



Maryland
Department of
the Environment

**Annual Report on Financial Assurance Plans and the
Watershed Protection and Restoration Program
-2022-**

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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 2 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 most recent FAPs submitted on the anniversary date of each jurisdiction's MS4 permit, between December 2020 and February 2021, were 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 were 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; and
- All SWM projects implemented in the previous fiscal year for the ISRP requirement.

This Annual Report on FAPs and the WPRP 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	2/2/2021	2/2/2021	1/4/2021	Y	6/14/2021
	Baltimore City	12/28/2020	12/28/2020	12/17/2020	Y	6/14/2021
	Baltimore	12/21/2020	12/21/2020	12/1/2020	Y	6/14/2021
	Montgomery ¹	2/16/2021	N/A	3/9/2021	Y	6/14/2021
	Prince George's ²	12/22/2020	12/22/2020	5/18/2021	Y	6/14/2021
	Carroll	12/22/2020	12/22/2020	12/3/2020	Y	6/14/2021
Medium	Charles	12/23/2020	12/23/2020	10/27/2020	Y	6/14/2021
	Frederick ³	12/28/2020	12/28/2020	8/17/2021	Y	6/14/2021
	Harford	12/30/2020	1/22/2020	11/10/2020	Y	6/14/2021
	Howard ⁴	12/17/2020	12/17/2020	3/15/2021	Y	6/14/2021

1. A draft FAP was submitted on Feb. 16, 2021. An approved FAP was submitted on May 5, 2021.
2. A draft FAP was submitted on Dec. 22, 2020. A .pdf of the approved FAP was submitted on July 15, 2021.
3. A draft FAP was submitted on Dec. 28, 2020. A .pdf of the approved FAP was submitted on Aug. 26, 2021.
4. A draft FAP was submitted on Dec. 17, 2020. An approved FAP was submitted on June 23, 2021.

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; and
- Programmatic Practices: street sweeping, inlet cleaning, storm drain vacuuming.

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.

Current Implementation

- The Department approved each MS4’s impervious acre baseline analysis, which set the 20% level of restoration required under the previous (or administratively continued) stormwater permits, also known as the ISRP requirement. Overall, the MS4s completed 93% of the ISRP requirement by the end of their permits’ 5-year terms (see Table 2). According to data provided by the MS4s, large MS4s completed 21,756 acres of restoration or 86% of the total ISRP requirement, while medium MS4s completed 10,448 acres of restoration or 109% of the ISRP requirement by the end of their permits’ 5-year terms.

Table 2: Completed Projects to Meet the ISRP 5-Year Permit Term Requirements

	MS4	Impervious Acre (IA) Baseline ¹	ISRP Requirement (Acres) ¹	Restoration Completed ¹	
Large	Anne Arundel	24,980	4,996	4,996	100%
	Baltimore City	21,455	4,291	4,530	106%
	Baltimore	30,180	6,036	6,064	100%
	Montgomery	18,891	3,778	3,779	100%
	Prince George's	30,525	6,105	2,387	39%
			126,031	25,206	21,756
Medium	Carroll	8,070	1,614	1,629	101%
	Charles	7,887	1,577	1,739	110%
	Frederick	9,903	1,981	1,981	100%
	Harford	10,928	2,186	2,186	100%
	Howard	11,019	2,204	2,913	132%
			47,807	9,562	10,448
Total		173,838	34,768	32,204	93%

1. Updated ISRP requirements, impervious acre baselines, and restoration completed from FY19 MS4 Annual Reports and data submitted for final permit restoration accounting. ISRP Requirement = impervious acre baseline * 20% MS4 permit restoration requirement.

- Prince George’s County **did not** meet the 20% ISRP requirement by the end of its 5-year permit term on Jan. 2, 2019. The County restored 2,387 impervious acres resulting in a restoration deficit of 3,718 impervious acres. Subsequently, on Dec. 6, 2021, the Department and Prince George’s County entered into a court-sanctioned consent decree resolving issues with the county’s performance pursuant to the MS4 permit. The consent decree formally establishes implementation schedules and annual milestones, for the completion of the County’s remaining ISRP requirement by Dec. 31, 2024. Additionally, the consent decree imposes a \$475,000 penalty, due on Dec. 31, 2024, for failure to complete all of the restoration work required by the 2014 permit. The penalty can be satisfied through the construction of one or more Department-approved supplemental environmental projects (SEPs) at a minimum cost of \$475,000 by Dec. 31, 2024. The SEPs completed as a result of this penalty will not count toward the County’s ISRP requirement.
- The specific actions implemented by these Phase I MS4s for meeting ISRP requirements through FY21 have achieved 38,713 acres of restoration or 22% of the total impervious acre baseline (see Table 3). This is equivalent to 29,328 football fields, 19,357 city blocks, or 60 square miles.

Table 3: Specific Actions Completed Through FY21 to Meet ISRP Permit Requirements

MS4	Impervious Acre (IA) Baseline ¹	Acres Restored as of						Restoration Completed ³
		FY16 ²	FY17 ²	FY18 ²	FY19 ²	FY20 ²	FY21 ²	
Anne Arundel ⁴	24,980	912	1,680	4,996	4,996	4,999	5,712	23%
Baltimore City	21,455	3,624	3,953	4,291	6,763	4,749	6,065	28%
Baltimore	30,180	983	1,033	6,036	6,664	7,263	7,572	25%
Montgomery ⁵	18,891	1,918	2,927	3,778	3,849	4,018	4,018	21%
Prince George's	30,525	225	937	2,217	2,529	2,656	4,177	14%
Carroll	8,070	1,247	1,369	1,491	1,629	1,758	2,070	26%
Charles	7,887	253	310	679	1,683	1,739	2,019	26%
Frederick ⁶	9,903	161	186	563	1,981	1,981	1,981	20%
Harford ⁶	10,928	453	478	504	2,186	2,186	2,186	20%
Howard ⁵	11,019	1,028	1,434	1,858	2,913	2,913	2,913	26%
Total	173,838	10,804	14,307	26,413	35,193	34,262	38,713	22%

1. Impervious acre (IA) baselines from FY19 MS4 Annual Reports and final permit restoration accounting.
2. Restoration data are from FY16 to FY21 MS4 Annual Reports (covering the end of the previous permit term up to June 30, 2016, June 30, 2017, June 30, 2018, June 30, 2019, June 30, 2020, and June 30, 2021 respectively). Some of these data have been updated to reflect annual report review findings.
3. Percent of impervious acre baseline restored.
4. Anne Arundel County completed restoration in FY19, but those restored acres were credited toward replacing the nutrient credits from FY18 that were obtained in an amount equivalent to 2,607 impervious acres.
5. Howard and Montgomery counties completed restoration in FY21 but did not provide amounts of acres restored. These data will be included with their next FAPs and MS4 annual reports. For this table, the reported amount from the previous FY was used.
6. Frederick and Harford counties completed restoration in FY20, but those restored acres are being credited toward replacing the nutrient credits from FY19 that were obtained in an amount equivalent to 1,273 and 970 impervious acres, respectively.

- On Nov. 5, 2021, the Department issued final MS4 permits for Baltimore City and Anne Arundel, Baltimore, and Montgomery counties. Permits for medium MS4s and Prince George’s County have been administratively continued. The Department also issued a draft MS4 permit for Prince George’s County on Nov. 5, 2021, and on Mar. 11, 2022, the Department issued draft MS4 permits for Carroll, Charles, Frederick, Harford, and Howard counties. The draft and final permits build upon and improve pollution prevention under the previous permits and require local jurisdictions to not only keep pace but do more to help Maryland meet its Chesapeake Bay total maximum daily load (TMDL) requirements.
- The final permits established new ISRP requirements for the next 5 years. As of FY21, Baltimore City and Anne Arundel, Baltimore, and Montgomery counties have achieved approximately 4,266 acres of restoration or 24% of the total ISRP requirement for their recently issued permits (see Table 4).

Table 4: Specific Actions Completed Through FY21 by Large MS4s to Meet New ISRP Permit Requirements

MS4	Impervious Acre (IA) Baseline ¹	Previous Permit		Total Acres Restored as of FY21 ²	New Permit			
		ISRP Requirement ¹	Restoration Completed ²		ISRP Requirement ³	Restoration Completed ⁴		
Anne Arundel	24,980	4,996	4,996	5,712	2,998	12%	716	3%
Baltimore City	21,455	4,291	4,530	6,065	3,696	17%	1,774	8%
Baltimore	30,180	6,036	6,064	7,572	2,696	9%	1,536	5%
Montgomery ⁵	18,891	3,778	3,779	4,018	1,814	10%	240	1%
Total	95,506	19,101	19,369	23,367	11,204	12%	4,266	4%

1. IA baselines from FY19 MS4 Annual Reports and final permit restoration accounting.
2. Restoration data are from FY21 MS4 Annual Reports (covering the end of the previous permit term up to June 30, 2021).
3. New ISRP Requirement from reissued permits. More information can be found at mde.maryland.gov/programs/water/StormwaterManagementProgram/pages/storm_gen_permit.aspx.
4. Restoration completed calculated by subtracting the total acres restored as of FY21 minus the ISRP requirement for the previous permit. Percent restoration completed calculated by restoration completed divided by impervious acre baseline.
5. Montgomery County completed restoration in FY21 but did not provide the total acres restored. These data will be included with its next FAP and MS4 annual report. For this table, the reported amount from the previous FY was used.

Projected Implementation and Funding

- For FY21 and FY22, the MS4s projected completing 9,199 acres of restoration. The total 2-year cost reported in the All Actions worksheets equals \$450.1 million. This is the cost for only BMPs without factoring in other associated ISRP costs such as debt service payments.

Table 5: Projected ISRP Implementation for FY21 and FY22 to Meet ISRP Requirements

	MS4	IA Baseline	Projected Restoration to be Completed ¹		Projected Cost ¹	Total Cost per Acre ²
Large	Anne Arundel	24,980	1,968	8%	\$94,009,114	\$47,767
	Baltimore City	21,455	1,230	6%	69,737,758	56,720
	Baltimore	30,180	665	2%	34,858,044	52,435
	Montgomery	18,891	491	3%	27,908,024	56,858
	Prince George's	30,525	2,599	9%	147,869,715	56,886
Medium	Carroll	8,070	808	10%	16,850,000	20,858
	Charles	7,887	479	6%	12,355,370	25,799
	Frederick	9,903	368	4%	21,816,155	59,280
	Harford	10,928	318	3%	12,712,000	40,038
	Howard	11,019	273	2%	12,000,000	43,956
Total		173,838	9,199	5%	\$450,116,180	\$48,937

1. Acres to be Completed and Cost from All Actions worksheet in FY20 FAPs.
2. Total Cost per Acre = Total Projected Cost/Total Projected Impervious Acres Restored Next Two Years. (Includes BMPs with no reported cost).

- The 10 MS4s reported that the total ISRP cost for FY21 and FY22 was \$644.9 million while the total revenue was \$640.6 million (see Table 6). The reporting for these years occurred while the permits were administratively continued. Subsequently, there were no additional ISRP requirements that the MS4s needed to ensure adequate revenues under the FAP requirement.
- **All of the MS4s, except for Baltimore City,** did show that they had the revenues necessary to fund 100% of the estimated costs of the ISRP requirements in their proposed MS4 permits for FY21 and FY22. Next year's FAP report will document actual permitted ISRP requirements, costs, revenues, and compliance with the FAP requirements.

Table 6: 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	\$105.7M	\$116.1M	110%	Y
	Baltimore City	\$64.3M	\$40.2M	63%	Y
	Baltimore	\$57.3M	\$57.3M	100%	Y
	Montgomery	\$92.2M	\$92.2M	100%	Y
	Prince George's	\$234.9M	\$235.2M	100%	Y
Medium	Carroll	\$22.9M	\$23.0M	101%	Y
	Charles	\$14.7M	\$19.8M	134%	Y
	Frederick	\$16.3M	\$16.3M	100%	Y
	Harford	\$21.7M	\$25.5M	118%	Y
	Howard	\$14.9M	\$14.9M	100%	Y
Total		\$644,883,170	\$640,585,905		

1. Cost and Revenue data from ISRP Revenue worksheet in FY20 FAPs.

- The next FAPs are expected to contain increased BMP implementation and funding to meet the requirements of the reissued permits, demonstrating efforts to improve water quality and restore the Chesapeake Bay. The FAP submittals, due to the Department with FY22 MS4 annual reports, must show how each jurisdiction can fund 100% of its ISRP requirement for FY23 and FY24.
- MS4s that implemented programmatic BMPs in the previous permit term are required to continue those BMPs or replace the ISRP credits that were achieved through programmatic BMPs. Also, MS4s will be able to incorporate new BMPs found in the 2021 “Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits” (2021 Accounting Guidance). For example, the updated 2021 Accounting Guidance incentivizes green stormwater infrastructure BMPs and BMPs with climate resiliency co-benefits.
- An analysis of BMP implementation and funding sources may be found in the following pages. Electronic copies of the report, submitted FAPs, and the Department’s reviews 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 FY20. Based on the impervious acres restored, 42% of restoration has been achieved through upland BMPs, 31% by programmatic BMPs, and 27% through in-stream practices. The following is an analysis of the diversity within each category of BMP.

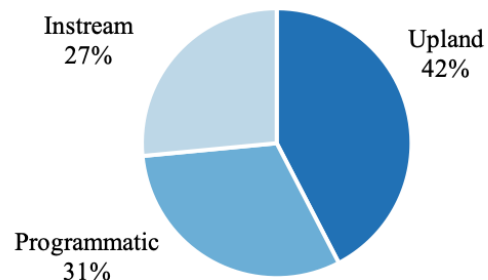


Figure 1: Completed BMP Implementation by Category during the Permit Term

Upland BMPs

- The three groups of upland BMPs with the greatest sum of impervious area treated are ponds (3,867 acres), other environmental site design (ESD) and structural practices (1,407 acres), and redevelopment (1,399 acres).
- As of FY20, the amount treated by ponds is equivalent to approximately 14% of the treated impervious acres in the 10 MS4s. On the other hand, 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 as of FY20.

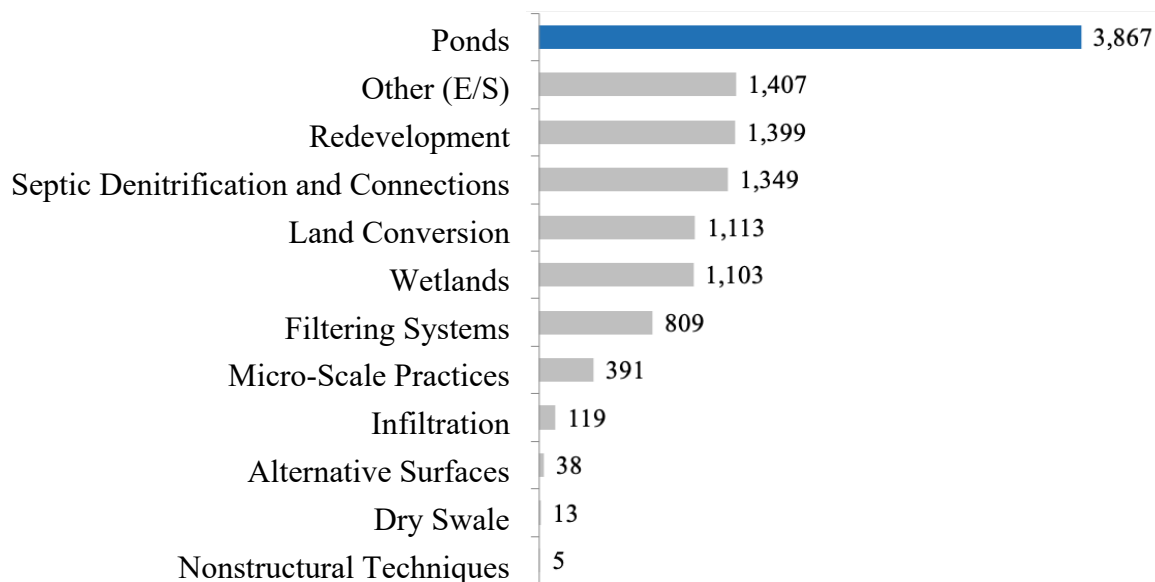


Figure 2: Impervious Acres Restored by Upland BMPs*

*Restoration data obtained from FY20 FAPs. See Appendix C.

In-stream BMPs

- Stream restoration is the most abundant in-stream practice and accounts for 5,516 acres of restored acres in the 10 jurisdictions. This is equivalent to approximately 20% of the treated impervious acres in the 10 MS4s as of FY20.

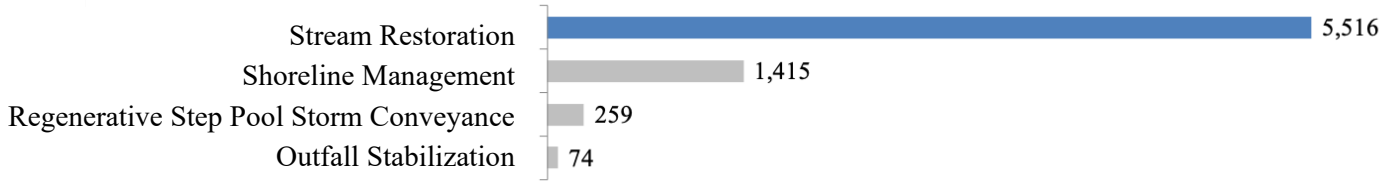


Figure 3: Impervious Acres Restored by In-stream BMPs*

*Restoration data obtained from FY20 FAPs. See Appendix C.

Programmatic BMPs

- Regenerative/vacuum street sweeping is not only the most widely used programmatic BMP, but it is also the second most widely used BMP in the 10 MS4s. It accounts for approximately 4,039 (15%) of the impervious acres being treated throughout the 10 MS4s as of FY20.

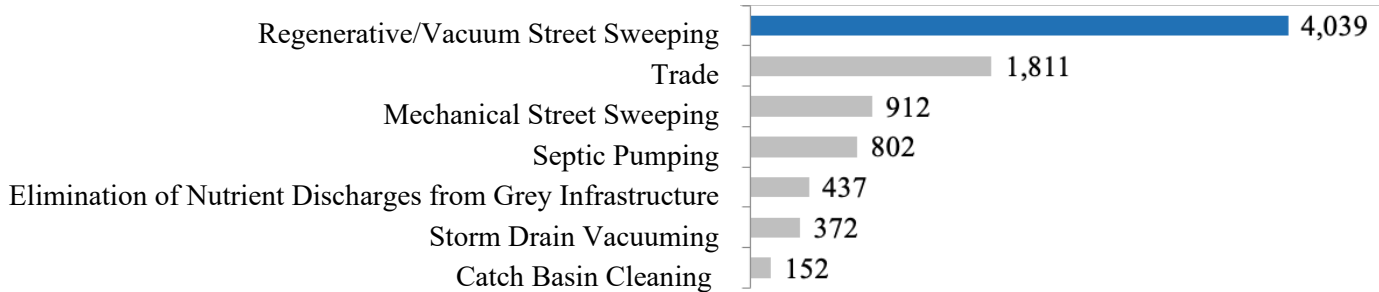


Figure 4: Impervious Acres Restored by Programmatic BMPs*

*Restoration data obtained from FY20 FAPs. See Appendix C.

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 \$815.1 million of projected funding sources for FY21 and FY22.

- Dedicated bonds and loans total \$287.8 million and range from 0% to 58% of funds for each MS4.
- Phase I MS4s receive between 0% and 93% of funds through dedicated fees, totaling \$239.9 million.
- General funds and other sources, totaling \$254.0 million, are used for between 3% and 53% of the funds for each MS4.

Funding Sources (cont.)

- A total of \$33.4 million in grants are used for between 0% and 32% of funds for each MS4.
- Additional MS4 funding sources may be found at the Department’s [Advancing Stormwater Resiliency in Maryland website](#).

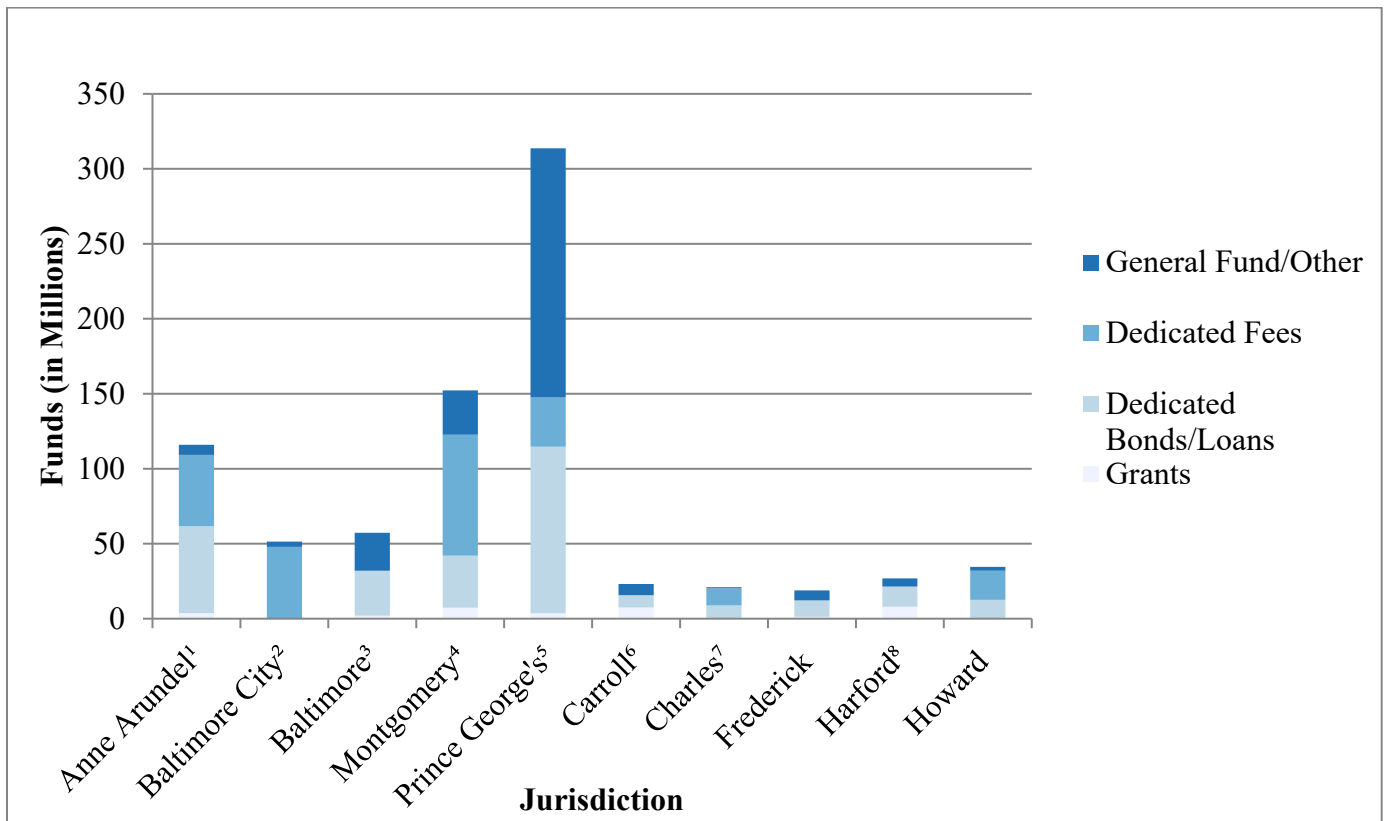


Figure 5: FY21-22 Funding Sources by Jurisdiction

1. Anne Arundel: Dedicated fees are stormwater remediation fees; general fund/other includes investment income and interfund recoveries.
2. Baltimore City: Other includes miscellaneous fees and water/wastewater utility.
3. Baltimore: Other includes carryover from previous fiscal years, miscellaneous fees, and debt premium.
4. Montgomery: Other includes bag tax revenue, SWM waiver fees, investment income, tree canopy fees, BMP monitoring fee, 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.
6. Carroll: No general fund reported in FAP; other includes Municipalities, Municipal Support Capital Projects, Fund Balance, Development Contributions, and Interest.
7. Charles: “Dedicated Fees” consists of stormwater maintenance fees, miscellaneous fees, and WPR Fund balance.
8. Frederick: Other includes Capital Improvement Project Funds and Operating Funds.
9. Harford: “General Fund/Other” includes \$3.6 million from recordation tax.

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 the number of properties subject to fees range from 50,713 to 289,876.

Table 7: FY21 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	222,859	5%	\$22,554,523	1%	\$2,087,576	-31%	\$24,642,098	-3%
Baltimore City	237,391	3%	\$33,621,325	-1%	\$286,704	35%	\$33,908,029	-1%
Baltimore ²	0		\$0		\$22,400,000	1%	\$22,400,000	1%
Montgomery ³	0		\$0		\$0	0%	\$0	0%
Prince George's	289,876	8%	\$14,650,761	0%	\$83,385,800	0%	\$98,036,561	4%
Carroll ⁴	0	0%	\$0	0%	\$2,849,042	14%	\$2,849,042	14%
Charles	50,713	0%	\$4,714,488	19%	\$315,550	-50%	\$5,030,038	9%
Frederick	54,456	4%	\$545	2%	\$0	0%	\$545	2%
Harford ⁴	0	0%	\$0	0%	\$7,300,000	-4%	\$7,300,000	-4%
Howard	99,338	-9%	\$9,866,078	2%	\$0	0%	\$9,866,078	2%
Total	954,633	3%	\$85,407,719	1%	\$118,624,671	3%	\$204,032,390	2%

*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 July 1, 2017.
3. Montgomery County was not required to report this information.
4. Carroll and Harford counties do not collect stormwater remediation fees, but do obtain funds through a dedicated property tax or recordation tax, respectively.

Table 8: FY21 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	\$11,245,805	\$6,506,457	\$860,200	\$3,306,917		\$83,374	\$592,698	\$22,595,450
Baltimore City	8,630,882	12,067,289	154,548	1,349,927	1,412,480	200,000	1,426,822	25,241,948
Baltimore Montgomery ⁶	7,861,904	3,322,446	151,680	348,788	0	367,480	0	12,052,298
Prince George's	49,352,931	25,700,000	622,543	3,236,829	5,066,000	900,000	710,000	85,588,303
Carroll	536,953	126,202	2,893	19,155			1,169,829	1,855,031
Charles	2,146,031	1,297,484	85,974	1,800,672	0	70,190	45,539	5,445,891
Frederick ⁷	0	0	0	0	0	0	0	0
Harford	4,690,000	293,000	113,000	973,000	0	0	0	6,069,000
Howard ⁸	14,028,349	1,875,276	303,234	0	0	768,957	311,696	25,394,254
Total	\$98,492,855	\$51,188,154	\$2,294,072	\$11,035,288	\$6,478,480	\$2,390,002	\$4,256,584	\$184,242,176

* 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.
8. Howard County’s total spent included an additional \$8.1M in funds not spent on one of the purposes specified in subsection (h)(4).

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. Maryland's MS4s in aggregate have restored 38,713 acres.

MS4 permits have been reissued for four large MS4s, while permits for one large MS4 and the medium MS4s are administratively continued. MS4s continue to implement restoration practices, utilizing new strategies in accordance with a greater understanding of BMP efficiencies and the processes to steer BMPs through planning, procurement, and construction. Additionally, with new MS4 permits in the future, planned restoration will need to be adjusted to effectively address goals while accounting for long-term bond obligations, and inspection and maintenance costs.

In the FY20 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 (FY21 and FY22). The next FAP submittals to the Department, due in FY23, must show how each jurisdiction can fund 100% of its ISRP requirement for the following 2 years. These FAPs are expected to contain increased BMP implementation and funding, as well as new BMPs, green stormwater infrastructure BMPs, and BMPs with climate resiliency co-benefits.



Photo: "Blue crabs, Bushel basket" by Lisa Jones OC



Photo: MDE



Photo: Micro-bioretenention by MDE

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-bioretenion.

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
CLTM	Conservation Landscaping	Upland
DGI	Elimination of Discovered Nutrient Discharges from Grey Infrastructure	Programmatic
FCO	Forest Conservation	Upland
FTW	Floating Treatment Wetlands	Upland
FPU	Forestation on Pervious Urban (i.e., Forest Planting)	Upland
IMPF	Impervious Surface to Forest (i.e., IMPP + FPU)	Upland
IMPP	Impervious Surface Reduction (i.e., impervious to pervious)	Upland
MSS	Mechanical Street Sweeping	Programmatic
OUT	Outfall Stabilization	In-Stream
RCL	Riparian Conservation Landscaping	Upland
RFP	Riparian Forest Planting	Upland
SDV	Storm Drain Vacuuming (i.e., Storm Drain Cleaning)	Programmatic
SEPC	Septic Connections to Wastewater Treatment Plant (WWTP)	Upland
SEPD	Septic Denitrification	Upland
SEPP	Septic Pumping	Programmatic
SHST	Shoreline Stabilization	In-Stream
SPSD	Dry Channel Regenerative Step Pool Stormwater Conveyance System	In-Stream
STRE	Stream Restoration	In-Stream
STCI	Street Trees	Upland
USRP	Urban Soil Restoration (Compacted Pervious Surfaces)	Upland
USRI	Urban Soil Restoration (Removed Impervious Surfaces)	Upland
UTC	Urban Tree Canopy (i.e., Pervious Turf to Tree Canopy over Turf)	Upland
VSS	Regenerative/Vacuum Street Sweeping (i.e., Advanced 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-Bioretenion	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	Upland
FPER	Perimeter Filter	Upland
FSND	Surface 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	Micro-Pool Extended Detention Pond	Upland
PMPS	Multiple Pond	Upland
PPKT	Pocket Pond	Upland
PWED	Wet Extended Detention Pond	Upland
PWET	Wet Pond	Upland
Wetlands		
WEDW	Extended Detention – Shallow Wetland	Upland
WPKT	Pocket Wetland	Upland
WPWS	Pond Wetland System	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: Calculations

Table 2

Restoration completed was determined by dividing the total acres restored (gathered from FY19 MS4 Annual Reports and data submitted for final permit restoration accounting) by the total updated ISRP Requirement.

Table 3

Restoration completed was determined by dividing the total acres of restored (gathered from FY21 MS4 Annual Reports) by the total updated impervious acre baseline.

Table 5

Restoration projected was determined by dividing the total projected acres of restoration (gathered from the FY20 FAPs) by the total updated impervious acre baseline.

Table 6

Fulfillment of 100% Revenue Requirement for 2-Year Costs = $2\text{-Year Revenue} / 2\text{-Year Costs}$.

Table 7

Percent change from previous FY was determined by dividing the FY21 household or dollar amount by the FY20 household or dollar amount and then subtracting by 1 (i.e., $(\text{FY21 Amount} / \text{FY20 Amount}) - 1$).

BMP Analysis

The pie chart for implemented BMPs was created using the total impervious acres restored during the reported administratively continued permit terms as of FY20. 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.

Appendix C: Additional Tables from BMP Analysis

Table C- 1: Impervious Acres Completed by Upland BMPs

BMP Class	BMP Type	Acres ¹	Cost	Cost/Acre ²	Average Cost/Acre ³	
<i>Alternative Surfaces</i>						
E	AGRE	Green Roof, Extensive	1	\$9,900	\$15,924	\$14,287
E	APRP	Permeable Pavement	37	\$2,535,913	\$67,917	\$234,974
			38	\$2,545,813	\$67,065	
<i>Nonstructural Techniques</i>						
E	NDRR	Rooftop Disconnect	1	\$46,000	\$74,286	\$73,470
E	NDNR	Non-Rooftop Disconnect	2	\$54,000	\$27,667	\$44,140
E	NSCA	Sheetflow to Conservation Area	2	\$-	\$-	\$-
			5	\$100,000	\$20,493	
<i>Micro-Scale Practices</i>						
E	MRWH	Rainwater Harvesting	26	\$554,767	\$21,264	\$15,767
E	MSGW	Submerged Gravel Wetland	36	\$2,542,575	\$70,799	\$38,679
E	MILS	Landscape Infiltration	0.3	\$25,000	\$81,029	\$208,333
E	MIDW	Dry Well	2	\$58,949	\$23,910	\$24,951
E	MMBR	Micro-Bioretenion	97	\$14,772,473	\$151,533	\$130,019
E	MRNG	Rain Garden	147	\$7,527,691	\$51,245	\$48,948
E	MSWG	Grass Swale	66	\$3,828,902	\$58,389	\$152,363
E	MSWB	Bio-Swale	15	\$174,219	\$11,552	\$250,537
E	MENF	Enhanced Filter	1	\$-	\$-	\$-
			391	\$29,484,576	\$75,390	
<i>Ponds</i>						
S	PWED	Wet Extended Detention Pond	1,579	\$38,953,502	\$24,664	\$40,057
S	PWET	Wet Pond	1,772	\$85,659,314	\$48,340	\$105,841
S	PMPS	Multiple Pond	3	\$348,494	\$101,602	\$101,602
S	PPKT	Pocket Pond	0.3	\$-	\$-	\$-
S	PMED	Micro-Pool Extended Detention (ED)	28	\$1,339,916	\$48,151	\$36,713
			3,383	\$126,301,226	\$37,335	

BMP Class	BMP Type		Acres ¹	Cost	Cost/Acre ²	Average Cost/Acre ³
<i>Wetlands</i>						
S	WSHW	Shallow Wetland	692	\$10,993,213	\$15,880	\$25,056
S	WEDW	ED Shallow Wetland	60	\$3,449,072	\$57,052	\$50,472
S	WPWS	Pond/Wetland System	309	\$5,825,226	\$18,863	\$45,884
S	WPKT	Pocket Wetland	42	\$364,010	\$8,750	\$6,236
			1,103	\$20,631,521	\$18,703	
<i>Infiltration</i>						
S	IBAS	Infiltration Basin	84	\$4,076,906	\$48,336	\$52,952
S	ITRN	Infiltration Trench	34	\$1,395,748	\$40,584	\$105,495
			119	\$5,472,654	\$46,090	
<i>Filtering Systems</i>						
S	FBIO	Bioretention	101	\$11,834,322	\$116,642	\$184,183
S	FSND	Surface Sand Filter	694	\$20,884,520	\$30,089	\$14,877
S	FUND	Underground Filter	13	\$2,151,622	\$161,676	\$63,072
			809	\$34,870,464	\$43,111	
<i>Open Channels</i>						
S	ODSW	Dry Swale	13	\$133,900	\$10,390	\$18,342
<i>Other Practices</i>						
S	XDED	Extended Detention Structure, Dry	484	\$24,621,845	\$50,828	\$113,632
S	OTH	Other	1,407	\$1,233,304	\$877	\$30,962
S	REDE	Redevelopment	1,399	\$615,387	\$440	\$569
			3,290	\$26,470,535	\$8,045	
<i>Alternative BMPs</i>						
A	IMPP	Impervious Surface Reduction (i.e., impervious to pervious)	56	\$1,174,266	\$21,136	\$96,161
A	IMPF	Impervious Surface to Forest (i.e., IMPP + FPU)	0.5	\$69,000	\$152,698	\$81,843
A	FPU	Forestation on Pervious Urban (i.e., Forest Planting)	564	\$20,417,789	\$36,195	\$7,644
A	CLTM	Conservation Landscaping	0.02	\$-	\$-	\$-
A	RCL	Riparian Conservation Landscaping	1	\$-	\$-	\$-

BMP Class	BMP Type		Acres ¹	Cost	Cost/Acre ²	Average Cost/Acre ³
A	RFP	Riparian Forest Planting	296	\$1,098,513	\$3,712	\$31,374
A	UTC	Urban Tree Canopy	45	\$701,661	\$15,607	\$6,327
A	GWB	Grass Meadow Buffer	150	\$-	\$-	\$-
A	FCB	Forest Conservation Buffer	2	\$-	\$-	\$-
A	SEPD	Septic Denitrification	793	\$3,341,744	\$4,216	\$564
A	SEPC	Septic Connections to WWTP	556	\$157,780	\$284	\$114
			2,462	\$26,960,753	\$10,951	
Total			11,613	\$272,971,442	\$23,506	

1. Restoration data obtained from FY20 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 included in the cost per acre analysis.
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. Impervious acres treated from BMPs with a cost of \$0 were excluded from the average cost per acre analysis. Therefore, the total impervious acres treated and cost/acre reflect all of the acres treated by a specific BMP type while the average cost per acre represents the cost per acre for only those BMPs with actual costs.
4. Some retrofit and pond upgrade projects were reported as dry extended detention structures.

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

BMP Class	BMP Type		Acres ¹	Cost	Cost/Acre ²	Average Cost/Acre ³
A	OUT	Outfall Stabilization	74	\$7,496,430	\$101,251	\$159,139
A	SPSC	Regenerative Step Pool Storm Conveyance	259	\$17,481,535	\$67,517	\$117,286
A	SHST	Shoreline Management	1,415	\$11,102,549	\$7,845	\$6,694
A	STRE	Stream Restoration	5,516	\$115,260,054	\$20,897	\$32,138
Total			7,264	\$151,340,568	\$20,835	

1. Restoration data obtained from FY20 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 included in the cost per acre analysis.
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. Impervious acres treated from BMPs with a cost of \$0 were excluded from the average cost per acre analysis. Therefore, the total impervious acres treated and cost/acre reflect all of the acres treated by a specific BMP type while the average cost per acre represents the cost per acre for only those BMPs with actual costs.

Table C- 3: Impervious Acres Completed by Programmatic BMPs

BMP Class	BMP Type		Acres ¹	Cost	Cost/Acre ²	Average Cost/Acre ³
A	CBC	Catch Basin Cleaning (i.e., Storm Drain Cleaning)	152	\$4,069,701	\$26,804	\$22,210
A	SDV	Storm Drain Vacuuming (i.e., Storm Drain Cleaning)	372	\$12,342,047	\$33,144	\$39,485
A	MSS	Mechanical Street Sweeping	912	\$8,138,783	\$8,924	\$7,376
A	VSS	Regenerative/Vacuum Street Sweeping (i.e., Advanced Street Sweeping)	4,039	\$28,609,921	\$7,084	\$7,372
A	Trade	Nutrient Credits	1,811	\$18,000	\$10	\$30
A	DGI	Elimination of Discovered Nutrient Discharges from Grey Infrastructure	437	\$-	\$-	\$-
A	SEPP	Septic Pumping	802	\$387,967	\$484	\$1,140
Total			8,525	\$53,566,419	\$6,284	

1. Restoration data obtained from FY20 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 included in the cost per acre analysis.
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. Impervious acres treated from BMPs with a cost of \$0 were excluded from the average cost per acre analysis. Therefore, the total impervious acres treated and cost/acre reflect all of the acres treated by a specific BMP type while the average cost per acre represents the cost per acre for only those BMPs with actual costs.

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