Annual Report on Financial Assurance Plans and the Watershed Protection and Restoration Program -2020-

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I. Introduction

Maryland's stormwater management (SWM) program includes fiscal reporting requirements for Maryland's 10 largest urban jurisdictions, which are Baltimore City and Anne Arundel, Baltimore, Carroll, Charles, Frederick, Harford, Howard, Montgomery, and Prince George's counties. One of these reporting requirements, Financial Assurance Plans **(**FAPs**)**, needs to demonstrate how stormwater restoration projects are going to be funded. These plans, submitted every two years, are to be completed by each National Pollutant Discharge Elimination System (NPDES) Phase I municipal separate storm sewer system (MS4) jurisdiction. The plans must include the following: all actions required to meet MS4 permit requirements; annual and projected 5-year costs and revenues necessary to meet the impervious surface restoration plan **(**ISRP**)** requirements; any and all sources of funds used toward meeting MS4 permit requirements; and all specific actions and expenditures undertaken in the previous fiscal years to meet the ISRP requirement.

The next FAPs to be submitted on the anniversary date of each jurisdiction's MS4 permit, between December 2020 and February 2021, are required to demonstrate sufficient funding for meeting 100% of the projected ISRP costs for the 2-year period immediately following the filing of the plan. Local governing bodies are required to hold public hearings and sign the plans for accuracy prior to submitting them to the Maryland Department of the Environment (MDE or the Department) for review. The law requires that the department shall: post FAPs on its website within 14 days of receipt; make a decision regarding the adequacy of these plans within 90 days of receipt; and submit an annual evaluation of these plans to the governor and the General Assembly by September 1 each year.

A second reporting requirement for each MS4 jurisdiction, excluding Montgomery County, is to submit a Watershed Protection and Restoration Program **(**WPRP**)** Annual Report on the anniversary date of its MS4 permit. The report requires the following items:

- The number of properties, if any, subject to a stormwater remediation fee
- Any funding structure developed, if any, including the amount of money collected
- The amount of money deposited into the Watershed Protection and Restoration Fund (WPRF) in the previous fiscal year by source
- The percentage and amount of funds in the WPRF spent on purposes defined in the law
- All SWM projects implemented in the previous fiscal year for the ISRP requirement

This Annual Report on Financial Assurance Plans and the Watershed Protection and Restoration Program, 2020, (FAP Annual Report), fulfills the requirement of § 4-202.1(j)(7), Environment Article, Annotated Code of Maryland. The Department's Executive Summary and Evaluation is included below, followed by an analysis of Best Management Practice (BMP) implementation and MS4 funding sources. Finally, the department provides a summary of these programs regarding statewide progress and future goals. The citizens of Maryland, and local, state, and federal partners are commended for their effort in developing and implementing these very important environmental programs for improving local water resources and restoring the Chesapeake Bay.

II. Primary Information

Table 1: Significant Dates for FAPs and WPRP Annual Reports

MS4		FAP Submission Date	WPRP Annual Report Submission Date	Date of Public Hearing	FAP Approved by Local Governing Body (Y/N)	Department's Determination of Sufficient Funding (100%)
Large	Anne Arundel	2/25/2019	2/11/2020	2/19/2019	Y	6/25/2019
	Baltimore City	12/27/2018	12/30/2019	11/29/2018	Y	4/10/2019
	Baltimore	12/27/2018	12/23/2019	12/11/2018	Y	6/6/2019
	Montgomery	2/19/2019	N/A	1/29/2019	Y	6/25/2019
	Prince George's[1]	2/15/2019	3/20/2020	6/11/2019	Y	1/2/2020
Medium	Carroll	12/18/2018	12/30/2019	11/29/2018	Y	4/10/2019
	Charles[2]	12/20/2018	12/26/2019	6/5/2018	Y	8/21/2019
	Frederick[3]	12/27/2018	12/27/2019	10/16/2018	Y	8/23/2019
	Harford	12/21/2018	2/28/2020	10/9/2018	Y	4/10/2019
	Howard[4]	12/18/2018	12/19/2019	4/22/2019	Y	7/26/2019

1. A draft FAP was submitted on Feb. 15, 2019. A .pdf of the approved FAP was submitted on Aug. 5, 2019, and an Excel file was submitted on Sept. 24, 2019.
2. On June 6, 2019, the department determined that Charles County's original FAP had insufficient data to complete its review. A revised FAP, submitted by the county on June 28, 2019, was determined to demonstrate sufficient funding. This determination was conditional on the revised FAP being approved by the local governing body. This approval, and a public hearing, occurred on Oct. 8, 2019.
3. Frederick County's original FAP was approved by the local governing body on Oct. 18, 2018. On June 6, 2019, the department determined that Frederick County's original FAP had insufficient data to complete its review. A revised FAP, submitted by the county on June 28, 2019, and again on Aug. 15, 2019, has yet to be approved by the local governing body. The department's determination was contingent upon the approval of the county's impervious area analysis by the department and the official approval of the FAP by the Frederick County Council. This approval, and a public hearing, occurred on Sept. 1, 2020.
4. A draft FAP was submitted on Dec. 18, 2018. An approved FAP was submitted on May 20, 2019.

III. Executive Summary and Evaluation

Anne Arundel, Baltimore, Carroll, Charles, Frederick, Harford, Howard, Montgomery, and Prince George's counties, and Baltimore City submitted comprehensive information on local projects for meeting ISRP requirements, including:

- Upland Practices: wet ponds, swales, infiltration, dry wells, rain gardens, green roofs, permeable pavement, rainwater harvesting, submerged gravel wetlands
- In-Stream Practices: shoreline management, outfall stabilization, stream restoration
- Programmatic Practices: street sweeping, inlet cleaning, storm drain vacuuming

The department approved each MS4's impervious acre baseline analysis, which sets the 20% level of restoration required under the stormwater permits. In accordance with the 2014 "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits" (2014 Accounting Guidance), some MS4s have submitted revised baseline analyses as part of the permit reapplication process.

This evaluation of the FAPs consists of budget and restoration information that have been provided by each MS4 Phase I permitted jurisdiction. Each locality has held public hearings and each plan has been signed by the local governing body. As per the department's review, Charles and Frederick counties submitted revised FAPs that showed completion of the 20% restoration requirement.

Current Implementation

- Statewide, the specific actions implemented by the Phase I MS4s for meeting ISRP requirements through FY19 are 103% completed (see Table 2). Overall, the MS4s completed 35,825 acres of restoration by FY19.

Table 2: Specific Actions Completed Through FY19 to Meet ISRP Permit Requirements

MS4	ISRP Requirement (Acres)[1]	Acres Restored as of FY16[2]	FY17[2]	FY18[2]	FY19[2]	Restoration Complete[2]
Anne Arundel[3]	4,996	912	1,680	4,996	4,996	100.0%
Baltimore City	4,291	3,624	3,953	4,291	6,921	161.3%
Baltimore	6,036	983	1,033	6,036	6,664	110.4%
Montgomery	3,778	1,918	2,927	3,778	3,849	101.9%
Prince George's	6,105	225	937	2,217	2,529	41.4%
Carroll	1,614	1,247	1,369	1,491	2,034	126.0%
Charles	1,577	253	310	679	1,683	106.7%
Frederick	1,981	161	186	563	1,981	100.0%
Harford	2,186	453	478	504	2,186	100.0%
Howard	2,262	1,028	1,434	1,858	2,982	131.8%
Totals:	34,826	10,804	14,307	26,413	35,825	102.9%

1. Updated ISRP Requirements and impervious acre (IA) baselines from FY19 MS4 Annual Reports.

2. Restoration data are from FY16 to FY19 MS4 Annual Reports (covering the end of the previous permit term up to June 30, 2016, June 30, 2017, June 30, 2018, and June 30, 2019, respectively). Some of this data have been updated to reflect annual report review findings. For the medium MS4s, FY19 data reflect final permit restoration totals and include the period between the end of FY19, and the end of the permit term.
3. Anne Arundel County completed restoration in FY19, but those restored acres are being credited toward replacing the nutrient credits from FY18 that were obtained in an amount equivalent to 2,607 impervious acres.

- This amount of restoration is equivalent to:


Photo: MDE

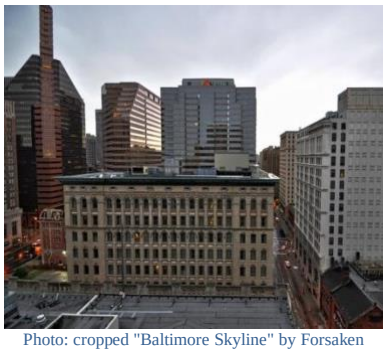
Photo: cropped "Baltimore Skyline" by Forsaken Fotos is licensed under CC BY 2.0


Photo: Library of Congress

56	17,913	92%
square miles	Baltimore City Blocks	of Washington DC's total land area

Projected Implementation and Funding

- For FY19 and FY20, the MS4s projected completing 16,930 acres of restoration. Excluding Montgomery County, the permit term for large MS4s ended in the middle of FY19. The permit term for the medium MS4s ended in the middle of FY20.

- The total 2-year cost reported in the All Actions worksheets equal $367.9 million. This is the cost for only BMPs without factoring in other associated ISRP costs such as debt service payments. The 10 MS4s report that the total ISRP cost for the next two years is $588.8 million while the total revenues is $596.5 million (see Table 3).

- All MS4s showed that they have the budgets necessary to fund 100% of the ISRP requirements of the MS4 permit over the next two state fiscal years (FY19 and FY20). Each MS4 has permit terms that expired before the end of the two-year period, therefore, the reported cost and funds are to support continued implementation outside of the expired permit.

Table 3: Fulfillment of 100% Revenue Requirement for 2-Year Costs

MS4		Cost[1]	Revenue[1]	Percent of Cost Covered	Meets 100% Requirement (Y/N)
Large	Anne Arundel	$110.2M	$124.7M	113.2%	Y
	Baltimore City[2]	$107.2M	$77.0M	71.8%	Y
	Baltimore	$50.7M	$50.7M	100.0%	Y
	Montgomery	$23.5M	$23.5M	100.2%	Y
	Prince George's	$189.1M	$189.2M	100.0%	Y
Medium	Carroll	$11.4M	$11.4M	99.8%	Y
	Charles	$28.3M	$29.4M	104.0%	Y
	Frederick	$18.2M	$18.2M	100.0%	Y
	Harford	$22.8M	$23.2M	101.9%	Y
	Howard	$27.4M	$49.1M	179.5%	Y
	Totals:	$588,833,663	$596,494,673		

1. Cost and Revenue data from ISRP Revenue worksheet in FY18 FAPs.
2. Baltimore City's MS4 permit expired and until a new one is issued, it has no ISRP requirement and associated FAP commitment.

- Three MS4s have acquired or proposed to acquire nutrient credits from Maryland's Water Quality Trading Program. Anne Arundel County obtained nutrient credits in an amount equivalent to 2,607 impervious acres, or 52% of its ISRP requirement. Frederick County obtained nutrient credits in an amount equivalent to 708 impervious acres, or 36% of its ISRP requirement. Harford County proposed obtaining nutrient credits in an amount equivalent to 56% of their ISRP requirements. More information can be found at mde.maryland.gov/programs/Water/WQT/Pages/index.aspx.

Table 4: Nutrient Credits Utilized or Proposed for Permit Term

Jurisdiction	ISRP Requirement (Acres)	Equivalent Acres of Nutrient Credits	Percentage of ISRP Requirement Met Through Trading	Acres Restored by End of Permit	Restoration Completed and Projected
Anne Arundel	4,996	2,607	52%	4,996	100.0%
Frederick	1,981	708	36%	1,981	100.0%
Harford	2,186	1,215	56%	2,186	100.0%
Total		4,530		9,163	

- The next FAP submittals to the department, due with FY20 MS4 annual reports, must show how each jurisdiction can fund 100% of its ISRP requirement for FY21 and FY22. Reissued MS4 permits will redefine the ISRP and requirements for each jurisdiction.

- An analysis of BMP implementation and funding sources may be found in the following pages. The department's reviews of the FAPs were provided in Appendix A of the 2019 report. Electronic copies of the report, reviews, and submitted FAPs may be viewed via the department's website at mde.maryland.gov/programs/Water/StormwaterManagementProgram/Pages/WPRPFinancialAssurancePlans.aspx

IV. Statewide BMP and Funding Analyses

BMPs

The department has encouraged MS4s to implement a wide range of BMPs that are effective for pollutant removal and meeting restoration requirements. Restoration may be achieved by a suite of practices that fall into one of three general categories: upland, in-stream, and programmatic. Figure 1 shows an analysis of the BMPs implemented in the 10 Phase I MS4s for meeting ISRP requirements through FY18. Based on the impervious acres restored, there are similar rates of implementation for upland and programmatic practices, 42% and 41%, respectively, while 17% is being restored through in-stream practices. The following is an analysis of the diversity within each category of BMP.

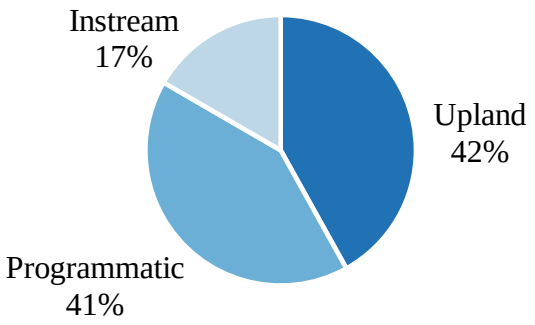

Figure 1: Completed BMP Implementation by Category during the Permit Term

Upland BMPs

- The three groups of upland BMPs with the greatest sum of impervious area treated are ponds (3,792 acres), redevelopment (1,399 acres), and wetlands (1,102 acres).
- The amount treated by ponds is equivalent to approximately 16% of the treated impervious acres in the 10 MS4s. On the other hand, environmental site design (ESD) practices (i.e., micro-scale practices, alternative surfaces, and nonstructural techniques) account for approximately 2% of the total impervious acres treated in the 10 Phase I MS4s.

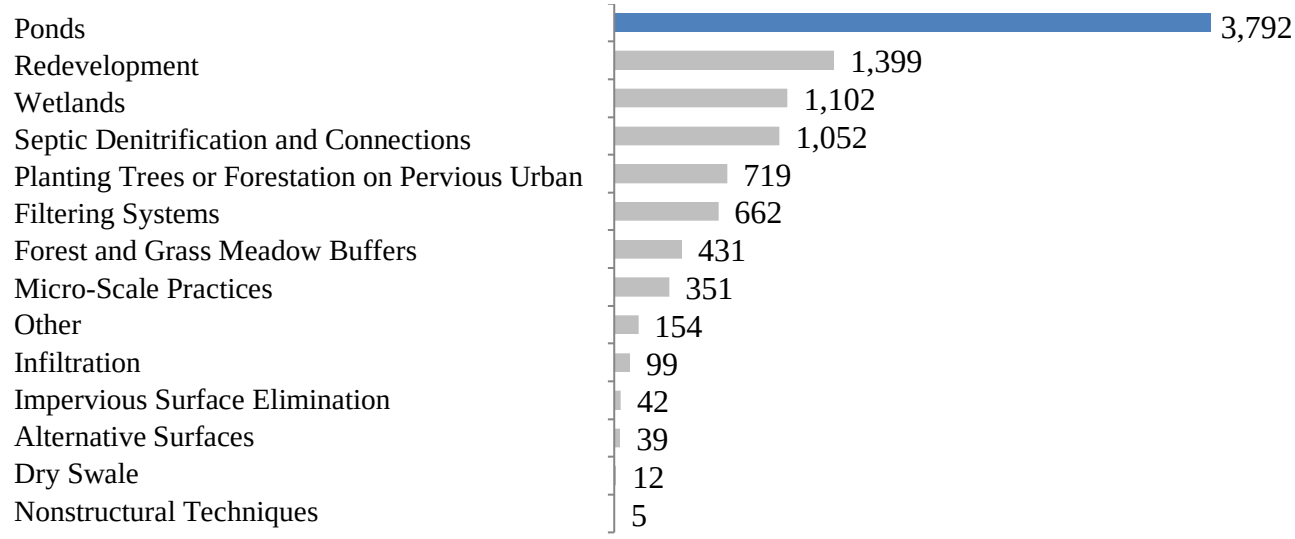

Figure 2: Impervious Acres Restored by Upland BMPs*

*Restoration data obtained from FY18 FAPs. See Appendix B.

In-stream BMPs

- Stream restoration is the most abundant in-stream practice and accounts for 2,259 acres of restored acres in the 10 jurisdictions. This is equivalent to approximately 10% of the treated impervious acres in the 10 MS4s.

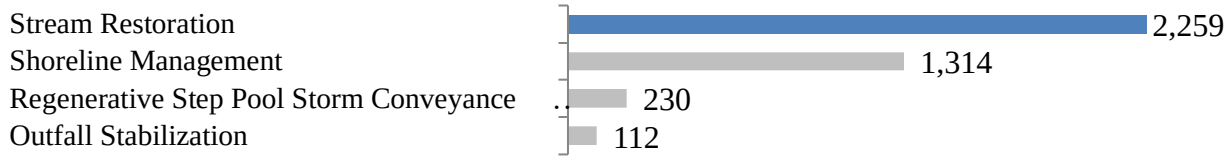

Figure 3: Impervious Acres Restored by In-stream BMPs*
*Restoration data obtained from FY18 FAPs. See Appendix B.

Programmatic BMPs

- Regenerative/vacuum street sweeping is not only the most widely used programmatic BMP, but it is also the most widely used BMP in the 10 MS4s. It accounts for approximately 4,009 (17%) of the impervious acres being treated throughout the 10 MS4s.

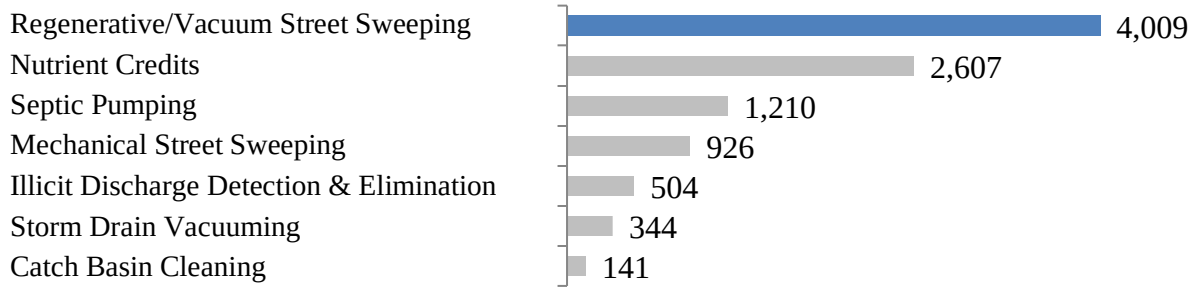

Figure 4: Impervious Acres Restored by Programmatic BMPs*
*Restoration data obtained from FY18 FAPs. See Appendix B.

Funding Sources

The WPRP provides MS4 jurisdictions with the flexibility to charge a fee or dedicate funds for SWM restoration projects. A majority of the MS4 funding in the 10 jurisdictions is achieved through bonds/loans (see Figure 5).

The MS4s have $903.4 million of projected funding sources for FY19 and FY20.

- Dedicated bonds and loans total $353.6 million and range from 5% to 72% of funds for each MS4.
- Phase I MS4s receive between 0% and 69% of funds through dedicated fees, totaling $250.6 million.
- General funds and other sources, totaling $274.7 million, are used for between 5% and 48% of the funds for each MS4.

Funding Sources (cont.)

- A total of $24.5 million in grants are used for between 0% and 35% of funds for each MS4.
- Additional MS4 funding sources may be found in Table 5.

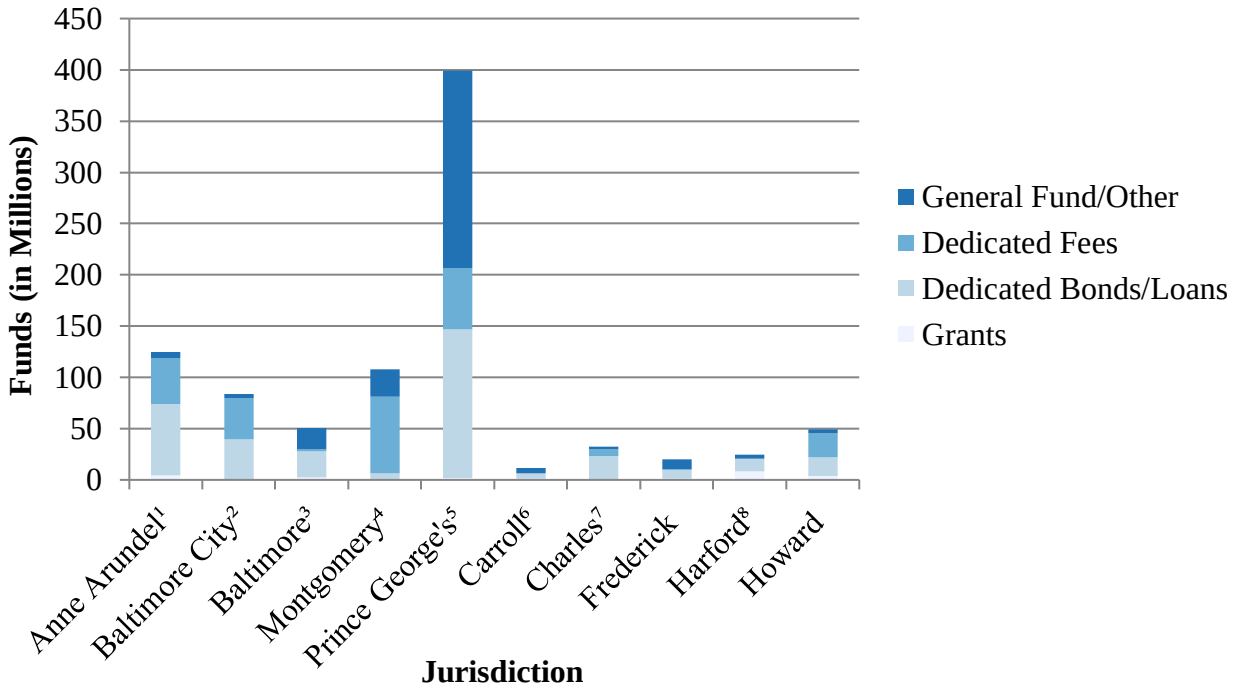

Figure 5: FY19-20 Funding Sources by Jurisdiction

1. Anne Arundel: dedicated fees are stormwater remediation fees; general fund/other includes other revenue, miscellaneous fees, and capital improvement projects (CIP) recoveries.
2. Baltimore City: other includes miscellaneous fees and water/wastewater utility.
3. Baltimore: other includes carryover from previous fiscal years; stormwater remediation fee (repealed in 2017) includes residual funds and was only used as a funding source in FY19.
4. Montgomery: other includes bag tax revenue, SWM waiver fees, investment income, solid waste fund, other departmental funds (Department of Transportation, Department of Permitting Services, and Department of General Services), and miscellaneous.
5. Prince George's: dedicated fees include Clean Water Act fees; other includes state funds and other debt service funds.
6. Carroll: no general fund reported in FAP; other includes property tax and interest.
7. Charles: "other" consists of erosion and sediment control fees, and stormwater maintenance fees.
8. Harford: "other" is $0.8 million from recordation tax.

Table 5: Additional Financing Opportunities for Maryland MS4s

State Resources		
Organization	***Program Name***	***Link***
Maryland Water Quality Financing Administration	Water Quality Revolving Loan Program	mde.maryland.gov/programs/water/WQFA/Pages/water_quality_fund.aspx
	Bay Restoration Fund Wastewater Grant Program	mde.maryland.gov/programs/water/BayRestorationFund/Pages/index.aspx
Maryland Department of Natural Resources	Chesapeake and Atlantic Coastal Bays Trust Fund	dnr.maryland.gov/ccs/Pages/funding/trust-fund.aspx
	Chesapeake & Coastal Service Funding Opportunities (Various)	dnr.maryland.gov/ccs/Pages/funding/fundingopp.aspx
Maryland Sea Grant College at the University of Maryland	"Green Streets, Green Jobs, Green Towns" Grant Program	cbtrust.org/grants/g3
	Maryland Watershed Restoration Assistance Directory (Various)	extension.umd.edu/watershed/watershed-restoration-assistance-directory
Sustainable Maryland	Grants Portal (Various)	sustainablemaryland.com/grants-resources/grants-portal/
Environmental Finance Center at the University of Maryland	Various resources for financial and technical training	arch.umd.edu/research-creative-practice/centers/environmental-finance-center/programs/stormwater-financing-and-outreach
National Resources		
Organization	***Program Name***	***Link***
Environmental Protection Agency	Green Infrastructure Funding Opportunities (Various)	epa.gov/green-infrastructure/green-infrastructure-funding-opportunities
	Water Finance Clearinghouse	epa.gov/waterfinancecenter
National Fish and Wildlife Foundation	Chesapeake Bay Stewardship Fund	nfwf.org/programs/chesapeake-bay-stewardship-fund

V. Watershed Protection and Restoration Program Annual Reports

- Stormwater remediation fees are optional for MS4 jurisdictions. Six MS4 jurisdictions reported having fees (seven if including Montgomery County, which is not required to submit a WPRP annual report, but does have a stormwater remediation fee); two obtain funds through taxes (see footnote 5 below); and one repealed its fee (see footnote 2 below). Residential fees range from $0.01 to $170.
- For the jurisdictions that have fees (excluding Prince George's County), the number of properties subject to fees range from 50,713 to 229,549.

Table 6: FY19 Sources of Funds for the WPRF

Jurisdiction	Properties Subject to a Stormwater Remediation Fee	% Change[1]	Total Stormwater Remediation Fees	% Change[1]	Total Additional Sources of Funds	% Change[1]	Total	% Change[1]
Anne Arundel	212,980	0%	$21,057,513	1%	$2,691,103	16%	$23,748,616	3%
Baltimore City	229,549	2%	31,637,481	16%	209,748	5%	31,847,229	16%
Baltimore[2]	0		0		10,500,000	-64%	10,500,000	-64%
Mont-gomery[3]	N/A		N/A		N/A		N/A	
Prince George's[4]	0		14,593,689	0.3%	1,941,322	N/A	16,535,011	14%
Carroll[5]	0		0		2,366,660	2%	2,366,660	2%
Charles	50,713	1%	3,080,369	9%	598,507	637%	3,678,876	26%
Frederick	52,379	2%	524	2%	0		524	2%
Harford[5]	0		0		6,780,000	-25%	6,780,000	-25%
Howard	108,919	2%	9,713,766	1%	0		9,713,766	1%
Total	654,540	-28%	$80,083,342	7%	$25,087,341	-42%	$105,170,682	-11%

*For further details on the WPRP, refer to the WPRP Annual Reports on the department's website at mde.maryland.gov/programs/Water/StormwaterManagementProgram/Pages/WPRPFinancialAssurancePlans.aspx.

1. Percent change from previous FY.
2. Baltimore County's stormwater remediation fee was repealed effective 7/1/2017.
3. Montgomery County was not required to report this information.
4. Prince George's County did not indicate how many properties were subject to fees in FY19, causing the state total to decrease by 28%. 266,129 properties were indicated for FY18.
5. Carroll and Harford counties do not collect stormwater remediation fees, but do obtain funds through a dedicated property tax or recordation tax, respectively.

Table 7: FY19 Percentage and Amount of Funds Spent on Specific Purposes

Jurisdiction	Capital Improvements for SWM	Operations & Maintenance of SWM Systems and Facilities	Public Education and Outreach[1]	SWM Planning[2]	Review of SWM Plans and Permit Application[3]	Grants to Nonprofit Organizations[4]	Administration of WPRF[5]	Total
Anne Arundel	$6,917,921	$6,260,555	$403,089	$2,886,862	$0	$86,490	$471,232	$17,026,149
Baltimore City	9,481,707	12,335,425	405,783	1,242,829	1,199,683	0	2,340,103	27,005,530
Baltimore	20,170,973	2,985,110	295,580	300,961	0	272,499	0	24,025,124
Montgomery[6]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Prince George's	38,213,395	13,268,593	3,720,166	5,085,757	9,100,000	900,000	263,000	70,550,911
Carroll	1,013,867	130,126	6,157	18,416	0	0	1,100,791	2,269,357
Charles	1,365,884	1,027,006	55,237	1,715,909	0	66,272	15,100	4,245,408
Frederick[7]	0	0	0	0	0	0	0	0
Harford	1,200,000	12,000	13,000	1,200,000	0	0	0	2,425,000
Howard	6,766,747	1,997,683	265,139	0	0	747,628	293,151	10,070,347
Total	$85,130,494	$38,016,499	$5,164,150	$12,450,735	$10,299,683	$2,072,889	$4,483,377	$157,617,827

* Md. Environment Code Ann. § 4-202.1.(i)(4) states "The percentage and amount of funds in the local watershed protection and restoration fund spent on each of the purposes provided in subsection (h)(4) of this section." Descriptions for some of these purposes are listed in footnotes 1 to 5 below.

1. "Public education and outreach relating to stormwater management or stream and wetland restoration".
2. "Stormwater management planning, including: 1. Mapping and assessment of impervious surfaces; and 2. Monitoring, inspection, and enforcement activities to carry out the purposes of the watershed protection and restoration fund".
3. "To the extent that fees imposed under § 4-204 of this subtitle are deposited into the local watershed protection and restoration fund, review of stormwater management plans and permit applications for new development".
4. "Grants to nonprofit organizations for up to 100% of a project's costs for watershed restoration and rehabilitation projects relating to:1. Planning, design, and construction of stormwater management practices; 2. Stream and wetland restoration; and 3. Public education and outreach related to stormwater management or stream and wetland restoration".
5. "Reasonable costs necessary to administer the local watershed protection and restoration fund".
6. Montgomery County was not required to report this information.
7. Frederick County reported sources of funds for the WPRF, but did not report the specific amounts spent on capital improvements, operations and maintenance, public education and outreach, etc.

VI. Summary

Maryland's MS4 permits and ISRP requirements are an integral part of the state's strategy to ensure that all stormwater pollution control measures needed to restore the Chesapeake Bay are in place by 2025. Maryland's 10 largest urban jurisdictions have been tasked with reducing their stormwater pollutant loads even as their communities continue to grow. Indeed, the restoration requirements in the MS4 permits have stretched these local jurisdictions to the fullest extent of their capabilities. Even so, Maryland's MS4s in aggregate have completed 103% of their ISRP requirement.

As MS4s continue to implement restoration practices, ISRP strategies are modified in accordance with a better understanding of what is and is not working. Additionally, with new MS4 permits in the future, planned restoration may need to be adjusted to effectively address goals while accounting for long-term bond obligations, and inspection and maintenance costs. In the FY18 FAPs, all MS4s showed that they have the budgets necessary to fund at least 100% of the ISRP requirements over the next two state fiscal years (FY19 and FY20). The next FAP submittals to the department, due in FY21, must show how each jurisdiction can fund 100% of its ISRP requirement for the following two years.

Photo: MDE

Photo: MDE

Photo: B. Cooper

VII. Definitions

Annual escalation: The practice of adjusting current values to account for future increases. Annual escalation can account for increases in value of labor and materials.
Appropriation: Authorization from the legislation to spend money from a specific funding source for the purposes allowed by law. Appropriations specify both the amount and funding source. Appropriations must be approved before a contract mechanism can be approved.
BMP: Best Management Practice; these include structural practices (e.g., filters, ponds, wetlands), ESD (e.g., grass swales, rain barrels, green roofs), and alternative practices (e.g., outfall stabilization, septic pumping, street sweeping, tree planting).
Budget: Plan or authorization for revenues and expenditures within a fixed period of time.
CIP: Capital improvement plan; A project must cost more than $250,000 and be associated with a specific asset which will depreciate over time.
Debt service: Portion of capital expenditures which is paid using mechanisms to extend the payment over a specified period of time. Debt service mechanisms include bonds and loans, which include costs for administration and interest.
Encumbrance: Commitment of money to meet an obligation for goods and services. Once a contract or agreement is approved, the money is encumbered into the budget to secure those funds.
EPA: United States Environmental Protection Agency
ESD: Environmental site design (also referred to as Low Impact Development / LID), comprehensive strategy for maintaining pre-development runoff characteristics by integrating site design, natural hydrology, and smaller controls to capture and treat runoff at the source, like micro-bioretention.
Expenditure: The amount of money that is actually spent.
FAP: Financial Assurance Plan; state required 5-year projection of funding and expenses related to the MS4 permit and impervious surface restoration requirements. These plans also require the reporting of specific actions and expenditures undertaken in previous fiscal years to meet impervious surface restoration requirements.
Fiscal year: July 1 to June 30
Grant: an amount of money given by an entity for a specific purpose, with no obligation of repayment. Grants can also be known as a gift. Grant agreements include matching commitments, either by cash or by in-kind services.
Impervious surface: a surface that does not allow stormwater to infiltrate into the ground. "Impervious surface" includes rooftops, driveways, sidewalks, or pavement.
ISRP: Impervious Surface Restoration Plan; can also mean MS4 WIP or implementation plan for qualitative controls. For the current MS4 permit, the impervious surface restoration requirement is 20% of the county's or municipality's total impervious area that has not already been treated or restored to the MEP.
Loan: A debt service mechanism in which a governing body receives money from an external source with a commitment to repay both the principal and interest within a specific time frame.
MDE: Maryland Department of Environment
MEP: Maximum Extent Practicable
MS4: Municipal Separate Storm Sewer System
NPDES: National Pollutant Discharge Elimination System
Nutrients: Total phosphorus and total nitrogen
Paygo: Portion of capital expenditures which is paid directly when the expenditure is incurred.

Public-private partnership (P3s): An agreement between one or more public and private entities to do something better together than could be done individually. In many of these agreements, the local government provides one or a combination of tax incentives, public assets, or financing assistance. The private entity may contribute land, capital investments, a commitment to provide local jobs, or development expertise and usually, but not always, assumes most of the financial risk for the ultimate project outcomes.
Qualitative Control: A system of practices that reduces or eliminates pollutants that might otherwise be carried by surface runoff. Design parameters include water quality volume and recharge volume. Water quality volume can be converted into equivalent acreage of impervious surface restored.
Quantitative Control: A system of practices that controls the increased volume and rate of surface runoff caused by man-made changes to the land. Design parameters include channel protection volume and flood protection volumes.
Reserve: Amount of revenue held to demonstrate ability to repay a debt service mechanism or to hedge against an unforeseen economic downturn.
Revenue: Cash received from external sources to supply specific funds.
Revenue bond: An official document authorized by a governing body to complete CIP projects using a debt service, with a specific enterprise fund used as collateral.
Request for Proposal: a document used by a company or organization to procure a good or service, typically through a bidding process.
Runoff: The portion of water during a storm that runs over the land instead of evaporating or being soaked through the ground surface.
SRLF: State revolving loan fund
TMDL: Total Maximum Daily Load, the maximum amount of a pollutant a water body can receive and still meet water quality standards; "pollution diet." Developed when a substance exceeds water quality standards.
Watershed: An area of land that drains down slope to the lowest point, discharging to a river or other body of water
WIP: Watershed Implementation Plan; document that sets the way an agency will meet the regulatory requirements.
WPRP Fund: Watershed Protection and Restoration Program Fund.
WQA: Water Quality Analysis, developed when supplemental data indicates the water body is meeting water quality standards for that substance

*Some definitions obtained from Baltimore City Department of Public Works Glossary of Terms.

VIII. Appendices

Appendix A: Abbreviations and Classifications of BMPs

Table A-1: BMP Classes

Code	Code Description
A	Alternative BMP
E	ESD
S	Structural BMP

Table A-2: Alternative BMPs

Code	Code Description	Category
CBC	Catch Basin Cleaning	Programmatic
FPU	Planting Trees or Forestation on Previous Urban	Upland
IMPF	Impervious Surface Elimination (to forest)	Upland
IMPP	Impervious Surface Elimination (to pervious)	Upland
MSS	Mechanical Street Sweeping	Programmatic
OUT	Outfall Stabilization	In-Stream
SDV	Storm Drain Vacuuming	Programmatic
SEPC	Septic Connections to wastewater treatment plant (WWTP)	Upland
SEPD	Septic Denitrification	Upland
SEPP	Septic Pumping	Programmatic
SHST	Shoreline Stabilization	In-Stream
SPSC	Step Pool Storm Conveyance	In-Stream
STRE	Stream Restoration	In-Stream
VSS	Regenerative/Vacuum Street Sweeping	Programmatic

Table A-3: Environmental Site Design (ESD) BMPs

Code	Code Description	Category
Alternative Surfaces		
AGRE	Green Roof – Extensive	Upland
AGRI	Green Roof – Intensive	Upland
APRP	Permeable Pavements	Upland
ARTF	Reinforced Turf	Upland
Micro-Scale Practices		
MENF	Enhanced Filters	Upland
MIBR	Infiltration Berms	Upland
MIDW	Dry Well	Upland
MILS	Landscape infiltration	Upland
MMBR	Micro-Bioretention	Upland
MRNG	Rain Gardens	Upland
MRWH	Rainwater Harvesting	Upland
MSGW	Submerged Gravel Wetlands	Upland
MSWB	Bioswale	Upland
MSWG	Grass Swale	Upland
MSWW	Wet Swale	Upland
Nonstructural Techniques		
NDNR	Disconnection of Non-Rooftop Runoff	Upland
NDRR	Disconnection of Rooftop Runoff	Upland
NSCA	Sheetflow to Conservation Areas	Upland

Table A-4: Structural BMPs

Code	Code Description	Category
Filtering Systems		
FBIO	Bioretention	Upland
FORG	Organic Filter (Peat Filter)	Upland
FPER	Perimeter (Sand) Filter	Upland
FSND	Sand Filter	Upland
FUND	Underground Filter	Upland
Infiltration		
IBAS	Infiltration Basin	Upland
ITRN	Infiltration Trench	Upland
Open Channels		
ODSW	Dry Swale	Upland
OWSW	Wet Swale	Upland
Ponds		
PMED	Micropool Extended Detention Pond	Upland
PMPS	Multiple Pond System	Upland
PPKT	Pocket Pond	Upland
PWED	Extended Detention Structure, Wet	Upland
PWET	Retention Pond (Wet Pond)	Upland
Wetlands		
WEDW	Extended Detention - Wetland	Upland
WPKT	Pocket Wetland	Upland
WPWS	Wet Pond – Wetland	Upland
WSHW	Shallow Marsh	Upland
Other Practices		
XDED	Extended Detention Structure, Dry	Upland
XDPD	Detention Structure (Dry Pond)	Upland
XFLD	Flood Management Area	Upland
XOGS	Oil Grit separator	Upland
OTH	Other	Upland

Appendix B: Additional Tables from BMP Analysis

Table B-1: Impervious Acres Completed by Upland BMPs

BMP Class		BMP Type	Acres[1]	Cost	Cost/Acre[2]	Average Cost/Acre[3]
		Alternative Surfaces				
E	AGRE	Green Roof – Extensive	1	$9,900	$15,924	$38,099
E	APRP	Permeable Pavements	38	$3,070,135	$80,766	$317,681
			39	$3,080,035	$79,722	
		Nonstructural Techniques				
E	NDRR	Disconnection of Rooftop Runoff		$46,000	$77,800	$137,357
E	NDNR	Disconnection of Non-Rooftop Runoff	2	$54,000	$27,327	$52,314
E	NSCA	Sheetflow to Conservation Areas	2	-	-	-
			5	$100,000	$20,735	
		Micro-Scale Practices				
E	MRWH	Rainwater Harvesting	26	$556,535	$21,186	$185,614
E	MSGW	Submerged Gravel Wetlands	33	$2,431,575	$72,705	$67,044
E	MILS	Landscape Infiltration	0.3	$25,000	$80,632	$416,667
E	MIDW	Dry Wells	2	$70,889	$32,902	$47,511
E	MMBR	Micro-Bioretention	87	$15,563,029	$178,967	$4,959,258
E	MRNG	Rain Gardens	122	$7,647,428	$62,524	$146,082
E	MSWG	Grass Swale	65	$3,828,902	$58,619	$1,066,544
E	MSWB	Bioswale	14	$174,219	$12,882	$173,857
E	MENF	Enhanced Filters	0.4	-	-	-
			351	$30,297,577	$86,392	
		Ponds				
S	PWED	Extended Detention Structure, Wet	1,590	$43,227,113	$27,182	$48,959
S	PWET	Retention Pond (Wet Pond)	1,684	$83,493,598	$49,576	$108,233
S	PMPS	Multiple Pond System	3	$348,494	$101,602	$101,602
S	PPKT	Pocket Pond	0.3	-	-	-
S	PMED	Micropool Extended Detention Pond	18	$901,471	$51,364	$70,032
			3,296	$127,970,676	$38,829	

BMP Class		BMP Type	Acres[1]	Cost	Cost/Acre[2]	Average Cost/Acre[3]
		Wetlands				
S	WSHW	Shallow Marsh	619	$10,426,242	$16,835	$32,695
S	WEDW	ED – Wetland	111	$2,928,377	$26,321	$93,987
S	WPWS	Wet Pond – Wetland	329	$5,560,258	$16,876	$99,189
S	WPKT	Pocket Wetland	42	$364,010	$8,750	$9,356
			1,102	$19,278,888	$17,500	
		Infiltration				
S	IBAS	Infiltration Basin	85	$4,004,043	$46,917	$75,076
S	ITRN	Infiltration Trench	14	$1,069,764	$76,880	$274,729
			99	$5,073,807	$51,117	
		Filtering Systems				
S	FBIO	Bioretention	100	$13,247,782	$132,734	$371,693
S	FSND	Sand Filter	536	$14,804,896	$27,619	$66,589
S	FUND	Underground Filter	26	$2,152,365	$81,913	$269,914
			662	$30,205,043	$45,618	
		Open Channels				
S	ODSW	Dry Swale	12	$133,900	$10,893	$183,425
		Other Practices				
S	XDED	Extended Detention Structure, Dry (Retrofits)[4]	497	$25,671,032	$51,690	$242,406
S	OTH	Other	154	$1,233,304	$36,878	$92,885
			651	$26,904,335	$41,357	
		Alternative BMPs				
A	IMPP	Impervious Surface Elimination (to pervious)	42	$1,177,066	$28,293	$406,237
A	IMPF	Impervious Surface Elimination (to forest)	0.5	$69,000	$152,698	$163,686
A	FPU	Planting Trees or Forestation on Pervious Urban	719	$29,480,515	$41,015	$75,673
A	FB	Forest Buffer	265	$683,662	$2,577	$102,032
A	GWB	Grass Meadow Buffer	165	-	-	-
S	REDE	Redevelopment	1,399	$615,387	$440	$1,706
A	SEPD	Septic Denitrification	571	$4,290,566	$7,518	$33,064

BMP Class		BMP Type	Acres[1]	Cost	Cost/Acre[2]	Average Cost/Acre[3]
A	SEPC	Septic Connections to WWTP	481	$157,780	$328	$24,265
			3,642	$36,473,976	$10,014	
Total			9,858	$279,518,237	$28,354	

1. Restoration data obtained from FY18 FAPs. BMPs were grouped based on their class, type, and function.
2. The cost per acre was calculated by dividing the total cost of the specific BMP type in the 10 MS4s by the total impervious acres treated by the specific BMP type in the 10 MS4s. Impervious acres treated from BMPs with a cost of $0 were excluded from the cost per acre analysis. Therefore, the total impervious acres treated reflects all of the acres treated by a specific BMP type while the cost per acre represents the cost per acre for only those BMPs with actual costs.
3. Average cost per acre was calculated by determining the individual cost per acre for each individual BMP and then finding the average for each BMP type.
4. Some retrofit and pond upgrade projects were reported as dry extended detention structures.

Table B-2: Impervious Acres Completed by In-Stream BMPs

BMP Class		BMP Type	Acres[1]	Cost	Cost/Acre[2]	Average Cost/Acre[3]
A	STRE	Stream Restoration	2,259	$99,218,575	$43,915	$68,455
A	SHST	Shoreline Management	1,314	$11,013,311	$8,384	$29,133
A	SPSC	Regenerative Step Pool Storm Conveyance	230	$14,384,835	$62,468	$157,625
A	OUT	Outfall Stabilization	112	$5,592,987	$49,808	$157,825
Total			3,915	$130,209,708	$33,255	

1. Restoration data obtained from FY18 FAPs. BMPs were grouped based on their class, type, and function.
2. The cost per acre was calculated by dividing the total cost of the specific BMP type in the 10 MS4s by the total impervious acres treated by the specific BMP type in the 10 MS4s. Impervious acres treated from BMPs with a cost of $0 were excluded from the cost per acre analysis. Therefore, the total impervious acres treated reflects all of the acres treated by a specific BMP type while the cost per acre represents the cost per acre for only those BMPs with actual costs.
3. Average cost per acre was calculated by determining the individual cost per acre for each individual BMP and then finding the average for each BMP type.

Table B-3: Impervious Acres Completed by Programmatic BMPs

BMP Class		BMP Type	Acres[1]	Cost	Cost/Acre[2]	Average Cost/Acre[3]
A	VSS	Regenerative/Vacuum Street Sweeping	4,009	$13,216,627	$3,297	$4,136
A	Trade	Nutrient Credits	2,607	-	-	-
A	SEPP	Septic Pumping	1,210	$387,967	$321	$3,426
A	MSS	Mechanical Street Sweeping	926	$7,743,483	$8,359	$1,250
A	IDDE	Illicit Discharge Detection & Elimination	504	-	-	-
A	SDV	Storm Drain Vacuuming	344	$8,183,750	$23,776	$16,332
A	CBC	Catch Basin Cleaning	141	$4,544,200	$32,146	$23,160
Total			9,742	$34,076,027	$3,498	

1. Restoration data obtained from FY18 FAPs. BMPs were grouped based on their class, type, and function.
2. The cost per acre was calculated by dividing the total cost of the specific BMP type in the 10 MS4s by the total impervious acres treated by the specific BMP type in the 10 MS4s. Except for nutrient trading with WWTP, impervious acres treated from BMPs with a cost of $0 were excluded from the cost per acre analysis. Therefore, the total impervious acres treated reflects all of the acres treated by a specific BMP type while the cost per acre represents the cost per acre for only those BMPs with actual costs.
3. Average cost per acre was calculated by determining the individual cost per acre for each individual BMP and then finding the average for each BMP type.

Appendix C: Calculations

General

ISRP Requirement (or Impervious Acre Baseline) = (total impervious acres not treated to the MEP jurisdiction-wide) * (20% MS4 permit restoration requirement)

Table 2

Restoration complete was determined by dividing the total acres restored (gathered from FY19 MS4 Annual Reports) by the total updated ISRP Requirement.

Tables 3

Fulfillment of 100% Revenue Requirement for 2-Year Costs = 2-Year Revenue/ 2-Year Costs

Table 4

Restoration complete was determined by dividing the total acres restored (gathered from FY19 MS4 Annual Reports) by the total updated impervious acre baseline. Percentage of ISRP Requirement Met Through Trading was calculated by dividing the equivalent acres of nutrient credits by the total acres restored.

Table 7

Percent change from previous FY was determined by dividing the FY19 household or dollar amount by the FY18 household or dollar amount and then subtracting by 1 (i.e., (FY19 Amount/FY18 Amount) – 1).

BMP Analysis

The pie chart for implemented BMPs was created using the total impervious acres restored during the reported permit term as of FY18. Permit term implementation amounts for the specific types, or groups, of BMPs were calculated by using the total impervious area treated of each BMP type/group implemented in all 10 MS4s.

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