approved, the calculation of the pollutant load reductions and the impervious surface credits will be verified and if necessary changed to reflect the built condition.

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**Table 10-53: Future Pollutant Load Reduction as a Result of Redevelopment/Revitalization Projects
(Currently in the Planning or Construction Phase)**

Project Name	Pre-development			Type*	Post Development Impervious	Pollutant Load Change			Est. Imp. Surface Credit	Status	Watershed
	Site Acres	Impervious Acres	% Impervious			N	P	TSS			
Metro Center – North	13.8	9.4	68.3	Red	9.4	-27.3	-3.0	-5,262.5	5.30	Const.	GF
Metro Center – South	30.2	24.7	81.9	Red	23.2	-94.7	-8.5	-12,209.6	6.14	Const.	GF
Galloway Creek PUD	3.9	3.0	77.9	Red	1.0	-13.5	-5.0	-2,560.1	2.07	Plan	MR
Shelter Harbor PUD	5.5	4.5	81.8	Red	4.2	-1.7	-1.0	-588.8	0.39	Const.	BH
The Townes at North Point	16.3	12.7	77.8	Red	12.2	-36.8	-7.8	-4,643.2	7.28	Const.	BH
York Road, 1620	1.33	1.31	98.5	Red	1.11	-3.88	-0.62	-1,026.6	0.66	Plan	JF
Belair Road 7528. 7536	2.19	0.71	32.4	Red	0.78	-3.05	-0.44	-175.6	0.48	Plan	BR
Talmudical Academy	8.89	3.27	36.8	Red	4.03	-34.71	-2.29	-3,582.9	2.97	Plan	GW
Towson Mews	1.37	0.98	71.3	Red	1.22	-4.29	-0.25	-354.2	0.51	Const.	JF
McCormick Rd 10909 bldg	3.9	3.2	82.6	Red	3.18	-0.47	-0.08	-132.8	0.08	Plan	LR
Totals	73.6	63.8			60.3	-220.4	-29.0	-30,536.3	25.88		

*Red = Redevelopment, Rev = Revitalization

The County depends on impervious surface removal to meet our restoration goals. Please refer to PLRC_SOP_RT-015.01 for protocols on how impervious removal is conducted and how pollutant load calculations are performed in Baltimore County. Table 10-54 shows impervious removal projects and pollutant removal through June 30, 2013. Table 10-55 shows impervious removal projects and pollutant removal and impervious acres equivalent for FY2014 and FY2015 and

Table 10-56 shows impervious removal projects and pollutant removal and impervious acres equivalent for FY2016.

Table 10-54: Impervious Removal Projects Pollutant Reductions Through FY13 by Watershed

Watershed	Imp Acres Removed by Type			Pollutant Reductions (lbs)			Imp Acres Equivalent
	NEWD	REDE	REST	N	P	SED	
Loch Raven Reservoir	0	0.30	0	1.76	0.37	418.09	0.23
Bird River	0.19	0	0	0.62	0.23	103.48	0.14
Jones Falls	0.01	0.37	0	2.21	0.46	317.73	0.29
Baltimore Harbor	0	0.06	0	0.19	0.07	35.02	0.05
Totals	0.20	0.73	0	4.78	1.13	874.32	0.70

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Table 10-55: Impervious Removal Projects Pollutant Reductions FY14 & 15 by Watershed

Watershed	Imp Acres Removed by Type			Pollutant Reductions (lbs)			Imp Acres Equivalent
	NEWD	REDE	REST	N	P	SED	
Loch Raven Reservoir	0	0	1.21	7.03	1.46	1,670.85	0.91
Patapsco River	0.04	0	0	0.19	0.04	53.67	0.03
Totals	0.04	0	1.21	7.22	1.5	1,724.52	0.94

Table 10-56: Impervious Removal Projects Pollutant Reductions FY16 by Watershed

Watershed	Imp Acres Removed by Type			Pollutant Reductions (lbs)			Imp Acres Equivalent
	NEWD	REDE	REST	N	P	SED	
Prettyboy Reservoir	0	0	0.14	0.81	0.17	198.76	0.11
Loch Raven Reservoir	0.13	1.98	1.56	21.29	4.43	5,061.11	2.75
Bird River	0.18	0	0	0.60	0.22	100.60	0.14
Gwynns Falls	0	0.20	0	1.13	0.24	346.42	0.15
Jones Falls	0.03	0	0	0.17	0.04	25.08	0.02
Back River	0	0	0.97	3.14	1.16	465.93	0.73
Totals	0.34	2.18	2.67	27.14	6.26	6,197.9	3.89

10.4.5 Restoration Summary

The information on the pollutant load reductions and the impervious surface credits is summarized in the section by watershed. This will provide a convenient reference for the following sections on meeting the impervious surface restoration requirements and the load reductions associated with the nutrient and sediment TMDLs.

In order to provide tracking for the current permit and the 2-year milestones, data on pollutant removal and impervious surface restoration credits are presented below in three separate tables, Table 10-57 for progress through FY2013, Table 10-58 for projects completed in FY2014 and FY2015, and Table 10-59 for projects completed in FY2016. Subsequent reports will provide additional tables to summarize the pollutant load reductions and impervious surface credits for each successive fiscal year.

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Table 10-57: Progress Made in Pollutant Load Reductions and Impervious Area Treated Through FY13

Deer Creek Watershed Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All WR Projects	0.0	0.0	0.0	0.0
Growing Home Campaign	5.7	0.2	133.3	0.2
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Cool Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	1.6	0.0	36.9	0.1
BC Rain Barrel Sale	0.1	0.0	22.2	0.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress through FY13	7.4	0.2	192.4	0.3
Prettyboy Watershed Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All WR Projects	0.0	0.0	0.0	0.0
Growing Home Campaign	4.6	0.1	77.2	0.2
EPS Rural Reforestation	120.7	5.0	3,272.6	4.4
Cool Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	166.9	5.7	4,825.0	5.8
EPS Big Tree Sale	3.2	0.1	53.4	0.1
BC Rain Barrel Sale	1.0	0.1	113.8	0.1
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress through FY13	296.4	11.0	8,342.0	10.6
Loch Raven Watershed Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	1,665.0	1,510.0	996,336.0	222.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	359.5	31.6	39,594.0	15.5
Growing Home Campaign	91.9	2.7	1,637.8	4.0
EPS Rural Residential Reforestation	146.3	4.6	3,657.9	5.7
Cool Trees	3.8	0.1	67.2	0.2
Watershed Association Projects	649.2	21.2	11,788.4	24.2
EPS Big Tree Sale	60.6	1.8	1,079.9	2.6
BC Rain Barrel Sale	15.9	1.6	1,830.0	0.9
Redevelopment/Revitalization	171.5	13.5	18,388.0	
Impervious Removal Projects	1.76	0.37	418.1	0.2
Septic Connections	1.6	na	na	0.4
Septic Denitrification	9.3	na	na	1.8
Restoration Progress through FY13	3,176.4	1,587.5	1,074,797.3	277.5

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Lower Gunpowder Falls Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	1,881.2	1,706.0	1,125,680.2	250.8
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	34.6	1.0	745.8	1.5
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	5.6	0.2	121.2	0.2
Watershed Association Projects	227.5	7.7	9,420.5	8.6
EPS Big Tree Sale	4.0	0.1	85.2	0.2
BC Rain Barrel Sale	12.1	1.2	1,694.8	0.7
Redevelopment/Revitalization	0.0	0.0	0.0	
Septic Denitrification	48.2	na	na	2.9
Restoration Progress through FY13	2,213.2	1,716.2	1,137,747.7	264.9
Little Gunpowder Watershed Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	15.7	0.5	343.2	0.7
EPS Community Reforestation Program	111.9	3.3	2,442.7	4.8
Watershed Association Projects	0.4	0.0	18.6	0.0
EPS Big Tree Sale	4.0	0.1	85.2	0.2
BC Rain Barrel Sale	2.3	0.2	349.8	0.1
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Septic Denitrification	8.7	na	na	0.5
Restoration Progress through FY13	143.0	4.1	3,239.5	6.3
Bird River Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	1,912.5	1,734.0	1,144,440.0	255.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	661.1	96.6	50,274.1	55.9
Growing Home Campaign	15.4	0.8	203.5	1.2
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	3.7	0.2	48.9	0.3
Watershed Association Projects	0.4	0.0	6.1	0.0
EPS Big Tree Sale	1.7	0.1	22.5	0.1
BC Rain Barrel Sale	5.2	0.9	424.6	0.5
Redevelopment/Revitalization	28.6	1.9	2,632.0	
Impervious Removal Projects	0.6	0.2	103.5	0.1
Septic Connections	53.9	na	na	2.7
Septic Denitrification	62.9	na	na	1.8
Restoration Progress through FY13	2,746.0	1,834.7	1,198,155.2	317.6

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Gunpowder River Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	20.5	13.5	56,160.0	5.6
SWM Retrofit/Conversions	148.0	22.2	13,663.2	17.2
Growing Home Campaign	6.2	0.3	104.9	0.5
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	0.9	0.1	15.3	0.1
Watershed Association Projects	42.1	2.1	713.4	3.3
EPS Big Tree Sale	0.3	0.0	4.8	0.0
BC Rain Barrel Sale	0.6	0.1	57.1	0.1
Redevelopment/Revitalization	0.0	0.0	0.0	
Septic Denitrification	27.1	na	na	0.8
Restoration Progress through FY13	245.7	38.3	70,718.7	27.6
Middle River Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	75.0	68.0	15,130.0	10.0
Shoreline Erosion Control	2,088.2	1,373.0	5,721,116.0	197.6
SWM Retrofit/Conversions	465.3	65.9	37,317.8	52.0
Growing Home Campaign	9.9	0.5	144.9	0.8
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	0.8	0.0	11.4	0.1
Watershed Association Projects	1.3	0.2	120.7	0.2
EPS Big Tree Sale	0.8	0.0	12.1	0.1
BC Rain Barrel Sale	1.4	0.3	132.4	0.1
Redevelopment/Revitalization	0.0	0.0	0.0	
Septic Connections	49.3	na	na	1.2
Restoration Progress through FY13	2,692.0	1,507.9	5,777,985.3	262.1
Liberty Reservoir Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	3.4	0.1	63.2	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Cool Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	1.1	0.0	19.4	0.1
EPS Big Tree Sale	1.5	0.0	27.5	0.1
BC Rain Barrel Sale	0.3	0.0	39.4	0.0
Redevelopment/Revitalization	0.0	0.0	0.0	
Septic Denitrification	0.0	na	na	0.3
Restoration Progress through FY13	6.3	0.1	149.5	0.6

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Patapsco River Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	236.3	214.2	141,372.0	31.5
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	61.0	5.1	6,205.9	1.0
Growing Home Campaign	16.8	0.5	290.7	0.9
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	15.4	0.5	265.5	0.8
Watershed Association Projects	45.5	1.7	1,837.0	2.2
EPS Big Tree Sale	3.2	0.1	55.3	0.2
BC Rain Barrel Sale	6.4	0.7	851.6	0.4
Redevelopment/Revitalization	114.6	11.4	19,866.0	
Septic Connections	19.7	na	na	1.6
Restoration Progress through FY13	518.9	234.2	170,744.0	38.6
Gwynns Falls Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	208.9	189.4	124,990.8	27.9
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	677.6	59.0	94,457.8	38.6
Growing Home Campaign	20.3	0.6	460.0	0.9
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	15.6	0.5	352.9	0.7
Watershed Association Projects	93.8	3.1	3,247.3	3.7
EPS Big Tree Sale	1.7	0.0	37.7	0.1
BC Rain Barrel Sale	5.3	0.5	781.7	0.3
Redevelopment/Revitalization	66.9	4.4	6228.0	
Septic Connections	3.5	na	na	0.4
Restoration Progress through FY13	1,093.6	257.4	230,556.2	72.6
Jones Falls Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	753.9	683.4	451,044.0	100.5
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	664.9	60.8	44,962.5	36.9
Growing Home Campaign	40.5	1.2	473.0	1.8
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	1.7	0.0	19.5	0.1
Watershed Association Projects	224.2	8.5	4,767.7	9.7
EPS Big Tree Sale	18.6	0.6	217.5	0.8
BC Rain Barrel Sale	7.4	0.8	512.3	0.4
Redevelopment/Revitalization	53.0	1.3	1,077.0	
Impervious Removal Projects	2.2	0.5	317.7	0.3
Septic Connections	3.8	na	na	2.8
Septic Denitrification	1.3	na	na	0.5
Restoration Progress through FY13	1,771.5	757.1	503,391.2	153.8

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Back River Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	771.1	699.1	461,411.3	102.8
Shoreline Management	3,226.3	2,121.4	8,839,413.6	473.6
SWM Retrofit/Conversions	929.9	134.5	62,708.8	89.3
Growing Home Campaign	22.8	1.1	245.3	1.8
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	6.2	0.3	66.8	0.5
Watershed Association Projects	95.3	7.4	1,404.3	16.2
EPS Big Tree Sale	1.7	0.1	18.3	0.1
BC Rain Barrel Sale	11.4	2.0	826.6	1.2
Redevelopment/Revitalization	7.9	2.3	194.0	
Septic Connections	332.1	na	na	8.2
Septic Denitrification	8.7	na	na	0.3
Restoration Progress through FY13	5,413.4	2,968.2	9,366,289.0	694.0
Baltimore Harbor Through FY13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	1,235.0	822.8	3,411,709.0	388.5
SWM Retrofit/Conversions	1,257.1	235.4	130,411.1	201.0
Growing Home Campaign	5.3	0.3	66.1	0.4
EPS Rural Reforestation	0.0	0.0	0.0	0.0
Cool Trees	9.3	0.5	116.9	0.7
Watershed Association Projects	15.5	0.9	332.2	1.1
EPS Big Tree Sale	5.2	0.3	65.5	0.4
BC Rain Barrel Sale	2.6	0.5	227.4	0.3
Redevelopment/Revitalization	7.4	1.0	479.0	
Impervious Removal Projects	0.2	0.1	35.0	0.1
Restoration Progress through FY13	2,537.6	1,061.8	3,543,442.2	592.5

Table 10-58: Progress Made in Pollutant Load Reductions and Impervious Area Treated – July 1, 2013 through June 30, 2015 (FY14& FY15)

Restoration In Deer Creek Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	1.2	0.0	28.7	0.1
BC Rain Barrel Sale	0.1	0.0	16.6	0.0
Septic Connections	0.0	0.0	0.0	0.0
Septic Denitrification Systems	0.0	0.0	0.0	0.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress FY14&15	1.3	0.0	45.3	0.1

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Restoration In Prettyboy Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	30.7	0.9	519.6	1.3
Watershed Association Projects	36.6	1.1	619.1	1.6
EPS Big Tree Sale	1.1	0.0	17.8	0.0
BC Rain Barrel Sale	0.2	0.0	25.1	0.0
Septic Connections	0.0	0.0	0.0	0.0
Septic Denitrification Systems	0.0	0.0	0.0	0.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress FY14&15	68.6	2.0	1,181.6	2.9
Restoration In Loch Raven Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	120.0	108.8	71,808.0	16.5
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	112.2	9.7	8,936.5	10.0
EPS Community Reforestation Program	582.5	17.8	10,769.7	24.1
Watershed Association Projects	192.4	6.1	3,051.8	7.6
EPS Big Tree Sale	50.3	1.5	897.0	2.2
BC Rain Barrel Sale	4.4	0.4	591.0	0.2
Septic Connections	2.7	na	na	0.4
Septic Denitrification Systems	13.3	na	na	2.9
Redevelopment/Revitalization	49.7	3.6	5,375.5	5.6
DPW Projects	2.1	0.1	121.3	1.3
Impervious Removal Projects	7.0	1.5	1,670.9	0.9
Restoration Progress FY14&15	1,136.6	149.5	103,221.7	71.7
Restoration In Lower Gunpowder Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	225.0	204.0	134,640.0	30.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	281.3	20.4	28,514.1	19.7
EPS Community Reforestation Program	35.2	1.1	1,137.8	1.3
Watershed Association Projects	3.4	0.1	96.4	0.1
EPS Big Tree Sale	7.0	0.2	149.5	0.3
BC Rain Barrel Sale	4.8	0.5	599.8	0.3
Septic Connections	5.5	na	na	0.4
Septic Denitrification Systems	54.1	na	na	2.9
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress FY14&15	616.3	226.3	165,137.6	55.0

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads

Restoration In Little Gunpowder Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	4.1	0.1	89.0	0.2
EPS Big Tree Sale	4.9	0.1	107.3	0.2
BC Rain Barrel Sale	0.9	0.1	122.5	0.1
Septic Connections	0.0	0.0	0.0	0.0
Septic Denitrification Systems	13.4	na	na	1.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress FY14&15	23.3	0.3	318.8	1.5
Restoration In Bird River Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	61.8	9.9	2,148.4	11.9
EPS Community Reforestation Program	24.8	1.2	329.0	1.9
Watershed Association Projects	11.2	0.6	191.3	0.9
EPS Big Tree Sale	3.0	0.1	11.6	0.3
BC Rain Barrel Sale	2.2	0.4	178.3	0.2
Septic Connections	152.7	na	na	9.4
Septic Denitrification Systems	50.6	na	na	1.6
Redevelopment/Revitalization	5.8	0.6	871.0	0.6
Restoration Progress FY14&15	312.1	12.8	3,729.6	26.8
Restoration In Gunpowder River Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	7.0	1.6	343.0	2.9
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	10.9	0.6	194.9	0.9
EPS Big Tree Sale	1.1	0.1	19.4	0.1
BC Rain Barrel Sale	0.7	0.1	102.1	0.0
Septic Connections	32.9	na	na	0.8
Septic Denitrification Systems	0.0	0.0	0.0	0.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress FY14&15	52.6	2.4	659.4	4.7

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Restoration In Middle River Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	17.7	2.8	538.7	3.0
EPS Community Reforestation Program	62.2	3.1	913.7	4.9
Watershed Association Projects	12.4	0.9	368.3	1.2
EPS Big Tree Sale	1.2	0.0	18.6	0.1
BC Rain Barrel Sale	0.6	0.1	70.2	0.0
Septic Connections	32.9	na	na	0.8
Septic Denitrification Systems	0.0	na	na	0.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Restoration Progress FY14&15	127.0	6.9	1,909.5	10.0
Restoration In Liberty Reservoir Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	6.5	0.2	200.3	0.2
Watershed Association Projects	0.2	0.0	3.2	0.6
EPS Big Tree Sale	1.8	0.0	37.9	0.0
BC Rain Barrel Sale	0.1	0.0	11.3	0.0
Septic Connections	0.0	0.0	0.0	0.0
Septic Denitrification Systems	0.0	0.0	0.0	0.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	14.8	0.8	851.8	1.1
Restoration Progress FY14&15	23.4	1.0	1,104.5	1.9
Restoration In Patapsco River Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	17.5	0.6	739.5	0.7
Watershed Association Projects	4.3	0.1	77.3	0.2
EPS Big Tree Sale	7.1	0.2	122.6	0.3
BC Rain Barrel Sale	3.2	0.4	388.6	0.3
Septic Connections	3.3	na	na	0.4
Septic Denitrification Systems	24.6	na	na	2.1
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
Impervious Removal Projects	0.2	0.0	53.7	0.0
Restoration Progress FY14&15	60.2	1.3	1,381.7	4.0

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Restoration In Gwynns Falls Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	148.0	134.2	88,548.2	19.7
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	100.3	8.3	9,599.3	5.0
EPS Community Reforestation Program	12.5	0.4	281.5	0.5
Watershed Association Projects	12.4	0.4	288.8	0.5
EPS Big Tree Sale	4.5	0.2	101.1	0.2
BC Rain Barrel Sale	3.2	0.4	435.3	0.2
Septic Connections	8.3	na	na	1.6
Septic Denitrification Systems	0.0	na	na	0.0
Redevelopment/Revitalization	133.8	9.4	13,433.0	12.5
DPW Projects	19.5	1.9	2,754.1	0.7
Restoration Progress FY14&15	442.5	155.2	115,441.3	40.9
Restoration In Jones Falls Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	21.5	0.6	264.6	0.9
Watershed Association Projects	26.8	0.8	332.1	1.2
EPS Big Tree Sale	16.8	0.5	197.0	0.8
BC Rain Barrel Sale	3.0	0.3	295.2	0.2
Septic Connections	0.0	na	na	0.0
Septic Denitrification Systems	6.1	na	na	1.8
Redevelopment/Revitalization	4.1	0.4	517.0	0.3
Restoration Progress FY14&15	78.3	2.6	1,605.9	5.2
Restoration In Back River Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	114.2	103.6	23,043.0	15.2
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	50.2	9.1	1,232.3	10.5
EPS Community Reforestation Program	8.1	2.0	209.1	0.5
Watershed Association Projects	20.5	1.1	252.7	1.6
EPS Big Tree Sale	3.8	0.2	41.2	0.3
BC Rain Barrel Sale	4.5	0.8	324.3	0.5
Septic Connections	15.8	na	na	0.4
Septic Denitrification Systems	13.9	na	na	0.5
Redevelopment/Revitalization	2.9	0.3	198.0	0.5
DPW Projects	6.7	1.0	405.9	1.9
Restoration Progress FY14&15	240.6	118.1	25,706.5	31.9

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Restoration In Baltimore Harbor Watershed FY14&15				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	39.5	2.3	1,136.8	2.4
Watershed Association Projects	27.9	1.8	633.5	2.1
EPS Big Tree Sale	6.8	0.3	85.7	0.6
BC Rain Barrel Sale	0.9	0.2	74.6	0.1
Septic Connections	1,709.8	na	na	40.6
Septic Denitrification Systems	0.0	na	na	0.0
Redevelopment/Revitalization	6.0	1.8	886.0	1.6
DPW Projects	6.4	0.4	189.1	1.0
Restoration Progress FY14&15	1,797.3	6.8	3,005.7	48.4

Table 10-59: Progress Made in Pollutant Load Reductions and Impervious Area Treated – July 1, 2015 through June 30, 2016 (FY16)

Restoration In Deer Creek Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.0	0.0	5.5	0.0
Street Sweeping	0.0	0.0	0.0	0.0
Inlet Cleaning	0.9	0.4	108.0	0.1
Septic Connections	0.0	na	na	0.0
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	11.5	na	na	1.7
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	12.4	0.4	113.5	1.8

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Restoration In Prettyboy Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	102.2	3.2	2,103.4	24.3
Watershed Association Projects	20.2	0.6	341.5	0.9
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.0	0.0	0.0	0.0
Street Sweeping	0.0	0.0	0.0	0.0
Inlet Cleaning	0.0	0.0	0.0	0.0
Septic Connections	0.0	na	na	0.0
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	2.4	na	na	3.7
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	1.8	0.2	187.8	1.0
Impervious Removal Projects	0.8	0.2	198.8	0.1
Restoration Progress FY16	127.4	4.2	2,831.5	30.0
Restoration in the Loch Raven Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	145.3	4.5	3,258.6	5.9
Watershed Association Projects	28.5	0.9	673.2	2.2
EPS Big Tree Sale	14.1	0.4	251.6	0.6
BC Rain Barrel Sale	2.4	0.2	271.4	0.1
Street Sweeping	656.8	262.7	78,810.7	52.5
Inlet Cleaning	6.8	2.7	819.8	0.6
Septic Connections	9.6	na	na	1.6
Septic Denitrification Systems	11.6	na	na	2.6
Septic Pumpouts	168.0	na	na	52.1
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	5.7	0.6	554.0	1.2
Impervious Removal Projects	21.3	4.4	5,061.1	2.8
Restoration Progress FY16	1,070.1	276.4	89,700.4	122.2

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Restoration in the Lower Gunpowder Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	46.6	3.7	3,863.8	3.9
EPS Community Reforestation Program	56.5	1.9	2,279.4	1.9
Watershed Association Projects	0.9	0.0	22.0	1.1
EPS Big Tree Sale	4.7	0.1	102.2	0.2
BC Rain Barrel Sale	1.3	0.1	180.0	0.1
Street Sweeping	302.7	121.1	36,318.7	24.2
Inlet Cleaning	9.7	3.9	1,165.2	0.8
Septic Connections	36.5	na	na	2.3
Septic Denitrification Systems	23.6	na	na	1.6
Septic Pumpouts	107.1	na	na	9.3
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	589.6	130.8	43,931.3	45.4
Restoration in the Little Gunpowder Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	1.0	0.0	21.1	0.0
BC Rain Barrel Sale	0.3	0.0	49.2	0.0
Street Sweeping	50.1	20.1	6,015.1	4.0
Inlet Cleaning	4.7	1.9	567.7	0.4
Septic Connections	0.0	na	na	0.0
Septic Denitrification Systems	6.9	na	na	0.5
Septic Pumpouts	75.7	na	na	8.5
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	138.7	22.0	6,653.1	13.4

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Restoration in the Bird River Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	24.3	4.6	770.6	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	10.7	0.5	159.1	4.7
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.4	0.1	34.0	0.0
Street Sweeping	319.3	127.7	38,313.6	25.5
Inlet Cleaning	6.6	2.6	786.8	0.5
Septic Connections	84.5	na	na	5.9
Septic Denitrification Systems	3.5	na	na	0.3
Septic Pumpouts	16.9	na	na	1.2
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Impervious Removal Projects	0.6	0.2	100.6	0.1
Restoration Progress FY16	466.8	135.7	40,164.7	38.2
Restoration in the Gunpowder River Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	64.3	3.4	1,426.4	4.6
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.4	0.0	6.5	0.0
BC Rain Barrel Sale	0.1	0.0	7.9	0.0
Street Sweeping	88.5	35.4	10,618.6	7.1
Inlet Cleaning	1.3	0.5	158.8	0.1
Septic Connections	98.6	na	na	2.3
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	3.2	na	na	0.2
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	256.4	39.3	12,218.2	14.3

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All Restoration in the Middle River Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	5.8	0.3	173.3	0.3
Watershed Association Projects	1.5	0.2	102.6	10.9
EPS Big Tree Sale	0.2	0.0	2.9	0.0
BC Rain Barrel Sale	0.1	0.0	9.2	0.0
Street Sweeping	246.1	98.5	29,536.3	19.7
Inlet Cleaning	6.6	2.6	786.8	0.5
Septic Connections	82.2	na	na	2.0
Septic Denitrification Systems	9.0	na	na	0.3
Septic Pumpouts	2.9	na	na	0.2
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	354.4	101.6	30,611.1	33.9
All Restoration in the Liberty Reservoir Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	108.1	3.3	2,224.1	4.5
Watershed Association Projects	0.3	0.0	4.9	0.0
EPS Big Tree Sale	1.6	0.1	29.2	0.1
BC Rain Barrel Sale	0.1	0.0	17.5	0.0
Street Sweeping	5.0	2.0	604.9	0.4
Inlet Cleaning	2.7	1.1	317.6	0.2
Septic Connections	0.0	na	na	0.4
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	0.0	na	na	5.9
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	117.8	6.5	3,198.2	11.5

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All Restoration in the Lower North Branch Patapsco Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	89.0	7.3	10,663.7	7.4
EPS Community Reforestation Program	108.1	3.3	2,224.1	4.5
Watershed Association Projects	4.0	0.1	83.7	0.2
EPS Big Tree Sale	3.3	0.1	56.5	0.2
BC Rain Barrel Sale	1.1	0.1	143.3	0.1
Street Sweeping	190.9	76.3	22,904.7	15.3
Inlet Cleaning	22.6	9.0	2,707.6	1.8
Septic Connections	18.6	na	na	2.0
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	47.5	na	na	7.2
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	485.1	96.2	38,783.6	38.7
Restoration in the Gwynns Falls Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	426.0	41.0	40,549.1	25.1
EPS Community Reforestation Program	13.1	0.5	695.3	0.4
Watershed Association Projects	14.8	0.4	340.4	1.0
EPS Big Tree Sale	2.0	0.1	45.6	0.1
BC Rain Barrel Sale	1.6	0.2	243.0	0.1
Street Sweeping	473.3	189.3	56,798.8	37.9
Inlet Cleaning	35.0	14.0	4,194.6	2.8
Septic Connections	34.6	na	na	4.7
Septic Denitrification Systems	1.1	na	na	0.3
Septic Pumpouts	25.8	na	na	6.0
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Impervious Removal Projects	1.1	0.2	346.4	0.2
Restoration Progress FY16	1,028.4	245.7	103,213.2	78.6

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Restoration in the Jones Falls Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	3.2	0.1	45.2	0.1
Watershed Association Projects	12.3	0.4	152.2	1.2
EPS Big Tree Sale	2.5	0.1	28.7	0.1
BC Rain Barrel Sale	1.4	0.1	99.5	0.1
Street Sweeping	282.2	112.9	33,858.6	22.6
Inlet Cleaning	16.9	6.8	2,024.3	1.4
Septic Connections	8.4	na	na	2.3
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	37.5	na	na	15.8
Redevelopment/Revitalization	11.2	1.1	924.9	1.9
DPW Projects	0.0	0.0	0.0	0.0
Impervious Removal Projects	0.2	0.0	25.1	0.0
Restoration Progress FY16	375.8	121.5	37,158.5	45.5
Restoration in the Back River Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	129.1	16.8	4,210.8	19.4
EPS Community Reforestation Program	11.5	0.6	123.2	0.9
Watershed Association Projects	24.5	1.3	309.3	7.0
EPS Big Tree Sale	2.9	0.1	31.3	0.2
BC Rain Barrel Sale	1.0	0.2	68.9	0.1
Street Sweeping	1,022.3	408.9	122,678.2	81.8
Inlet Cleaning	65.5	26.2	7,864.8	5.2
Septic Connections	79.1	na	na	2.3
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	16.9	na	na	1.1
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Impervious Removal Projects	3.1	1.2	465.9	0.7
Restoration Progress FY16	1,355.9	455.3	135,752.4	118.7

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Restoration in the Baltimore Harbor Watershed FY16				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Management	23.8	21.6	43,429.0	12.7
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	12.9	0.6	171.5	3.1
EPS Big Tree Sale	0.8	0.0	9.8	0.1
BC Rain Barrel Sale	0.3	0.1	24.3	0.0
Street Sweeping	892.0	356.8	107,042.3	71.4
Inlet Cleaning	19.0	7.6	2,283.3	1.5
Septic Connections	28.8	na	na	1.2
Septic Denitrification Systems	0.0	na	na	0.0
Septic Pumpouts	10.8	na	na	0.6
Redevelopment/Revitalization	0.0	0.0	0.0	0.0
DPW Projects	0.0	0.0	0.0	0.0
Restoration Progress FY16	988.4	386.7	152,960.2	90.6

Table 10-60 summarizes the data from Table 10-57 by watershed, while Table 10-61 summarizes the data from Table 10-58 by watershed. Table 10-62 summarizes the impervious cover treated during FY2015 by watershed.

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Table 10-60: Pollutant load Reductions and Impervious Area Treated by Watershed Through FY2013

Watershed	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Deer Creek	7.4	0.2	192.4	0.3
Prettyboy	296.4	11.0	8,342.0	10.6
Loch Raven Reservoir	3,176.4	1,587.5	1,074,797.3	277.5
Lower Gunpowder Falls	2,213.2	1,716.2	1,137,747.7	264.9
Little Gunpowder Falls	143.0	4.1	3,239.5	6.3
Bird River	2,746.0	1,834.7	1,198,155.2	317.6
Gunpowder River	245.7	38.3	70,718.7	27.6
Middle River	2,692.0	1,507.9	5,777,985.3	262.1
Liberty Reservoir	6.3	0.1	149.5	0.6
Patapsco River	518.9	234.2	170,744.0	38.6
Gwynns Falls	1,093.6	257.4	230,556.2	72.6
Jones Falls	1,771.5	757.1	503,391.2	153.8
Back River	5,413.4	2,968.2	9,366,289.0	694.0
Baltimore Harbor	2,537.6	1,061.8	3,543,442.2	592.5
Restoration Progress through FY2013	22,861.4	11,978.7	23,085,750.2	2,719.0

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**Table 10-61: Pollutant load Reductions and Impervious Area Treated by Watershed FY14-FY15**

Watershed	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Deer Creek	1.3	0	45.3	0
Prettyboy	68.6	2.0	1,181.6	2.9
Loch Raven Reservoir	1,136.6	149.5	103,221.7	71.7
Lower Gunpowder Falls	616.3	226.3	165,137.6	55.0
Little Gunpowder Falls	23.3	0.3	318.8	1.5
Bird River	312.1	12.8	3,729.6	26.8
Gunpowder River	52.6	2.4	659.4	4.7
Middle River	127.0	6.9	1,909.5	10.0
Liberty Reservoir	23.4	1.0	1,104.5	1.9
Patapsco River	60.2	1.3	1,381.7	4.0
Gwynns Falls	442.5	155.2	115,441.3	40.9
Jones Falls	78.3	2.6	1,605.9	5.2
Back River	239.0	118.0	25,679.5	27.0
Baltimore Harbor	1,797.3	6.8	3,005.7	48.4
Total FY2014-15	4,978.5	685.1	424,422.1	300.1

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**Table 10-62: Pollutant load Reductions and Impervious Area Treated by Watershed FY2016**

Watershed	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Deer Creek	12.4	0.4	113.5	1.8
Prettyboy	127.4	4.2	2,831.5	30.0
Loch Raven Reservoir	1,070.1	276.4	89,700.4	122.2
Lower Gunpowder Falls	589.6	130.8	43,931.3	45.4
Little Gunpowder Falls	138.7	22.0	6,653.1	13.4
Bird River	466.8	135.7	40,164.7	38.2
Gunpowder River	256.4	39.3	12,218.2	14.3
Middle River	354.4	101.6	30,611.1	33.9
Liberty Reservoir	117.8	6.5	3,198.2	11.5
Patapsco River	485.1	96.2	38,783.6	38.7
Gwynns Falls	1,028.4	245.7	103,213.2	78.6
Jones Falls	375.8	121.5	37,158.5	45.5
Back River	1,355.9	455.3	135,752.4	118.7
Baltimore Harbor	988.4	386.7	152,960.2	90.6
Total FY2016	7,367.2	2,022.3	697,289.9	682.8

10.5 Progress in Meeting Impervious Surface Restoration Requirements

The amount of impervious cover that needs to be addressed in Baltimore County was calculated based on the guidelines provided in the document *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated (MDE, 2014)*. In order to assure consistency between MS4 regulated jurisdictions MDE has determined that the base year of 2002 impervious cover be used to determine how many acres of impervious cover will need to be addressed. The implementation of the MDE 2000 Stormwater Design Manual was initiated in 2002 by local jurisdictions. The revised Design Manual required management of the 1st inch of runoff for quantity control and included groundwater recharge volume and water quality volume reductions. Chapter 5 of the manual included many Environmental Site Design (ESD) practices that are now required for new development and redevelopment projects. MDE considers that any approvals of stormwater plans for development approved in 2002 and thereafter will meet the highest required stormwater management requirements.

Baltimore County did not have an impervious surface area (ISA) delineated specifically for 2002 as a starting point. The County had to compile an impervious surface from previous years and county permits in order to create the 2002 ISA baseline. Planimetric data including roads and building footprints were compiled for the years 1996, 1997, and 2001 into one surface. Using the Counties permit data, 2003 aerial photography, and the Counties ISA from 2005, the new surface

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layer was refined by adding or subtracting impervious area based on the permit data and verified by the 2005 ISA and the 2003 photography.

Not all impervious surface areas fall under the jurisdiction of the county. Impervious areas which the County is not responsible for are areas associated with land that is owned and managed by the State of Maryland, Federal government, and the City of Baltimore. In addition to these areas, agricultural lands and its associated impervious surface do not fall under the counties responsibility. It was necessary to determine the amount of impervious controlled by each sector listed above and subtract that amount of impervious cover from the total impervious cover in the county. The detail of the calculations will be described in the Baltimore County Impervious Cover Analysis that will be submitted to MDE once the final quality assurance/quality control is completed and the Baltimore County NPDES – MS4 permit is re-issued. The results of the analysis are presented in Table 10-63.

Table 10-63: Baltimore County Impervious Area by Watershed – Calculated for 2002

Watershed	Total Imp. Cover	Ag Imp. Cover	Federal Imp. Cover	State Imp. Cover	City Imp. Cover	SWM Imp. Cover	County Imp. Cover
Deer Creek	166.2	49.8	0.0	25.3	0.0	0.0	91.1
Prettyboy Reservoir	460.7	121.3	0.0	26.6	2.9	0.0	309.9
Loch Raven Reservoir	6257.1	588.8	5.1	643.7	25.1	55.5	4939.0
Lower Gunpowder Falls	2277.2	139.0	0.0	207.8	1.7	33.3	1895.3
Little Gunpowder Falls	614.8	80.8	0.0	95.3	0.0	4.2	434.5
Bird River	2508.9	32.4	0.0	289.8	6.2	123.6	2057.0
Gunpowder River	359.8	12.4	0.0	35.4	0.0	9.8	302.2
Middle River	1328.9	3.9	0.0	287.6	0.0	9.2	1028.2
Upper Western Shore	13973.6	1028.4	5.1	1611.5	35.9	235.5	11057.2
Liberty Reservoir	524.4	38.4	0.0	117.8	20.1	0.5	347.6
Patapsco River	4112.8	29.8	18.6	691.1	2.1	51.3	3320.0
Gwynns Falls	6138.5	0.7	80.4	729.7	0.9	73.6	5253.2
Jones Falls	3508.8	28.8	3.6	495.8	3.3	30.9	2946.4
Back River	5526.0	9.2	3.3	617.0	5.6	95.8	4795.0
Baltimore Harbor	3000.8	0.0	0.6	355.6	0.0	3.1	2641.6
Patapsco/ Back River Totals	22811.3	106.9	106.5	3006.9	32.1	255.1	19303.8
County-Wide Totals	36784.9	1135.3	111.6	4618.3	68.0	490.6	30361.0
% of Total Imp. Cover		3.1	0.3	12.6	0.2	1.3	82.5

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To meet the current NPDES permit requirement Baltimore County must provide restoration for impervious land areas that are equal to or greater than 20% of the County's urban impervious cover. Twenty percent of 30,361. acres is 6,072 acres.

Using the guidance provided by *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (MDE, August 2014) the impervious area treated was calculated for each restoration program. The results are presented in Table 10-57 for progress made through fiscal year 2013, along with the pound of nitrogen, phosphorus and sediment reduced, by watershed, by restoration program. The same information is presented in Table 10-58 for fiscal year 2014 (July 1, 2013 – June 30, 2014). Note that programs that receive only annual credit are presented in table that summarizes the most recent reporting year, in this case FY2016 Table 10-59.

Table 10-64 shows that Baltimore County has addressed 3,701.9 acres of impervious surface or 12.2% of the impervious surface for which Baltimore County has responsibility through FY2016. In FY2016 the county addressed 682.8 acres of impervious surface. This includes the annual practices of street sweeping, storm drain cleaning, and OSDS pump-outs. In FY2014 & 15 300.1 acres of impervious surface were addressed, excluding the annual practices. This results in a total of 982.9 acres of impervious surface being addressed during the first three years of the MS4 permit or 16.2% of the required amount of impervious surface to be addressed (6,036 acres of impervious surface). This would indicate that the county is lagging in meeting the impervious surface restoration requirement.

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Table 10-64: Impervious Area Treated Through June 30, 2016

Watershed	20% BC Impervious Target	Through 2013	Equivalent Impervious Acres Addressed Under Current Permit				All Imp. Restoration
			FY 14&15	FY 16	Total	%	Total
Deer Creek	18.2	0.3	0.1	1.8	1.9	10.4	2.2
Prettyboy	62.0	10.6	2.9	30.0	32.9	53.1	43.5
Loch Raven Reservoir	987.8	277.5	71.7	122.2	193.9	19.6	471.4
Lower Gunpowder Falls	379.1	264.9	55.0	45.4	100.4	26.5	365.3
Little Gunpowder Falls	86.9	6.3	1.5	13.4	14.9	17.1	21.2
Bird River	411.4	317.6	26.8	38.2	65.0	15.8	382.6
Gunpowder River	60.4	27.6	4.7	14.3	19.0	31.4	46.6
Middle River	205.6	262.1	10.0	33.9	43.9	21.3	306
Liberty Reservoir	69.5	0.6	1.9	11.5	13.4	19.3	14
Patapsco River	664.0	38.6	4.0	38.7	42.7	6.4	81.3
Gwynns Falls	1050.6	72.6	40.9	78.6	119.5	11.4	192.1
Jones Falls	589.3	153.8	5.2	45.5	50.7	8.6	204.5
Back River	959.0	694.0	27.0	118.7	145.7	15.2	839.7
Baltimore Harbor	528.3	592.5	48.4	90.6	139.0	26.3	731.5
Restoration Progress through June 30, 2015	6,036.0	2,719.0	300.1	682.8	982.9	16.2	3,701.9

10.6 Progress in Meeting Local TMDLs and the Chesapeake Bay TMDL*10.6.1 Local TMDLs*

The local TMDL Implementation Plans have now been developed and were submitted to MDE for review and approval with the 2014 annual report. A May 29th, 2015 letter included comments on not only the 2014 annual report, but also the 22 TMDL Implementation Plans submitted with the 2014 annual report. The comments were derived from the review of the plans by both the Water Management Administration and the Science Services Administration. Responses to these comments are provided separately. Revised TMDL Implementation Plans are submitted with this report as appropriate.

Starting with this report we will detail the progress made in meeting the load reductions and interim milestones for each of the local TMDLs. The local TMDL progress reporting will be grouped by broad pollutant type; bacteria (Section 10.6.1.1), nutrients and sediment (Section 10.6.1.2), and toxics (Section 10.6.1.3). The Trash TMDL Implementation Plan is being

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submitted to MDE for review and approval with this annual report. Future annual reports will report on progress in trash load reductions, however, the reporting will be in Section 6 which covers the trash and litter programs.

10.6.1.1 Bacteria TMDLs

Seven watersheds have Bacteria TMDLs (Prettyboy Reservoir, Loch Raven Reservoir, Liberty Reservoir, Lower North Branch of the Patapsco River, Gwynns Falls, Jones Falls, and Back River (only the Herring Run portion). The initial focus of each the Bacteria TMDL Implementation Plan is to provide monitoring for better resolution of subwatersheds with high bacteria counts, to continue monitoring at the Bacteria Trend Monitoring sites, to continue to implement the requirements of the sanitary sewer Consent Decree, and to develop education and outreach for pet waste bacteria sources. The bacteria monitoring is detailed in Section 9.4.2. The County has completed the first year of the subwatershed bacteria prioritization monitoring and will conduct another round of subwatershed monitoring in 2016. The results of the 2015 subwatershed prioritization monitoring will be presented in the next report and should provide an initial assessment of where bacteria concentrations are the highest.

The progress in meeting the sanitary sewer Consent Decree in relation to the bacteria monitoring is detailed in Section 7.6.2. Currently Baltimore County has a Request for Proposals published for the development of education and outreach materials with a closing date of December 16, 2015. The expectation is that a firm(s) will be selected and have a contract executed sometime in the late winter/early spring of 2016. One of the assignments will be the development of a pet waste education and outreach program. The consultant is also tasked with assessing the effectiveness of the education and outreach program and determining pollutant load reductions as a result of implementing the pet waste education and outreach program.

The trends in the bacteria concentrations for all of the Bacteria TMDL watershed are presented in relation to sanitary sewer repairs if applicable is presented in Table 10-65. The concentrations presented are the geometric means for the seasonal (May 1st – September 30th) dry weather flow. This data was selected for presentation as it represents the most likely condition under which human recreational contact will occur. Most people will not enter the streams during the colder months nor during times of high water flow as occurs during and immediately after storm events. Section 9 presents the monitoring data for each site under all flow conditions.

Table 10-65: Seasonal Dry Weather Results and Sanitary Sewer System Repairs

Station	Geometric Mean (MPN)			Sanitary Sewer Project Status		2020 Reduction Target	% Change Relative to MDE Geometric Mean	
	MDE	2010-2015	2015	Completed	Future		2010-2014	2014
PRE-1	287	322	331	NA	NA	247	+12.2%	+15.3%
PRE-2	134	154	167	NA	NA	132	+14.9%	+24.6%
PRE-3	751	253	283	NA	NA	595	-66.3%	-62.3%

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Station	Geometric Mean (MPN)			Sanitary Sewer Project Status		2020 Reduction Target	% Change Relative to MDE Geometric Mean	
	MDE	2010-2015	2015	Completed	Future		2010-2014	2014
Prettyboy Downstream Subshed*	391	234	234	NA	NA	325	-40.2%	-40.2%
LOC-1	1,080	508	551	0	0	842	-53.0%	-49.0%
LOC-2	611	342	257	0	2	490	-44.0%	-57.9%
LOC-3	491	348	360	0	0*	400	-29.1%	-26.7%
LOC-4	224	227	589	0	0*	200	+1.3%	+163.0%
LOC-5	168	150	223	NA	NA	158	-10.7%	+39.9%
LOC-6	139	189	372	NA	NA	136	+36.0%	+167.6%
LOC-7	18	7	13	NA	NA	126	-16.1%	-27.8%
Loch Raven Downstream Subshed**	442	129	129	?	?	363	-17.9%	-17.9%
LIB-1!	200	116	133			NA	-42.0%	-33.5%
LIB-2!	172	122	133			NA	-29.1%	-22.7%
LIB-3!	607	485	629			NA	-17.8%	+3.3%
LIB-4!	278	147	194			NA	-47.1%	-30.2%
LIB-5!	427	290	239			NA	-32.1%	-44.0%
Liberty Downstream Subshed***	337	129	129	?	?	284	-61.7%	-61.7%
PAT-1	231	277	277	25	241	205	+20.0%	+20.0%
PAT-2	117	99	88	9	158	126	-15.4%	-24.8%
PAT-3	119	116	142	4	94	126	-2.5%	+19.3%
PAT-4	93	83	154	3	2	126	-10.8%	+65.6%
PAT-5	134	83	75	NA	NA	132	-38.1%	-44.0%
GWY-1	35,290	1,453	1,081	39	17	City	-95.9%	-96.9%
GWY-2	373	320	189	7	17	636	-14.2%	-49.3%

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Station	Geometric Mean (MPN)			Sanitary Sewer Project Status		2020 Reduction Target	% Change Relative to MDE Geometric Mean	
	MDE	2010-2015	2015	Completed	Future		2010-2014	2014
GWY-5	636	349	667	39	7	City	-42.1%	+4.9%
GWY-6	743	380	232	2	0	743	-48.9%	-68.8%
GF-B-8#	636	634	634	7	6	636	-0.3%	-0.3%
DR-B-10#	636	238	238	10	2	636	-62.6%	-62.6%
JON-1	372	527	161	City	City	City	+41.4%	-56.7%
JON-2	139	74	30	27	234	136	-46.8%	-78.4%
JON-3	501	376	188	2	78	407	-25.0%	-9.6%
JON-4	872	365	295	1	13	686	-56.7%	-62.5%
JON-5	2,394	278	376	City	City	City	-88.4%	-84.3%
JF-B-12	372	337	337			311	-9.4%	-9.4%
JF-B-13	372	295	295			311	-20.7%	-20.7%
HER-1	591	219	41	2	265	City	-62.9%	-93.1%
Biddle	1,920	448	356	0	2	City	-66.7%	-81.5%
Pulaski	616	281	231	2	274	City	-54.4%	-62.5%
HR-B-12		870	870			475		
HR-B-13		1,353	1,353			475		
HR-B-14		372	372			475		
HR-B-15		2,599	2,599			475		

NA – There are no Baltimore County sanitary sewer systems upstream of the monitoring site

* - The sanitary sewer rehabilitation, repair, replacement plans are not complete yet

* Sampling of subwatersheds began in 2015. The Geomean is from all of the seasonal low flow samples in all subwatersheds

** Sampling of subwatershed began in 2015. The Geomean is from all of the seasonal low flow samples in those subwatersheds below the long term trend sites.

! These sites are in Carroll County so no reduction targets have been set by Baltimore County. Data summarized in this table.

*** Sampling of subwatershed began in 2015. The Geomean is from all of the seasonal low flow samples in all subwatersheds

Only three stations of the 31 stations exhibited increases in the seasonal dry weather bacteria concentrations relative to the MDE monitoring that was used to develop the bacteria TMDLs. These three were consistent for both the average over the 5 years of monitoring and in

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comparison with the monitoring results for 2014. One station exhibited mixed results with the long term average showing a decrease relative to MDE results, but the 2014 indicated an increase. The balance of the stations (27) showed a decrease in the bacteria concentrations by varying amounts; those showing greater than a 25% decrease are highlighted in green. Six of the stations (19%) displayed a geometric mean in the 2014 data that met the water quality standard of 126 MPN for *E. coli*.

10.6.1.2 Nutrient and Sediment TMDLs

Each of the Reservoir watersheds (Prettyboy, Loch Raven, and Liberty) have TMDLs for phosphorous based on the water quality standards for chlorophyll a and hypolimnion dissolved oxygen within the reservoirs. Loch Raven and Liberty reservoirs also have TMDLs for sediment based on the rate of in-filling of the reservoirs. It should be noted that while it is worthwhile to decrease the rate of reservoir infilling in order to preserve the drinking water supply; there is no water quality standard related to the sediment infill of reservoirs.

Three additional watersheds have sediment TMDLs (Lower North Branch of the Patapsco River, and Jones Falls) based on impacts to the aquatic biological community. In addition, Baltimore Harbor has a TMDL for nutrients (both nitrogen and phosphorus) that require nutrient reductions from the Lower North Branch of the Patapsco River, Gwynns Falls, Jones Falls, and Baltimore Harbor direct drainage watersheds. Back River also has a nutrient (nitrogen and phosphorus) TMDL. A summary of the local TMDLs and percent reduction is presented in Table 10-66.

Table 10-66: TMDL Reduction Requirements for Nutrient and Sediment TMDLs

Watershed	Phosphorus		Sediment		Nitrogen	
	#s	%	#s	%	#s	%
Prettyboy	286.1	15%	NA	NA	NA	NA
Loch Raven	2,946.1	15%	716,600		NA	NA
Liberty	513.0	49%	588,000	38%	NA	NA
LNB Patapsco River	4,633		1,491,236	21.2%	13,843	
Gwynns Falls	5,938		5,539,803	36.4%	33,757	
Jones Falls	7,508		4,378,000	21.9%	14,479	
Baltimore Harbor	1,370		NA	NA	4,615	
Total Baltimore Harbor	19,449	15%	NA	NA	66,694	15%
Back River	653.3	15%	NA	NA	17,821.3	15%

The Baltimore Harbor nutrient TMDL has an overall 15% reductions for nitrogen and phosphorus from urban stormwater sources. To achieve these reductions, the restoration actions are spread over four watersheds. Since three of these watersheds have reductions associated with sediment impacts to the aquatic community and since most restoration actions that reduce sediment also reduce nitrogen and phosphorus, Baltimore County used the sediment TMDL

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Implementation Plans to determine how much nitrogen and phosphorus would be reduced and adjusted from that baseline if additional reductions were needed.

TMDL Implementation Plans were submitted for each of these TMDLs December 23, 2014 and revised Implementation Plans are being submitted with this annual report. Implementation actions to achieve these local TMDL pollutant reductions, with the exception of Liberty Reservoir, are directly applicable to meeting the Chesapeake Bay TMDL after accounting for delivery factors. Restoration actions with the Liberty Reservoir do not count toward meeting the Bay TMDL as the Watershed Model for the Bay TMDL indicates zero delivery of pollutants from within Liberty watershed to the bay based on the lack of flow over the Liberty reservoir dam.

The TMDL Implementation Plans accounted for the changes in the amount of urban load due to development, and the amount of restoration actions since the development of each TMDL and adjusted the loads based on the Chesapeake Bay Program loading rates to determine new baseline load reductions needed. These loads are reflected in Table 10-67. The new baseline date for all plans was July 1, 2013. Therefore restoration actions and other reductions that have occurred since that date can be credited toward meeting the reductions needed (ie. fiscal years 2014 - 2016). Load reductions have been summarized by watershed for Fiscal Years 2014 and 2015 in Table 10-68 and for fiscal year 2016 in Table 10-66 above. Since the timeline for meeting the reductions for nutrients and sediment were set to coincide with meeting the Bay TMDL reduction targets for nutrients and sediment in 2025, there are 11 fiscal years prior to meeting the deadline, we assumed a steady pace target rate of 9% reduction per year, therefore the target for this third year is 27%. Table 10-67 below summarized Baltimore County's progress in meeting the local nutrient and sediment TMDLs. Those watershed pollutant reductions that are at or exceed the target of 27% reduction target are highlighted in green, those that miss the target, but are close (within 5%) are highlighted in orange, while those miss the target by >5% are highlighted in red. The Liberty Reservoir TMDL Implementation Plans are on an extended timeframe, the Liberty Reservoir watershed does not contribute pollutants to the Bay. The timeframe for the Liberty Reservoir is based on 20 years with completion in 2030. Therefore the measure of progress is based on 6.5% per year. For fiscal year 2016 the target is 19.5%.

Table 10-67: Progress in Meeting the Local Nutrient and Sediment TMDLs to date

Watershed	Target Load Reduction	FY2014 & FY2015 Reductions	FY2016 Reductions	2011 Fert. Use Act	Total Reductions	% of Target
Phosphorus						
Prettyboy	286.1	2.0	4.2	106.9	113.1	39.5%
Loch Raven	2,946.1	149.5	276.4	1,644.1	2,070.0	70.3%
Liberty*	513.0	1.0	6.5	154.9	162.4	31.7%
LNB Patapsco	4,633	1.3	96.2	489.7	587.2	12.7%

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Gwynns Falls	5,938	155.2	245.7	1,082.5	1,483.4	25.0%
Jones Falls	7,508	2.6	121.5	723.2	847.3	11.3%
Baltimore Harbor	1,370	6.8	386.7	47.5	441.0	32.2%
Total Baltimore Harbor	19,449	165.9	850.1	2,713	3,729	19.2%
Back River	653.3	118.1	455.3	857.2	1,430.6	219.0%
Nitrogen						
LNB Patapsco	13,843	60.2	485.1	3,430.2	3,975.5	28.7%
Gwynns Falls	33,757	442.5	1,028.4	7,582.2	9,053.1	26.8%
Jones Falls	14,479	78.3	375.8	5,065.9	5,515.0	38.1%
Baltimore Harbor	4,615	1,909.8	988.4	1,724.2	4,622.4	100.2%
Total Baltimore Harbor	66,694	2,490.8	2,877.7	17,802	23,170.5	34.7%
Back River	17,821.3	240.6	1,355.9	3,540.4	5,136.9	28.8%
Sediment						
Loch Raven	716,600	103,221.7	89,700.4	NA	192,922	26.9%
Liberty*	588,000	1,104.5	3,198.2	NA	4,303	0.7%
LNB Patapsco	1,491,236	1,381.7	38,783.6	NA	40,165	2.7%
Gwynns Falls	5,539,803	115,441.3	129,052	NA	244,493	4.4%
Jones Falls	4,378,000	1,605.9	64,405	NA	66,011	1.5%

* The Liberty Reservoir watershed nutrient and sediment TMDLs are on a different schedule for completion, as the Liberty Reservoir watershed has no effect on restoration of the Chesapeake Bay. The target for completion of the phosphorus and sediment reductions for the Liberty Reservoir watershed is 2030. This would be an annual target of 6.25% reduction.

Phosphorus: Baltimore County is currently on target to meet the phosphorus load reductions for reservoir TMDLs. The targets for phosphorus reduction to meet the Baltimore Harbor have fallen behind, with only Baltimore Harbor watershed meeting the target reduction. The target reduction of phosphorus for Back River has been exceeded, and in fact, the TMDL for the Baltimore County portion of the urban stormwater sector has been met.

Nitrogen: Nitrogen reductions apply to the Baltimore Harbor and Back River Nutrient TMDLs. All watersheds draining to Baltimore Harbor either met or were close to meeting the nitrogen reduction targets and the reductions overall are on target to meet the TMDL. The Baltimore Harbor direct watershed, which in Baltimore County includes the subwatersheds of Bear Creek

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and Old Road Bay exceeded the target for that drainage area. This could result in greater improvements to those subwatersheds relative to Baltimore Harbor as a whole.

Sediment: For the sediment TMDLs, we are missing the targets for in the three watershed that have a sediment TMDL based on impacts to the biological community and in the Liberty Reservoir watershed for which the sediment TMDL is based on the rate of infill of the reservoir. We are close to meeting the sediment reduction target for the Loch Raven watershed, missing it by 0.1%.

It should be noted that the higher reductions in in FY 2016 relative to the combined FY14/FY15 reductions are due, in part, to the inclusion of annual practices, such as, street sweeping and inlet cleaning in the load reductions. These annual practices can vary from year to year. FY16 saw a 30% decrease in street sweeping and a 15% decrease in storm drain cleaning relative to the average for FY14/FY15. This results in a decrease in the pollutant load reductions and the impervious surface credits.

10.6.1.3 Toxics TMDLs

Toxic local TMDLs include mercury (Prettyboy and Loch Raven Watersheds), chlordane (Back River and Baltimore Harbor) and PCBs (Back River, Baltimore Harbor, and Jones Falls (Lake Roland)). The initial focus of the toxics TMDL Implementation Plans is to conduct monitoring to better target efforts to identify sources. A Request for Bids is currently being processed for the contracting of a chemical analysis laboratory to analyze the various toxics in a variety of media (aqueous, sediment, fish tissue). Results will be reported in the future.

Mercury: For the mercury TMDLs, Baltimore County is awaiting the results for the 2014 MDE fish tissue monitoring prior to developing monitoring plans. The results of previous fish tissue monitoring indicated that the levels of mercury are below the action level. In fact, Liberty Reservoir has been delisted. Baltimore County is waiting to see if the 2014 results confirm the earlier results. The Healthy Air Act passed by Maryland in 2007 placed stricter mercury air emissions, which have significantly reduced mercury deposition to the reservoir surface and to the watershed. Mercury is collected through the Hazardous Waste Collection Program. One hundred and fifty-two pounds of mercury were collected in FY14/FY15 for recycling. The amount collected for 2016 is not available, as the material is still being consolidated for future recycling. See Section 7.

Chlordane: The TMDL Implementation Plans for Chlordane indicated working with MDE to develop a coordinated fish tissue and bioaccumulation monitoring plan. Baltimore County met once MDE in 2015 to discuss the value of a fish tissue monitoring plan and a bioaccumulation monitoring plan. Baltimore County is still exploring the value of this type of monitoring. The fish tissue monitoring will determine when the endpoint is reached, while the bioaccumulation studies would help target subwatersheds for additional evaluation of sources of chlordane. Chlordane usage has been banned since 1987, so the monitoring would be looking for historic contamination sites. The Hazardous Waste Collection Program collected 27,000 pounds of pesticides in FY2014, 19,600 pounds in FY2015, and 19,985 pounds in FY2016 for proper disposal. While this covers all pesticides, a portion will probably consist of chlordane, but what that portion is has not been determined. See Section 7.

PCBs: Similar to the chlordane, PCBs are a banned substance, however, unlike chlordane the use of PCBs may still be occurring through old electrical transformers, PCBs in hydraulic fluid,

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and in old building materials. PCBs continue to be deposited from the air throughout the world, which may currently be the major source of PCBs. As with chlordane, Baltimore County is exploring fish tissue and bioaccumulation monitoring to target remediation efforts. Based on the literature and the findings from MDE, the bioaccumulation monitoring may not give consistent results and needs to be further evaluated prior to developing a monitoring program. The Hazardous Waste Collection Program collects PCB oil and ballast from fluorescent bulbs. Ballasts are recycled, and oil is incinerated. Table 10-68 displays the amounts collected over the last three fiscal years.

Table 10-68: Collection of PCB Containing Materials Over the Last Three Fiscal Years

Material	FY2014	FY2015	FY2016
PCB Oil (pounds)	2,298	1,100	**
Fluorescent bulbs (N)	59,289	69,153	64,696

** drum only shipped when filled.

Baltimore County has explored in situ remediation options that appear to have utility in remediation of sediments, which is the major repository of PCBs from historic contamination. The PCBs in sediment have not been assigned a load reduction, but remediation of sediment may be a more cost effective restoration mechanism than finding and treating PCBs in the watershed.

10.6.2 Chesapeake Bay TMDL

The Chesapeake Bay TMDL was developed in December 2010 and refined in July 2011. The CB TMDL is based on a series of interlinked models. The Watershed Model provides the pollutant loading input into the Chesapeake Bay from the various land uses, septic systems, and point sources. The agricultural sources of pollutant loads will not be addressed in this annual report, nor will actions taken by the State of Maryland or the federal government. For future reports an attempt will be made to include actions taken by the agriculture section, the State of Maryland, and the federal government.

Progress made in meeting the Chesapeake Bay TMDL may be viewed in two fashions; progress in meeting the 2-year milestones (Section 10.6.2.1) and overall load reductions (Section 10.6.2.2).

10.6.2.1 Progress in Meeting the 2-year Milestones

Baltimore County submitted its Phase II Watershed Implementation Plan (WIP) to MDE on July 2, 2012. To view the Baltimore County Phase II WIP, see:

http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Documents/FINAL_PhaseII_Report_Docs/Final_County_WIP_Narratives/Baltimore_County_WIP2012.pdf

10.6.2.2 Urban Stormwater Load Reduction Progress – Restoration Milestones

The Baltimore County proposal for the first three sets of 2-year milestones for urban stormwater source nutrient reductions in the Phase II WIP are presented in Table 10-69, along with the remaining actions needed to meet the 2017 target based on the Baltimore County Phase II WIP. This table displays the individual strategies, by milestone years and the proposed amount of action to take place. The expected nitrogen and phosphorus reductions that will result from

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implementation are presented in Table 10-70 and Table 10-71, respectively. The nitrogen and phosphorus reductions are expressed as delivered load.

Table 10-69: 2-year Milestone Targets for Each Restoration Strategy

Strategy	Type*	Units	July 1, 2011 – June 30, 2013 (1st 2-Year Milestones)	July 1, 2013 – June 30, 2015 (2nd 2-Year Milestones)	Remaining to meet 2017 Target	Total at end of the 3rd 2-year milestone
Stream Restoration	C	feet	63,174	25,800	132,135	221,109
Shoreline Erosion Control	C	feet	5,190	13,067	0	18,165
SWM Retrofit/Conversions	C	acres	669	675	8,023	9,367
Street Sweeping	A	Pounds	Current Rate	Current Rate	Current Rate	Current Rate
Storm Drain Cleaning	A	Pounds	Current Rate	Current Rate	Current Rate	Current Rate
Nutrient Management 1998	A	acres	6,125	NA	NA	6,125
SSO Elimination	C	NA	20% reduction	20% Reduction	20% Reduction	60% Reduction
Upland Reforestation	C	acres	20	144	501	665
Riparian Buffer Reforestation	C	acres	10	45	85	140
Urban Tree Canopy Planting	C	trees	1,400	1,100	2,400	4,900
Redevelopment	C	acres	200	200	100	500
Watershed Association Projects	C	Pounds	Current Rate	Current Rate	Current Rate	Current Rate

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Table 10-70: Expected Nitrogen Reductions through the Three 2-Year Milestones

Strategy	Type*	Nitrogen Reduction			
		July 1, 2011 – June 30, 2013	July 1, 2013 – June 30, 2015	July 1, 2015 – June 30, 2017	Total at end 2017 Target
Stream Restoration (Interim Rate)	C	7,165	2,926	14,986	25,077
Shoreline Erosion Control	C	830	2,090	0	2,920
SWM Retrofit/Conversions	C	1,268	1,279	15,214	17,661
Street Sweeping	A	4,238	4,238	4,238	4,238
Storm Drain Cleaning	A	734	734	734	734
Nutrient Management 1998	A	4,565	0	0	4,565
SSO Elimination	C	230	230	230	690
Upland Reforestation	C	85	612	2,114	2,811
Riparian Buffer Reforestation	C	57	257	490	804
Urban Tree Canopy Planting	C	59	46	103	208
Redevelopment	C	915	915	456	2,286
Watershed Association Projects	C	155	155	231	541
Fertilizer Act of 2011	A	0	83,322	0	83,322
Total Reductions		20,301	96,804	38,796	145,857
Reduction Target					123,608
Remaining					-22,249

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Table 10-71: Expected Phosphorus Reductions through the Three 2-Year Milestones

Strategy	Type*	Phosphorus Reduction			
		July 1, 2011 – June 30, 2013	July 1, 2013 – June 30, 2015	July 1, 2015 – June 30, 2017	Total at end 2017 Target
Stream Restoration (Interim Rate)	C	4,225	1,725	8,838	14,788
Shoreline Erosion Control	C	571	1,438	0	2,009
SWM Retrofit/Conversions	C	165	1,279	871	2,315
Street Sweeping	A	1,620	1,620	1,620	1,620
Storm Drain Cleaning	A	284	284	284	284
Nutrient Management 1998	A	204	204	204	204
SSO Elimination	C	76	76	115	267
Upland Reforestation	C	3	22	67	92
Riparian Buffer Reforestation	C	4	18	27	49
Urban Tree Canopy Planting	C	2	2	3	7
Redevelopment	C	106	106	52	264
Watershed Association Projects	C	15	15	23	53
Fertilizer Act of 2011	A	0	3,681	0	3,681
Total Reductions		7,275	10,470	12,104	25,633
Reduction Target					22,990
Remaining					-2,643

The actual implementation of the restoration strategies through FY2016 is presented in Table 10-72. Also included in this table is the percent of target achieved for each strategy. In a number of cases the tracking mechanism has not been developed, but actions have occurred. The table presents the actions completed in the first two 2-year milestone period and those completed during the first year of the third 2-year milestone period. Included in the Table is the completed, the amount remaining, and the % of the target achieved.

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Table 10-72: 2-year Milestone Progress on Restoration Strategies and Percent of Target Achieved

Strategy	Type*	Unit	Combined Target	Completion Progress				Remaining	% Target
				First 2-year Milestone	Second 2-year Milestone	Third 2-year Milestone	Total		
Stream Restoration (Interim Rate)	C	Feet	221,109	9,600	6,573	0	16,173	204,936	7.3%
Shoreline Erosion Control	C	Feet	18,165	5,710	0	317	6,027	12,138	33.2%
SWM Retrofit/Conversions	C	Acres	9,367	305.4	326.9	482.8	1,115.1	8,251.9	11.9%
Street Sweeping	A	Pounds	Current Rate	Current Rate	Current Rate	Below Historic Rate	NA	NA	NA
Storm Drain Cleaning	A	Pounds	Current Rate	Current Rate	Below Historic Rate	Below Historic Rate	Below Historic Rate	NA	NA
Fertiliser Use Act of 2011	A	Acres	91,200	0	108,287	0	108,287	0	100.0%
SSO Elimination	C	Pounds	60% reduction	20% reduction	20% reduction	20% reduction	Need to develop tracking mechanism		
Upland Reforestation	C	Acres	665	39.6	74.9	39.5	154.0	511	23.2%
Riparian Buffer Reforestation	C	Acres	140	10	17.8	24.4	52.2	87.8	62.7%
Urban Tree Canopy Planting	C	Trees	4,900	2,046	1,426	444	3,916	984	79.9%
Redevelopment	C	Acres	500	133.4	45.4	4.6	183.4	316.6	63.3%
Watershed Association Projects	C	Pounds	Current rate	> Current Rate	~ Same as Historic Rate	Below Historic Rate	> 2010 Rate	> 2010 Rate	> 2010 Rate

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Table 10-73 and Table 10-74 show the progress made by strategy in reduction nitrogen and phosphorus delivered loads, respectively. The load reductions are expressed in delivered loads.

Table 10-73: Progress in the Reduction of Nitrogen by Strategy for the First Two Sets of 2-year Milestone Periods (Delivered Load, #s)

Strategy	Type*	Combined Target	Completion Progress				Remaining	% Target
			First 2-year Milestone	Second 2-year Milestone	Third 2-year Milestone	Total		
Stream Restoration (Interim Rate)	C	25,077	1,660	250.3	0	1,910.3	23,166.7	7.6%
Shoreline Erosion Control	C	2,920	909.5	0.0	23.8	933.3	1,986.7	32.0%
SWM Retrofit/Conversions	C	17,661	1,725	695.0	378.7	2,798.7	14,862.3	15.8%
Street Sweeping&	A	4,238	0	0	3,269.9	3,269.9	968.1	77.2%
Storm Drain Cleaning&	A	734	0	0	136.7	136.7	597.3	18.6%
Fertilizer Use Act of 2011*	A	83,322	0	23,345	0	23,345.0	-18,780.0	511.4%
SSO Elimination**	C	690	230	230	230	690.0	0.0	100.0%
Upland Reforestation	C	2,811	168	234.1	73.3	475.4	2335.6	16.9%
Riparian Buffer Reforestation**	C	804	40.2	71.6	123.1	234.9	569.1	29.2%
Urban Tree Canopy Planting	C	208	87.7	48.1	16.2	152.0	56.0	73.1%
Redevelopment***	C	2,286	434.1	200.0	2.1	634.1	1,651.9	27.7%
Watershed Association Projects	C	541	623.8	142.5	65.1	831.4	-290.4	153.7%
Total Reductions		141,292	5,878.3	25,216.6	4,318.9	35,411.7	27,123.3	25.1%
2017 Reduction Target		123,608					88,196	28.6%

* Expert Panel Report for Urban Nutrient Management indicates a 4.5% reduction in nitrogen for urban pervious cover, effective with the full implementation of the Fertilizer Use Act of 2011.

** The Sanitary Sewer Consent Decree implementation is on track for completion within the timeframe specified by the Decree.

& Annual Practice, only most recent year counts

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Table 10-74: Progress in the Reduction of Phosphorus Strategy for the First Three Sets of 2-year Milestone Periods (Delivered Load, #s)

Strategy	Type*	Combined Target	Completed				Remaining	% Target
			First 2-year Milestone	Second 2-year Milestone	Third 2-year Milestone	Total		
Stream Restoration (Interim Rate)	C	14,788	571.4	289.8	0	861.2	13,927	5.8%
Shoreline Erosion Control	C	0	571	0	21.6	592.6	1,416	29.8%
SWM Retrofit/Conversions	C	2,315	329	58.5	52.9	440.4	1,875	19.0%
Street Sweeping&	A	1,620	0	0	1,412.9	1,412.9	207	87.2%
Storm Drain Cleaning&	A	284	0	0	60.9	60.9	223	21.4%
Fertiliser Use Act of 2011*	A	3,681	0	4,546	0	4,546	-865	12.35%
SSO Elimination**	C	267	76	76	115	167	0.0	100.0%
Upland Reforestation	C	92	5.4	7.5	3.3	16.2	76	17.6%
Riparian Buffer Reforestation	C	49	5.6	10.0	5.2	20.8	28	42.4%
Urban Tree Canopy Planting	C	7	2.8	1.6	0.6	4.4	2	71.4%
Redevelopment	C	264	51.4	31.2	1.1	83.7	180	31.7%
Watershed Association Projects	C	53	28.9	7.6	3.3	39.8	13	75.1%
Total Reductions		25,429	1,641.5	5,028.2	1,676.8	8,346.5	17,083	32.8%
2017 Reduction Target		13,616					5,269.5	61.3%

*Expert Panel Report for Urban Nutrient Management indicates a 25% reduction in phosphorus for urban pervious cover, effective with the full implementation of the Fertilizer Use Act of 2011.

** The Sanitary Sewer Consent Decree implementation is on track for completion within the timeframe specified by the Decree.

& Annual Practice, only most recent year counts

As can be seen from Table 10-75 and Table 10-76, Baltimore County has achieved 28.6% of the nitrogen target and 61.3% of the phosphorus target through the first two sets of 2-year milestones and the first year of the third set of 2-year milestones. See below for additional reductions that were not included in the original Baltimore County WIP, including difference in the Watershed Model projection of acres of disturbance from construction and the closure of several quarries. There are a significant number of projects that are currently in construction, in design, or ready for construction during the next year

Additional Pollutant Load Reductions Not Specified in the Baltimore County Watershed Implementation Plan or the 2-Year Milestones

While Baltimore County has not achieved its' 2-year milestone targets through the actions identified in the Baltimore County Watershed Implementation Plan, additional reductions have been achieved through other actions; specifically reductions through an overestimate of the amount of land development in the Chesapeake Bay Watershed Model as reflected in MAST and

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conversion of operating quarries to development with subsequent reductions due to the termination of the associated discharge permits and a lower land use load with stormwater treatment.

Reductions due to overestimate of the amount of land under development: The Chesapeake Bay Watershed Model predicts a certain number of acres to be under development on an annual basis. This data is reflected in the Maryland Assessment Scenario Tool (MAST) based on the July 2011 model run. The actual acres of disturbance is based on the grading permits issued by Baltimore County (acres of disturbance due to State projects are not captured). Table 10-75 displays the actual versus the predicted acres of disturbance, and the difference between the two by watershed.

Table 10-75: Actual Acres of Disturbance versus Predicted Acres of Disturbance (FY2016)

Watershed	Number of Permits	Acres of Disturbance	Model Acres of Disturbance	Difference
Upper Western Shore				
Deer Creek	0	0.0	9.34	-9.3
Prettyboy Reservoir	0	0.0	35.65	-35.7
Loch Raven Reservoir	23	40.47	415.87	-375.4
Lower Gunpowder Falls	14	66.55	212.18	-145.6
Little Gunpowder Falls	1	.25	16.97	-16.7
Bird River	22	310.02	179.08	130.9
Gunpowder River	3	.33	8.57	-8.2
Middle River	4	17.48	0.00	17.5
UWS Totals	67	435.1	877.66	-442.5
Patapsco/Back River				
Liberty Reservoir	6	4.23	50.92	-46.69
Patapsco River	23	55.90	237.64	-181.74
Gwynns Falls	30	131.29	331.85	-200.56
Jones Falls	18	68.11	152.77	-84.66
Back River	17	108.21	95.90	12.31
Baltimore Harbor	9	40.94	0.00	40.94
P/B Totals	103	408.68	869.08	-460.4
County Totals	170	843.78	1,746.74	-902.9

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County-wide there were 903 fewer acres of disturbance than predicted by the Chesapeake Bay Watershed Model and reflected in MAST. Using the watershed specific per acre loading rates due to construction for nitrogen, phosphorus, and sediment the difference between the model loading and the actual loading was calculated. This difference reflects a reduction in the amount of nitrogen, phosphorus, and sediment loadings in Baltimore County. Table 10-76 and Table 10-77 display the analysis for nitrogen and phosphorus, respectively.

Table 10-76: Difference between Modeled and Actual Nitrogen Loading Rates Due to Construction

Watershed	Acres of Disturbance	Model Acres of Disturbance	Difference	Model Load Rates N Delivered Load	Model N Load	FY16 Actual N Load	Difference
Upper Western Shore							
Deer Creek	0.0	9.34	-9.3	18.54	173.16	0.00	-173.16
Prettyboy Reservoir	0.0	35.65	-35.7	1.76	62.74	0.00	-62.74
Loch Raven Reservoir	40.47	415.87	-375.4	2.4	998.09	97.13	-900.96
Lower Gunpowder Falls	66.55	212.18	-145.6	9.02	1,913.86	600.28	-1,313.58
Little Gunpowder Falls	.25	16.97	-16.7	22.88	388.27	5.72	-382.55
Bird River	310.02	179.08	130.9	14.91	2,607.08	4,622.4	2,015.32
Gunpowder River	.33	8.57	-8.2	17.89	153.32	5.90	-147.42
Middle River	17.48	0.00	17.5	17.89	0.00	312.72	312.72
UWS Totals	435.1	877.667	-442.5		6,296.52	5,644.15	-652.37
Patapsco/Back River							
Liberty Reservoir	4.23	50.92	-46.69	0.00	0.00	0.00	0.00
Patapsco River	55.90	237.64	-181.74	4.86	1,154.93	271.67	-883.26
Gwynns Falls	131.29	331.85	-200.56	4.41	1,463.46	578.99	-884.47
Jones Falls	68.11	152.77	-84.66	1.77	270.40	120.55	-149.85
Back River	108.21	95.90	12.31	6.14	588.83	664.41	75.58
Baltimore Harbor	40.94	0.00	40.94	17.89	0.00	732.42	732.42
P/B Totals	408.68	869.081	-460.4		3,477.62	2,368.04	-1,109.58
County Totals	843.78	1,746.8	-902.9		9,774.14	8,012.19	-1,761.95

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Table 10-77: Difference between Modeled and Actual Phosphorus Loading Rates Due to Construction

Watershed	Acres of Disturbance	Model Acres of Disturbance	Difference	Model Load Rates P Delivered Load	Model P Load	FY14 Actual P Load	Difference
Upper Western Shore							
Deer Creek	0.0	9.34	-9.3	3.89	36.33	0.00	-36.33
Prettyboy Reservoir	0.0	35.65	-35.7	0.42	14.97	0.00	-14.97
Loch Raven Reservoir	40.47	415.87	-375.4	1.85	769.36	74.87	-694.49
Lower Gunpowder Falls	66.55	212.18	-145.6	4.09	867.82	272.19	-595.63
Little Gunpowder Falls	.25	16.97	-16.7	4.31	73.14	1.08	-72.06
Bird River	310.02	179.08	130.9	4.79	857.79	1,485.00	627.21
Gunpowder River	.33	8.57	-8.2	5.10	43.71	9.18	-42.03
Middle River	17.48	0.00	17.5	5.10	0.0	131.58	89.15
UWS Totals	435.1	877.667	-442.5		2,663.12	1,923.96	-739.16
Patapsco/Back River							
Liberty Reservoir	4.23	50.92	-46.69	0.00	0.00	0.00	0.00
Patapsco River	55.90	237.64	-181.74	1.25	297.05	69.88	-227.18
Gwynns Falls	131.29	331.85	-200.56	3.43	1,138.52	450.32	-688.20
Jones Falls	68.11	152.77	-84.66	1.16	177.21	79.01	-98.20
Back River	108.21	95.90	12.31	5.10	489.09	551.87	62.78
Baltimore Harbor	40.94	0.00	40.94	5.10	0.00	208.79	208.79
P/B Totals	408.68	869.081	-460.4		2,101.87	1,359.87	-742.00
County Totals	843.78	1,746.8	-902.9		4,764.99	3,283.84	-1,481.15

As can be seen from the preceding tables, there were 6,400 fewer pounds of nitrogen, and 3,400 fewer pounds of phosphorus. .

Reductions due to closing of quarries and conversion to development: This information was presented in last years' report, but is applicable to the progress made to date in reducing nitrogen and phosphorus. Two quarries have recently closed and are in the process of being developed, this results in pollutant load reductions due to several factors; elimination of nutrients and sediment due to discharges from the quarry that reflect loads due to quarry operations and change in land use with differential nutrient and sediment loading rates. The two quarries are Greenspring Quarry in Jones Falls and Delight Quarry in Gwynns Falls. Information on the two quarries is provided in Table 10-78. Greenspring Quarry had already terminated its discharge permit and this is reflected in the Chesapeake Bay Watershed Model, however, the discharge permit for Delight Quarry was still in effect at the time of model development.

Section 10 - Watershed Planning, Restoration Progress, and Total Maximum Daily Loads

Table 10-78: Load Reductions Due to Development of Quarries

Quarry	Discharge Permit			Land Use			Total		
	N	P	TSS	N	P	TSS	N	P	TSS
Quarry Loadings									
Greenspring	NA – not in the model			1,291	205	153,515	1,291	205	153,515
Delight	1,244	444	4,164	653	104	176,847	1,897	548	181,011
Development Loadings									
Greenspring	0	0	0	1,066	57	33,649	1,066	57	33,649
Delight	0	0	0	542	29	38,515	542	29	38,515
Difference									
Greenspring	NA – not in the model			-225	-148	-119,866	-225	-148	-119,866
Delight	-1,244	-444	-4,164	-111	-75	-138,332	-1,355	-519	-142,496
Totals	-1,244	-444	-4,164	-336	-233	-258,198	-1,580	-667	-262,362

The effect of changing land use and retirement of discharge permits for these two quarries results in a reduction of 1,580 pounds of nitrogen and 667 pounds of phosphorus. The reduction is actually greater, as these calculations do not take into account the installation of stormwater management on the development sites. Taking into account these two additional reductions and with an addition year for the third 2-year milestone, Baltimore County will have to reduce nitrogen by a further 84,855 pounds and phosphorus by 3,121 pounds (Table 10-79). With an average rate of annual nitrogen and phosphorus reduction of 7,082 and 1,699 pounds, respectively; making the 60% nutrient reduction targets will be difficult.

Table 10-79: Total Reductions in Relation to Target Reductions

Constituent	Target	Restoration	Reduced Grading	Quarry Development	Total Reductions	Remaining
Nitrogen	123,608	35,411	1,762	1,580	38,753	84,855
Phosphorus	13,616	8,347	1,481	667	10,495	3,121

Table 10-80 presents the progress in meeting the second 2-year milestone for onsite disposal systems.

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Table 10-80: Progress in Meeting the First three sets of 2-Year Milestones for OSDS Remediation

Strategy	Target	0Milestones			Total	% of Target
		2011-2013	FY2014 – FY2015	FY2016- FY2017		
Denitrifying Systems #	73	34	59	21	114	156.2%
Denitrifying N Reduction (#s)	298	166	176	56	398	133.6%
Hook-ups to Sanitary Sewer	67	39	140	69	248	370.1%
Hook-up N Reduction (#s)	882	464	1,964	481	2,909	329.8%
OSDS Pump-outs	7,800	NA	NA	3,778	3,778	48.4%
Pump-out N Reduction (#s)	464	NA	NA	526	526	113.4%
Total Nitrogen Reduced	1,640	630	2,140	1,063	5,473	333.7%

While we have not achieved some of the OSDS implementation targets in terms of number of pump outs, we have exceeded the number of hook-ups of OSDS to the sanitary sewer and the number of denitrifying systems installed. We have also far exceeded the amount of nitrogen reductions, mainly due to the locations of the various improvements being in zones of higher OSDS loading rates and the preponderance of sanitary sewer hook-ups. The 5,473 pounds of nitrogen removed due to the various actions related to OSDS is greater than the 2025 target removal of 2,298 pounds of nitrogen. The greater amount of nitrogen removal from the OSDS program will help offset the short fall in the stormwater program.