

3.0 Permit Requirements**D. Management Programs****1. Stormwater Management**

An acceptable stormwater management program shall be maintained in accordance with Environment Article, Title 4, Subtitle 2, Annotated Code of Maryland. Activities to be undertaken by the County shall include, but not be limited to:

a. Implementing the stormwater management design policies, principles, methods, and practices found in the latest version of the *2000 Maryland Stormwater Design Manual*. This includes:

i. Comply with the Stormwater Management Act of 2007 (Act) by implementing environmental site design (ESD) to the MEP for new and redevelopment projects;

ii. Tracking the progress toward satisfying the requirements of the Act and identifying and reporting annually the problems and modifications necessary to implement ESD to the MEP; and

iii. Reporting annually the modifications that have been or need to be made to all ordinances, regulations, and new development plan review and approval process to comply with the requirements of the Act.

b. Maintaining programmatic and implementation information including, but not limited to:

i. Number of Concept, Site Development, and Final plans received. Plans that are re-submitted as a result of a revision or in response to comments should not be considered separate projects;

ii. Number of redevelopment projects received;

iii. Number of stormwater exemptions issued; and

iv. Number and type of waivers received and issued, including those for quantity control, quality control, or both. Multiple requests for waivers may be received for a single project and each should be counted separately, whether part of the same project or plan. The total number of waivers requested and granted for qualitative and quantitative control shall be documented.

Stormwater program data shall be recorded on MDE's annual report database and submitted as required in PART V of this permit.

c. Maintaining construction inspection information according to COMAR 26.17.02 for all ESD treatment practices and structural stormwater management facilities including the number of inspections conducted and violation notices issued by Baltimore County.

d. Conducting preventative maintenance inspections, according to COMAR 26.17.02, of all ESD treatment systems and structural stormwater management

facilities at least on a triennial basis. Documentation identifying the ESD systems and structural stormwater management facilities inspected, the number of maintenance inspections, follow-up inspection, the enforcement actions used to ensure compliance, the maintenance inspection schedules, and any other relevant information shall be submitted in the County's annual reports.

3.1 Introduction

The Stormwater Management Program addresses the impacts on stormwater quantity and quality resulting from new development and redevelopment after the construction phase is complete. These impacts are mainly associated with the increase in impervious area due to the installation of roadways and buildings. Baltimore County has been delegated authority by the State of Maryland to enforce stormwater management regulations. The Stormwater Management Program is located within the EPS – Stormwater Management Section. EPS currently implements the requirements of the 2000 Maryland Stormwater Design Manual, revised in 2009, for new and redevelopment activities. The Stormwater Management Act of 2007 was incorporated into the County's regulations in May 2010. The delegation of this program is periodically reviewed by the Maryland Department of the Environment (MDE) and has consistently passed the review requirements.

The Stormwater Management Program contains several components, including:

- review of stormwater management facilities plans,
- review of variance and associated fee-in-lieu requests,
- as-built inspections,
- triennial inspections, and
- maintenance of public stormwater management facilities.

All inspections of public and private facilities and maintenance of public facilities are conducted by the Stormwater Management Section.

3.2 Plan, Variance, and Fee-in-lieu Reviews

3.2.1 Plan Reviews

During fiscal year 2016 the following new plan reviews were conducted:

- Concept Plans – 82
- Site Development Plans – 4
- Final Development Plans – 580

This does not include multiple reviews for the same development project, only new projects. In FY 2016, there were 5 exemptions granted and one waiver was received and issued.

3.2.2 Variance and Fee-in-lieu Reviews

A variance in accordance with the Baltimore County Council Bill 33-4-113 may be approved for a project when exceptional circumstances are applicable to the site. This option is only acceptable to Baltimore County if it is proven to be infeasible to provide stormwater management (SWM) on site and a suitable outfall has been identified for the

project. An accompanying fee-in-lieu is generally required with variance approval. The fee-in-lieu money is utilized by EPS’s Watershed Restoration Section for water quality restoration projects. In FY 2016, there were a total of 77 variances granted: 42 of those variances required a fee-in-lieu. Projects do not receive their grading permit until the fee-in-lieu money is received. Twenty one of the forty two projects that were approved for fee-in-lieu have not yet paid as of June 30, 2016 and therefore did not start development in fiscal year 2016. Table 3-1 shows the number of projects, amount of fee-in-lieu due, and the fee-in-lieu money received by watershed during fiscal year 2016.

Table 3-1: Fee-in-lieu money received from July 1, 2015 through June 30, 2016

Watershed	# of Projects	Fee-in-lieu Due	Fee-in-lieu Collected
Upper Western Shore			
Deer Creek	0	\$0	\$0
Prettyboy Reservoir	0	\$0	\$0
Loch Raven Reservoir	5	\$30,582	\$8,192
Lower Gunpowder Falls	2	\$13,630	\$13,630
Little Gunpowder Falls	1	\$15,000	\$0
Bird River	5	\$65,880	\$3,240
Gunpowder River	0	\$0	\$0
Middle River	1	\$2,204	\$0
Upper Western Shore Total	14	\$127,296	\$25,062
Patapsco/Back River			
Liberty Reservoir	0	\$0	\$0
Patapsco River	5	\$64,742	\$64,004
Gwynns Falls	8	\$79,476	\$18,060
Jones Falls	4	\$13,881	\$5,621
Back River	6	\$76,712	\$17,700
Baltimore Harbor	5	\$27,464	\$21,948
Patapsco/Back River Total	28	\$262,275	\$127,333
County Totals	42	\$398,571	\$152,395

3.3 Approved Stormwater Management Facility Analysis

The database of approved stormwater management facilities indicates that a total of 4,597 facilities have been approved through June 30, 2016. Of the 4,597 approved facilities, 2,968 have been built and have approved as-builts (1,097 public and 1,869 private).

The 4,597 approved facilities will, if built, serve 41,626 acres of land. Private facilities represent 61% of all approved facilities and 44% of the drainage area served by stormwater management facilities. Table 3-2 lists approved facilities, but not necessarily built, by watershed, type and ownership.

It is possible for a facility to be active, that is functioning and passing regular inspections, but not have an approved as-built. This scenario occurs in several situations. For example, sometimes a developer builds a facility but never submits an as-built drawing. These facilities without approved as-builts still provide important stormwater management as intended. There are 2,968 built facilities with approved as-builts serving 31,084 acres of land, with 45% of the drainage area served by private facilities. However, when we include built facilities without approved as-builts, that number increases to 3,388 built facilities serving 35,922 acres of land. Table 3-3 shows the total approved and built facilities by watershed and includes facilities with and without approved as-builts.

Table 3-2: Approved Stormwater Management Facilities by Watershed through Fiscal Year 2016

Watershed	Detention Ponds, Underground Storage & Oil/Grit Separator				Extended Detention Ponds			
	Private		Public		Private		Public	
	#	D.A.	#	D.A.	#	D.A.	#	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Reservoir	0	0	0	0	0	0	5	36
Loch Raven Reservoir	85	893	24	1,118	108	972	64	1,418
Lower Gunpowder Falls	14	142	32	661	43	244	59	807
Little Gunpowder Falls	4	4	2	10	6	15	8	93
Bird River	40	561	26	618	59	365	73	789
Gunpowder River	0	0	3	39	2	4	4	30
Middle River	5	25	6	90	14	104	4	32
UWS Totals	148	1,625	93	2,536	232	1,705	217	3,205
Patapsco/Back River								
Liberty Reservoir	4	2	1	0	9	59	11	197
Patapsco River	33	247	36	1,282	86	631	73	660
Gwynns Falls	109	1,076	44	1,525	204	1,748	160	2,231
Jones Falls	47	682	23	602	104	935	35	647
Back River	61	270	23	383	99	636	46	393
Baltimore Harbor	9	169	18	181	16	131	1	79
Patapsco/Back R. Tot	263	2,445	145	3,981	518	4,139	326	4,208
County Totals	411	4,070	238	6,517	750	5,844	543	7,413

Table 3-2: Approved Stormwater Management Facilities by Watershed through Fiscal Year 2016 (continued)

Watershed	Retention Ponds and Wet Ponds				Infil. Basins, Trenches, Dry Wells, Porous Paving, Level Spreader			
	Private		Public		Private		Public	
	#	D.A.	#	D.A.	#	D.A.	#	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Reservoir	0	0	0	0	1	16	2	13
Loch Raven Reservoir	16	519	11	362	82	228	21	218
Lower Gunpowder Falls	2	297	11	166	11	23	27	84
Little Gunpowder Falls	1	50	2	21	9	118	2	32
Bird River	20	526	28	956	28	60	12	52
Gunpowder River	13	124	6	114	6	22	3	2
Middle River	17	313	14	300	13	18	4	7
UWS Totals	69	1,829	72	1,919	150	484	71	409
Patapsco/Back River								
Liberty Reservoir	1	22	0	0	23	43	2	3
Patapsco River	14	364	15	231	63	155	14	209
Gwynns Falls	20	1,025	21	398	77	147	30	188
Jones Falls	8	953	8	227	34	89	25	86
Back River	26	255	13	944	24	28	11	19
Baltimore Harbor	8	68	14	766	11	17	1	2
Patapsco/Back R. Tot	78	2,686	71	2,567	232	478	83	506
County Totals	146	4,515	143	4,486	382	962	154	915

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Watershed	Sand Filter, Bioretention, Filter Strip, Swales				Environmental Site Design			
	Private		Public		Private		Public	
	#	D.A.	#	D.A.	#	D.A.	#	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Reservoir	2	3	6	73	12	6	1	0
Loch Raven Reservoir	86	432	104	826	69	90	20	47
Lower Gunpowder Falls	29	79	46	353	44	90	3	6
Little Gunpowder Falls	8	10	9	79	11	40	2	0
Bird River	91	274	84	516	52	59	18	46
Gunpowder River	8	16	4	52	4	1	3	2
Middle River	33	90	12	43	11	45	3	4
UWS Totals	257	904	265	1,944	203	330	50	105
Patapsco/Back River								
Liberty Reservoir	19	58	26	166	9	17	4	15
Patapsco River	81	230	60	444	43	75	13	49
Gwynns Falls	151	611	118	612	66	73	21	31
Jones Falls	87	182	43	230	61	140	4	3
Back River	85	207	56	289	42	69	27	14
Baltimore Harbor	13	31	3	5	12	15	6	10
Patapsco/Back R. Tot	436	1,319	306	1,747	232	389	75	122
County Totals	693	2,223	571	3,691	436	719	125	227

Note: Drainage areas are rounded to the nearest acre.

Table 3-3: Total Facilities Built by Watershed and Ownership through Fiscal Year 2016

Watershed	Detention Ponds Underground Storage & Oil/Grit Separator				Extended Detention Ponds			
	Private		Public		Private		Public	
	#	D.A.	#	D.A.	#	D.A.	#	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Reservoir	0	0	0	0	0	0	5	36
Loch Raven Reservoir	80	873	21	882	98	882	61	1,254
Lower Gunpowder Falls	11	135	29	609	41	221	54	761
Little Gunpowder Falls	0	0	2	10	6	15	7	77
Bird River	35	480	25	604	49	284	71	771
Gunpowder River	0	0	3	39	1	2	4	30
Middle River	4	7	6	90	14	104	4	32
UWS Totals	130	1,496	86	2,233	209	1,508	206	2,960
Patapsco/Back River								
Liberty Reservoir	4	2	0	0	7	54	10	186
Patapsco River	30	241	32	1,263	70	461	67	609
Gwynns Falls	85	625	41	1,511	181	1,589	146	2,116
Jones Falls	40	638	23	602	94	889	32	603
Back River	45	163	19	372	83	580	40	332
Baltimore Harbor	8	168	15	178	15	130	1	79
Patapsco/Back R. Tot	212	1,837	130	3,927	450	3,703	296	3,925
County Totals	342	3,332	216	6,160	659	5,211	502	6,885

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Watershed	Retention Ponds and Wet Ponds				Infil. Basins, Trenches, Dry Wells, Porous Paving, Level Spreader			
	Private		Public		Private		Public	
	#	D.A.	N	D.A.	#	D.A.	#	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Reservoir	0	0	0	0	0	0	2	13
Loch Raven Reservoir	14	512	9	327	50	207	21	218
Lower Gunpowder Falls	2	297	9	138	6	13	25	80
Little Gunpowder Falls	1	50	2	21	5	114	2	32
Bird River	17	490	24	840	19	55	10	52
Gunpowder River	9	65	5	114	4	22	3	2
Middle River	12	229	11	266	9	14	4	7
UWS Totals	55	1,642	60	1,707	95	426	67	404
Patapsco/Back River								
Liberty Reservoir	1	22	0	0	11	23	1	2
Patapsco River	12	358	13	219	44	122	13	208
Gwynns Falls	18	802	15	324	66	114	28	187
Jones Falls	6	944	8	227	24	84	24	85
Back River	20	233	11	922	15	17	6	15
Baltimore Harbor	5	38	7	723	10	15	1	2
Patapsco/Back R. Tot	62	2,398	54	2,415	170	375	73	498
County Totals	117	4,040	114	4,121	265	800	140	902

Table 3-3: Total Facilities Built by Watershed and Ownership through Fiscal Year 2016 (continued)

Watershed	Sand Filter, Bioretention, Filter Strip, Swales				Environmental Site Design			
	Private		Public		Private		Public	
	#	D.A.	#	D.A.	#	D.A.	#	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	1	0
Prettyboy Reservoir	0	0	5	43	4	2	8	5
Loch Raven Reservoir	57	357	89	768	29	23	0	0
Lower Gunpowder Falls	14	23	30	257	11	14	0	0
Little Gunpowder Falls	8	10	6	48	0	0	0	0
Bird River	59	187	49	295	26	19	8	9
Gunpowder River	5	13	3	14	3	1	0	0
Middle River	12	58	6	33	1	1	1	1
UWS Totals	155	648	188	1,458	74	60	18	14
Patapsco/Back River								
Liberty Reservoir	12	20	8	45	4	8	1	2
Patapsco River	55	167	39	302	7	6	5	3
Gwynns Falls	99	373	61	489	21	17	3	3
Jones Falls	69	160	34	193	27	14	0	0
Back River	61	153	45	261	22	25	10	10
Baltimore Harbor	6	20	0	0	3	1	4	3
Patapsco/Back R. Tot	302	893	187	1,291	84	71	23	22
County Totals	457	1,541	375	2,748	158	130	41	36

Note: Drainage areas are rounded to the nearest acre.

Figure 3-1 displays the number of approved facilities, both private and public, by watershed. The Gwynns Falls watershed continues to have the greatest total number of existing and newly approved facilities. The large number of facilities in the Gwynns Falls watershed can be attributed to the fact that the Owings Mills growth area was built mostly after SWM regulations were in place. Many older communities, developed prior to regulatory authority, do not have any SWM facilities. Deer Creek, Prettyboy Reservoir, Liberty Reservoir, the Little Gunpowder Falls and the Gunpowder River watersheds have only a few facilities, which is reflective of fewer development projects or the small size of those watersheds. This pattern has not changed from past reports.

Figure 3-2 displays acreage to be served by approved private stormwater management facilities by watershed, and Figure 3-3 displays the same information for public facilities.

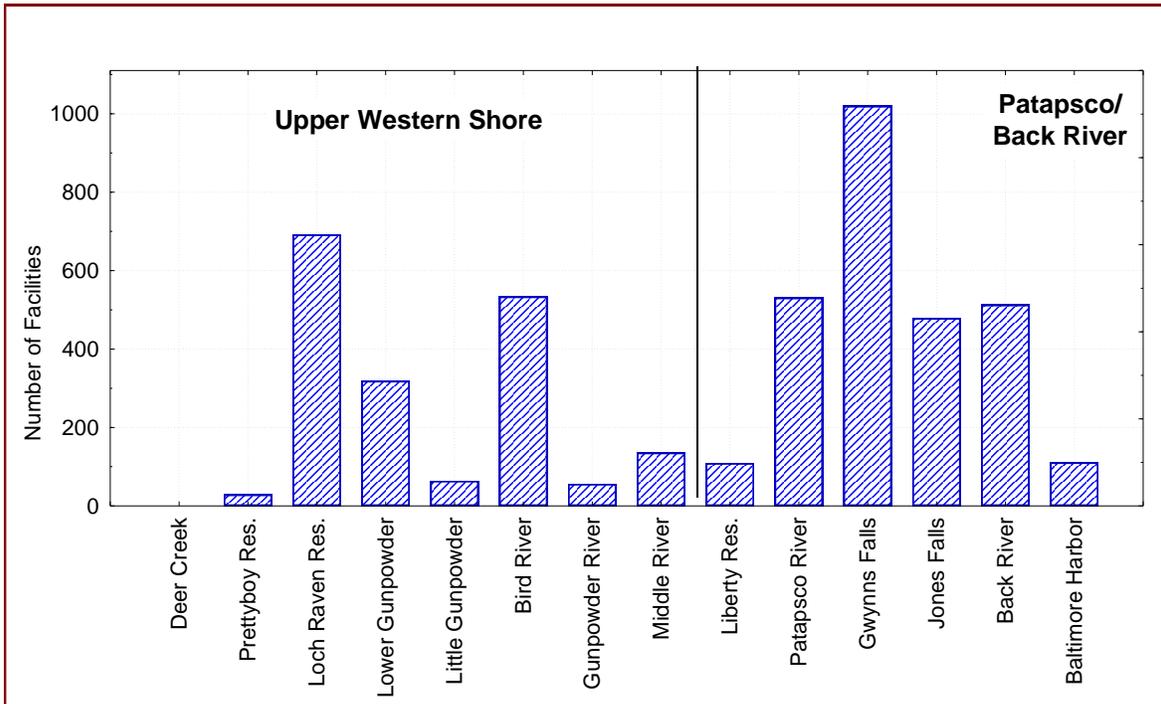


Figure 3-1: Number of Approved SWM Facilities by Watershed through Fiscal Year 2016

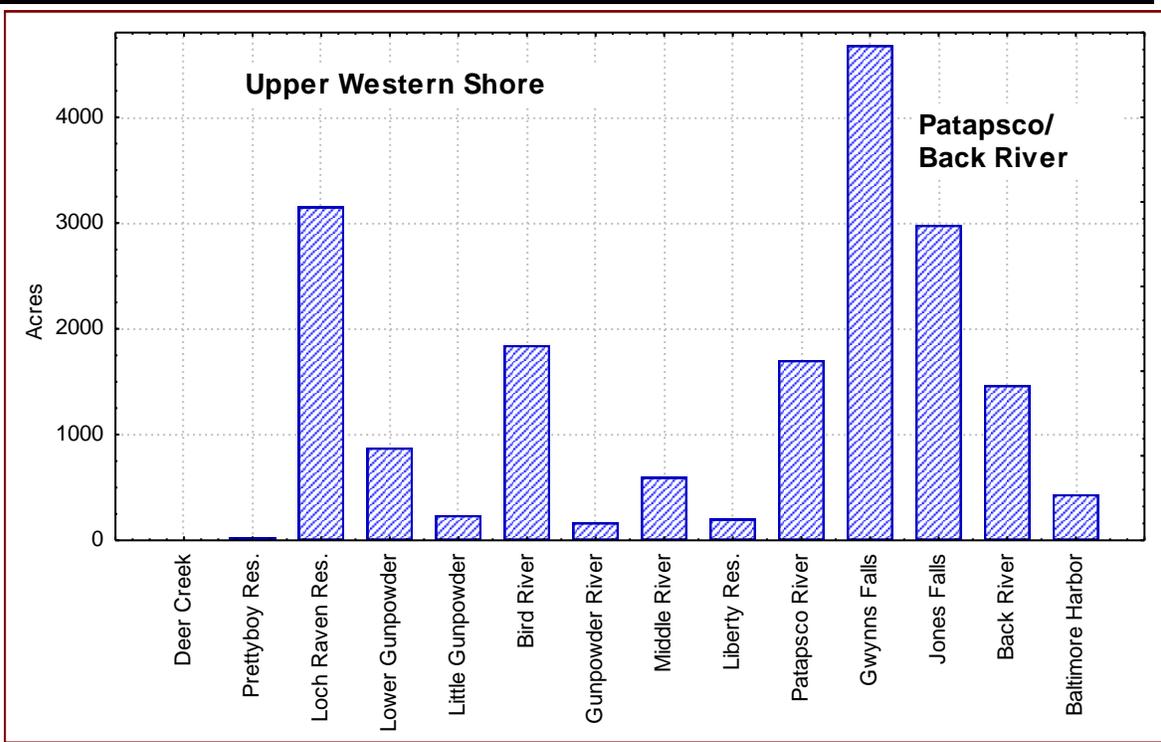


Figure 3-2: Acreage Served by Approved Private SWM Facilities by Watershed through Fiscal Year 2016

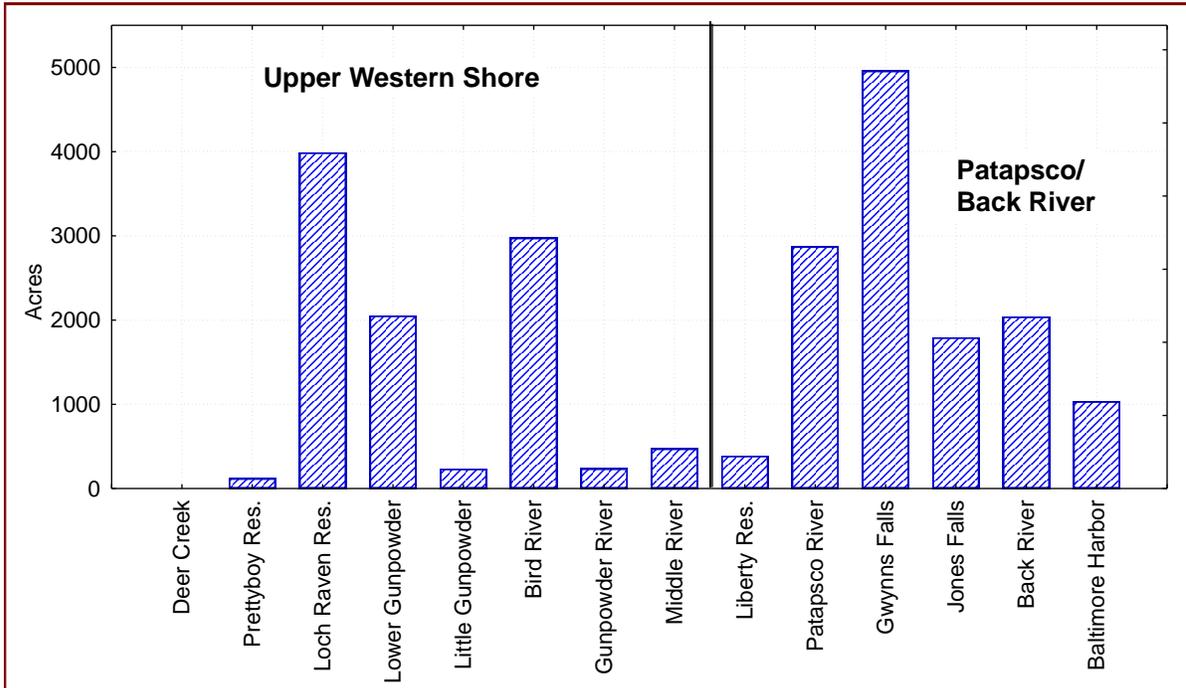


Figure 3-3: Acreage Served by Approved Public SWM Facilities by Watershed through Fiscal Year 2016

3.3.1 As-built Analysis

As stated earlier, it is possible for a facility to be active, that is functioning and passing regular inspections, but not have an approved as-built. This scenario occurs in several situations.

Table 3-4 presents the SWM facilities by sector that do not have an as-built with their corresponding drainage area and pollutant removal capabilities. This analysis includes all facilities, including retrofits, conversions, redevelopment and new development. Table 3-5 presents the load reductions for facilities without as-builts.

Table 3-4: Count and Drainage Area of SWM Facilities with Missing As-builts as of June 30, 2016

	Count	Drainage Area (acres)
Public Stormwater Facilities	288	3,616
Private Stormwater Facilities	131	1,213
Total	419	4,829

Table 3-5: Load Reductions from SWM Facilities with Missing As-builts

	TN (pounds)	TP (pounds)	TSS (pounds)
Public Stormwater Facilities	7,433	673	751,417
Private Stormwater Facilities	3,823	379	521,978
Total	11,255	1,052	1,273,395

When an inspection happens for a facility with no approved as-built, the inspector attempts to contact the pond owner to ask for an as-built.

In order to address the missing as-builts, the County proposes several methods, depending on whether the facility is privately or publically owned. For private facilities, the County will determine if there are any monies being withheld from the developer. If so, developers could be incentivized to submit an as-built in order to get their security deposit back.

For public facilities, however, there is typically no security deposit required, so there is often no financial incentive to prepare and submit an as-built, or to pass an as-built inspection. EPS is working with other agencies in the County to determine a plan to address missing as-builts. Additionally, we are now aware that sometimes providing an as-built plan was not part of the contract and therefore was not completed. In April 2016, EPS held meetings with Baltimore County Public Schools, Department of Public Works, and Property Management to develop a plan for finding or creating as-built style documentation for existing stormwater management facilities that lack documentation of as-built inspections.

EPS requested each agency to review a list of facilities in their department which are lacking as-builts. Most County agencies have responded to the EPS request and have committed to work on the review, and to help with the search for as-built documentation. DPW is now requiring as-builts to be done in their contracts along with a 2-year warranty (maintenance period).

The issue of facilities lacking as-builts was discussed at meetings between the MS4 phase 1 permittees and MDE held in CY 2016. MDE and the permittees agreed that an acceptable procedure for post-hoc as-built like documentation would be beneficial. The permittees and MDE continue to work on developing such a procedure, with an initial proposal expected before January 2017. Baltimore County's work on missing as-built facilities will continue after the initial proposed procedure is released.

3.4 Inspections

As of October 1, 2013, all SWM inspections and maintenance have been consolidated under the Stormwater Management Section. Prior to October 1, 2013, staff in the Stormwater Engineering Section completed all as-built inspections and one-year inspections, while all three-year inspections of public facilities were conducted by the Capital Programs and Operations Section and for private facilities by the Stormwater Engineering Section. Table 3-6 presents the SWM facility inspections conducted by EPS during the reporting period of July 1, 2015 through June 30, 2016.

Table 3-6: SWM Inspections from July 1, 2015 through June 30, 2016

	As-built	One year	Three year	Totals
Public Stormwater Facilities	45	44	279	368
Private Stormwater Facilities	60	91	161	312
Totals	105	135	440	680

A total of 105 as-built inspections were completed for the reporting period. A total of 135 one year inspections were completed. Approval of the one year maintenance inspection initiates the three-year maintenance inspection cycle. A total of 279 three-year inspections were completed for public facilities and 161 three year inspections were completed for private facilities. A total of 440 three year inspections of public and private stormwater facilities were conducted. The inspection program's goal is to inspect all built facilities every three years. A total of 680 inspections were completed for all built facilities. There are 1,385 public facilities built with and without as-builts so the County's goal is to inspect 462 public facilities: there are 1,999 private facilities built with and without approved as-builts so the goal is to inspect 666 private facilities. Increases in inspection staff in FY2014, hiring of a crew chief and contractual inspection and maintenance of public facilities increased both the number of three year inspections conducted and the maintenance of public facilities for FY2014 and FY2015. Due to budget constraints in 2015, the County discontinued use of the inspections contractors for several months. Inspection contractors began again on July 26, 2016.

3.5 Stormwater Management Facility Maintenance

The Baltimore County Department of Environmental Protection and Sustainability has an operations crew in the Stormwater Management Section, responsible for inspection and maintenance of public facilities. Their staff consists of one supervisor, one crew chief, and five maintenance field crew members. Additionally there are two contracted inspectors and one contracted maintenance field crew consisting of five field workers. The crews are divided geographically into eastern and western districts. The County also utilizes an on call contractor for major facility repairs as well as water quality conversions to publicly owned facilities.

A database has been developed to track all routine maintenance and responses to complaints. Table 3-7 summarizes the number of maintenance visits due to complaints versus routine maintenance. There were 53 routine maintenance assessments and 148 complaint driven site assessments during the reporting period for a total of 201 maintenance visits.

Table 3-7: Stormwater Facility Maintenance Visits by Type FY 2016

# of Routine Maintenance Visits	# of Complaint Maintenance Visits
53	148

3.6 Constructed Stormwater Management Facility Data Analysis

An analysis of the databases related to stormwater management facilities indicated that a total of 3,388 facilities have been built to date. The 3,388 built facilities have a combined drainage area of 35,922 acres, and 30,677 acres of land are treated by at least one of these SWM facilities. The difference is due to treatment trains for some of the facilities, where the facility drainage areas are nested. The drainage areas of 3,210 built facilities for development (does not include conversion or retrofits) have been delineated and digitized into the County GIS. As new facilities are built their drainage areas will also be added to the GIS data layer. Overall, built stormwater management facilities serve 22% of the designated urban acreage (156,099 acres). This is exclusive of the stormwater facilities converted by the county for greater pollutant removal efficiency and retrofits installed by the county. The total urban acreage is based on the October 2011 Maryland Assessment Scenario Tool (MAST) data.

The drainage areas were overlaid on the National Land Cover Database 2011 land use data and the Baltimore County 2011 impervious surface data to determine the specific land use and impervious cover draining to each facility. Table 3-8 presents a summary of the land use served by built SWM facilities by watershed. It should be noted that the date of the creation of the GIS land use data layer might precede the building of a number of the stormwater management facilities. This fact will result in some error in the determination of land use draining to those facilities.

Table 3-8: Constructed SWM Facility Drainage Area Land Use (Acres) through June 30, 2016

Watershed	Pervious Urban	Impervious Urban	Forest and Wetlands	Pasture	Crops	Extractive	Open Water	Total Acres
Upper Western Shore								
DC	0.1	0.1	0	0.3	0.3	0	0	0.8
PR	25.5	12.2	28.5	6.9	16.3	0	0	89.5
LR	2,482.3	1,395.8	1,007.9	228.3	190.9	0.2	7.5	5,312.9
GU	1,305.6	560.6	300.4	80.7	54.0	3.4	0	2,304.7
LG	134.2	47.5	94.6	46.4	27.5	0	0	350.1
BI	1,793.3	1,145.3	295.6	26.4	33.1	6.3	0	3,299.8
GR	101.0	75.4	23.7	0.1	0.9	9.7	1.5	212.2
MR	259.3	185.4	21.6	0	0	4.1	0.1	470.6
Total	6,101.2	3,422.2	1,772.3	389.1	322.9	23.7	9.1	12,040.6
Patapsco/Back River								
LI	122.7	85.0	42.0	27.4	47.4	0	0	324.4

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PA	1,463.7	1,047.5	440.1	160.9	139.8	0	0	3,251.8
GW	3,631.8	2,455.0	536.6	41.5	93.4	4.6	2.0	6,764.8
JF	1,764.2	889.7	757.8	52.8	64.3	3.2	11.9	3,543.9
BR	1,051.3	875.1	90.1	0	0	3.5	0	2,020.0
BH	209.9	164.9	8.4	0	0	0	0	383.2
P/B	8,243.7	5,517.1	1,875.0	282.5	344.9	11.3	14.0	16,288.1
County	14,344.7	8,939.3	3,647.3	671.6	667.8	35.0	23.0	28,328.7

LR = Loch Raven Reservoir PR = Prettyboy Reservoir GU = Lower Gunpowder Falls
 LG = Little Gunpowder Falls BI = Bird River GR = Gunpowder River
 PA = Patapsco River LI = Liberty Reservoir GW = Gwynns Falls
 JF = Jones Falls MR = Middle River BH = Baltimore Harbor
 BR = Back River DC = Deer Creek

3.7 Pollutant Loads

MDE and the EPA Chesapeake Bay Program currently endorse two methods for calculating stormwater management facility load reductions: the "BMP Removal Rate Adjustor Curve" method (Schueler and Lane 2015a, Maryland Department of the Environment 2014) and, for facilities that do not qualify for the curve method, the "Approved CBP BMP Efficiency Rates" method (Schueler and Lane 2015a, 12 & 40).

These methods, which are documented in detail in SOP RT-010: Tracking, Verification, and Pollutant Load Calculations: Stormwater Management Facilities (Baltimore County EPS, 2015), were used for the 3,210 facilities that are currently active with drainage areas digitized. The results of the analysis are displayed in Table 3-9 (Total Nitrogen), Table 3-10 (Total Phosphorus), and Table 3-11 (Total Suspended Solids), respectively.

Facilities designed and constructed for water quantity management or limited water quality management (e.g. extended detention) represent an opportunity for water quality improvement through conversion to water quality facilities that is explored through the Small Watershed Action Plan planning process and by EPS watershed restoration section staff. Conversions are typically cost effective only for facilities with greater than ten acres of drainage. However, to meet the pollutant reduction requirements facilities with acreage less than 10 acres are also considered. Assessments of existing County owned stormwater management facilities for conversion possibilities are summarized in Small Watershed Action Plans (see Section 10).

In order to avoid double counting, these tables and figures do not include those facilities that have been converted by the County, nor those facilities that have been installed as retrofits to address water quality. Converted and retrofit facilities as well as rain barrel installations, roof top disconnections and rain barrels installed by Watershed Groups are discussed further in Section 10 of this report. Facilities that are part of redevelopment/revitalization projects that have been fully analyzed for stormwater management impacts and land use conversions are in Section 10. The remainder of the redevelopment/revitalization projects are included in the analysis below.

Table 3-9: Total Nitrogen Removal by SWM Facility Type and Watershed (pounds)

Watershed	Total pounds of N to SWM	Pounds of Removal by Facility Type						Total Removed	
		DP	EDP	WP	INF.	FIL.	ESD	Pounds	%
Upper Western Shore Watersheds									
Prettyboy Reservoir	1,017	0	95	0	44	149	17	304	29.9
Loch Raven Reservoir	73,425	772	4,825	1,893	2,751	3,693	208	14,142	19.3
Lower Gunpowder Falls	28,721	445	2,212	1,138	492	546	66	4,898	17.1
Little Gunpowder Falls	3,706	5	232	209	437	276	0	1,160	31.3
Bird River	26,854	313	1,380	2,157	704	876	80	5,509	20.5
Gunpowder River	2,084	11	29	403	102	69	3	617	29.6
Middle River	4,888	27	170	859	93	114	6	1,271	26.0
Totals	140,695	1,572	8,944	6,660	4,623	5,723	379	27,901	19.8
Patapsco/Back River Watersheds									
Liberty Reservoir	4,366	1	554	81	199	299	111	1,245	28.5
Patapsco River	40,720	658	2,376	1,351	1,088	1,563	63	7,098	17.4
Gwynns Falls	96,792	998	9,169	2,619	2,243	2,299	126	17,454	18.0
Jones Falls	46,366	514	3,037	2,219	926	1,221	131	8,049	17.4
Back River	20,027	177	1,116	1,636	128	719	86	3,861	19.3
Baltimore Harbor	7,038	60	277	792	70	110	18	1,328	18.9
Totals	215,309	2,409	16,529	8,697	4,655	6,210	535	39,034	18.1
County Total	356,004	3,981	25,473	15,357	9,277	11,933	914	66,935	18.8

Table 3-10: Total Phosphorus Removal by SWM Facility Type and Watershed (pounds)

Watershed	Total pounds of P to SWM	Pounds of Removal by Facility Type						Total Removed	
		DP	EDP	WP	INF.	FIL.	ESD	Pounds	%
Upper Western Shore Watersheds									
Prettyboy Reservoir	54	0	5	0	2	13	1	21	39.6
Loch Raven Res.	3,779	73	255	137	194	308	15	983	26.0
Lower Gunpowder	1,430	41	114	111	34	40	3	343	24.0
Little Gunpowder	190	1	13	14	21	27	0	76	40.0
Bird River	2,504	55	141	300	78	127	7	708	28.3
Gunpowder River	186	2	3	47	13	12	0	77	41.1
Middle River	379	4	17	74	12	21	1	129	34.0
Totals	8,522	176	548	683	354	548	27	2,337	27.4
Patapsco/Back River Watersheds									
Liberty Reservoir	252	0	31	7	13	24	8	83	33.1
Patapsco River	2,114	59	137	115	82	138	4	535	25.3
Gwynns Falls	5,460	105	527	273	128	204	8	1,246	22.8
Jones Falls	2,273	50	165	130	53	97	9	503	22.1
Back River	1,678	34	115	163	12	107	8	439	26.1
Baltimore Harbor	370	5	28	20	9	12	1	76	20.5
Totals	12,146	253	1,004	709	296	583	38	2,883	23.7
County Total	20,668	430	1,551	1,392	651	1,131	65	5,219	25.3

Table 3-11: Total Suspended Solids Removal by SWM Facility Type and Watershed (tons)

Watershed	Total TSS To SWM	Tons of Removal by Facility Type						Total Removed	
		DP	EDP	WP	INF.	FIL.	ESD	Pounds	%
Upper Western Shore Watersheds									
Prettyboy Reservoir	45,984	0	12,821	4	2,277	13,903	603	29,608	64.4
Loch Raven Reservoir	3,594,860	70,375	747,358	159,132	205,131	331,660	14,594	1,528,250	42.5
Lower Gunpowder Falls	1,595,556	47,154	388,926	148,798	41,731	57,097	3,611	687,316	43.1
Little Gunpowder Falls	215,316	644	43,393	22,224	27,485	32,235	0	125,982	58.5
Bird River	999,292	21,551	172,199	153,303	34,410	62,627	2,682	446,772	44.7
Gunpowder River	87,845	842	4,507	32,479	1,423	7,155	136	46,541	53.0
Middle River	179,324	1,949	26,163	42,887	6,001	12,632	354	89,985	50.2
Totals	6,718,177	142,514	1,395,367	558,826	318,459	517,308	21,980	2,954,454	44.0
Patapsco/Back River Watersheds									
Liberty Reservoir	240,807	221	89,541	10,322	13,740	23,464	8,575	145,863	60.6
Patapsco River	2,314,171	66,184	458,731	145,033	96,480	184,684	4,804	955,916	41.3
Gwynns Falls	6,873,465	131,626	2,030,400	446,866	158,661	306,391	12,180	3,086,124	44.9
Jones Falls	1,296,524	28,829	300,391	87,111	32,485	65,205	4,548	518,568	40.0
Back River	603,464	12,156	127,392	72,834	3,888	46,870	2,969	266,109	44.1
Baltimore Harbor	158,719	2,177	38,601	11,428	4,408	5,604	522	62,739	39.5
Totals	11,487,149	241,192	3,045,056	773,593	309,661	632,218	33,598	5,035,318	43.8
County Total	18,205,326	383,706	4,440,423	1,332,419	628,120	1,149,526	55,578	7,989,772	43.9

3.8 BMP Data Maintenance

Baltimore County continues to improve the quality of our SWM data. In particular, water quality volume (Q), BMP type, and drainage areas were closely reviewed and revised as needed. Particularly notable improvements are noted below.

For ESD facilities which the PE required is known, the County updated the Q as described in Section 2.2 of PLRC_SOP_RT-010. Certain errors committed in 2015 in the calculation of Q were identified and corrected. Specifically, channel protection volume (189 facilities) and recharge volume (146 facilities) had been added to the water quality volume, resulting in high Q values. All SWM facility records affected by these mistakes were corrected this year.

As described in Appendix B of the MDE NPDES MS4 Geodatabase Design and User's Guide (Maryland Department of the Environment 2015), Baltimore County began implementing the use of a BMP Point of Investigation (BMPPOI) when necessary when calculating the water quality volume for multiple SWM BMPs installed in the same drainage or study area. Please refer to PLRC_SOP_RT-010 for more information on how BMPPOI's are used in Baltimore County.

3.9 Summary

Baltimore County operates a comprehensive stormwater management program. EPS has always taken a firm stand on requiring water quality treatment even when quantity management was not required. EPS continues to require all projects to explore and implement methods for water quality treatment. EPS uses the option to accept a fee-in-lieu payment if an exhaustive search has resulted in no practicable opportunity for on-site treatment.

The stormwater management facility maintenance program within EPS has continued to inspect both publicly and privately owned facilities and maintain public facilities. The staff has compiled an extensive database of inspections and maintenance operations for the publicly and privately owned stormwater facilities. These inspections, and the resulting actions, are improving the overall pollutant reduction efficiency of all stormwater facilities.

Constructed stormwater management facilities serve ~23.0 % of the total urban land, 156,099 acres (87,452 P/B and 68,647 UWS), in Baltimore County. For the areas served by these facilities a significant amount of pollutants are removed annually.